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AI for Sustainable Development in ASEAN (AISDA): Strengthening evidence toward promoting responsible, safe and inclusive AI to support sustainable development in Southeast Asia education

D4 – Final Report

April 2025

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9 April 2025

Ref: AISDA/FCDO/D4

To: UK Mission to ASEAN (UKMis ASEAN), Jakarta, and the South & Southeast Asia Research Hub (SSEARIH), FCDO

Cc: Fund Manager of the AI for Sustainable Development in ASEAN (AISDA) Strengthening evidence toward promoting responsible, safe and inclusive AI to support sustainable development in Southeast Asia Education Project

D4 – Final Report – "AI for Sustainable Development in ASEAN (AISDA) Strengthening evidence toward promoting responsible, safe and inclusive AI to support sustainable development in Southeast Asia Education"

We refer to the contract between Pricewaterhouse Coopers Services Limited and Ernst & Young Vietnam Limited (collectively "EY" or "we"), through which EY teams have been engaged as the Consultant for the Project "AI for Sustainable Development in ASEAN (AISDA) Strengthening evidence toward promoting responsible, safe and inclusive AI to support sustainable development in Southeast Asia Education." As part of the engagement, EY teams have prepared this Final Report dated 27 March 2025 (the "Final Report" or "Report").

Purpose of the Report and restrictions on its use

This Report was prepared on the instructions under the Contract solely to (i) share approach and methodology for executing this study, (ii) present a summary of the challenges and issues in AI adoption in education and lessons learned across nine (09) Southeast Asian countries identified from our secondary research, key informant interviews and consultative meetings, and (iii) identify potential action points to unlock opportunities across (09) Southeast Asian countries in AI adoption in education, and the Report must not be relied upon for any other purpose. In carrying out our work and preparing this Report, we have worked solely on these instructions and for this purpose.

Limitations of this Report

This Report may only be relied upon by the UK Mission to ASEAN (UKMis ASEAN), Jakarta, the South & Southeast Asia Research Hub (SSEARIH), FCDO and Fund Manager of the project pursuant to the terms in the signed contract. Any decisions taken by you should take into account the limitations of the scope of our work and other factors that you should be aware of from sources other than our work.

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This Report may not have considered issues relevant to any other party. Any use that any other party chooses to make of this Report is entirely at its own risk, and we will have no responsibility whatsoever in relation to any such use.

You can contact Long Viet Nguyen at +84 24 3211 6177 or send an e-mail to long.viet.nguyen@vn.ey.com for discussion of the Report.

Yours sincerely,

Nguyen Viet Long

Deputy General Director

Ernst & Young Vietnam Limited

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Abbreviations

AI	Artificial intelligence
AISDA	AI for Sustainable Development in ASEAN
AR	Augmented reality
ASEAN	Association of Southeast Asian Nations
EU	European Union
FCDO	Foreign, Commonwealth and Development Office
GESI	Gender equality and social inclusion
GPU	Graphics processing unit
HPC	High-performance computing
ICT	Information and communication technology
LLM	Large language model
MOU	Memorandum of understanding
NGO	Non-governmental organization
NLP	Natural language processing
ODA	Official development assistance
OECD	Organization for Economic Co-operation and Development
PwD	Persons with disabilities
SEAMEO	Southeast Asia Ministers of Education Organization
MSMEs	Micro, small and medium enterprises
STEAM	Science, technology, engineering, art and mathematics
STEM	Science, technology, engineering, and mathematics
TVET	Technical and vocational education and training
UN	The United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children’s Emergency Fund
VR	Virtual reality
WPs	Work packages

XR	Extended reality
R&D	Research and development
SDG	Sustainable development goal
EdTech	Education technology

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Executive summary

This report is part of the United Kingdom's (UK) expansion of the AI for Development (AI4D) program, which aims to support responsible Artificial intelligence (AI). This initiative was announced by the UK and its partners at the AI Safety Summit (AISS). The study's goal is to identify potential interventions that the UK could support, in alignment with the UK Foreign, Commonwealth & Development Office (FCDO) priorities, to promote responsible, safe, and inclusive AI in the education sector across nine ODA-eligible countries in Southeast Asia. These countries include Indonesia, the Philippines, Malaysia, Cambodia, Vietnam, Thailand, Lao PDR, Timor-Leste, and Myanmar.

The study aims to pinpoint AI-based research and development (R&D) investment opportunities that are actionable, innovative, and scalable, helping those Southeast Asian countries achieve their Sustainable development goals (SDGs). It will focus on key enabling pillars such as Responsible governance, Talent and skills, Data, Computing, Innovation, and Scaling.

This report consists of the following sections:

- The definition of "responsible, safe, inclusive" AI for the purpose of the report
- An analysis of AI applications in education in nine Southeast Asian countries:
  - Overview of current AI-related strategies and policies in education
  - Stakeholders involved in the development and implementation of AI application in education, including government agencies, academia, and the private sector
  - AI applications in education
  - Summary of challenges/issues in AI adoption and lessons learned across nine Southeast Asian countries
- Recommendations on potential action points and actionable areas to address the challenges/issues in AI applications in education across nine Southeast Asian countries:
  - Recommendations on potential action points and priorities that could be invested in by the UK and other dialogue/development partners to further promote responsible, safe and inclusive AI in education in nine Southeast Asian countries
  - A list of proposed action points at the Association of Southeast Asian Nations (ASEAN)-level and country-level which consist of actionable areas, potential counterparts, and use cases

To compile this report, the study team conducted desk research by reviewing publicly available materials including reports and articles and held key informant interviews and consultative meetings from January to February 2025. Appendix 4 contains a comprehensive list of stakeholders consulted for the study.

1. Context of AI applications in education in nine Southeast Asian countries

AI-related strategies and policies differ across countries. Countries such as Indonesia, the Philippines, Malaysia, Vietnam, and Thailand have defined the contents regarding AI in education as a part of national AI strategies. The remaining countries do not have specific AI strategies; instead, AI is mentioned in their national digital strategies. All studied countries lack clear regulations and guidelines for responsible AI use, as well as a dedicated AI policy for education.

Most of the studied countries, except Thailand,[1] have not established national government agencies for AI governance. In the nine studied countries, responsibilities for the development and implementation of AI in education are distributed across various ministries. Ministries responsible for technology, science, or digital primarily issue and govern national AI strategies, while ministries responsible for education are focusing on AI in education. It is noted that in some countries, such as Indonesia and Malaysia, education is managed by different ministries.

Academia and private sector play a crucial role in promoting AI applications in education. Academic institutions nurture AI talent through the integration of AI contents into curricula, offering specialized courses, establishing AI laboratories, and fostering partnerships between the public and private entities. The private sector facilitates AI development by providing educational applications, collaborating on skill development initiatives, investing in infrastructure, and offering financial support for startups.

The education technology (EdTech) market in nine Southeast Asian countries comprises both domestic and international providers. Countries such as Thailand, Vietnam, Malaysia, Indonesia, and the Philippines feature a mix of local and international providers. In contrast, Timor-Leste, Myanmar, and Lao PDR primarily rely on international providers. AI applications in education are categorized by end-users, including tools for learners (e.g., study tools and virtual tutors), educators (e.g., content creation), administrators (e.g., academic integrity and educational administration), and others (e.g., research and information). Among these, the most popular AI applications are study tools and virtual tutoring.[2]

AI-enabled applications for persons with disabilities (PwDs) offer popular features such as speech recognition tools for students with dyslexia and sign language translation services for hearing-impaired individuals. Examples include translating Khmer or English into Khmer Braille to assist blind or visually impaired students in Cambodia, and the AI-assisted Vietnamese Sign Language Bi-directional Translator in Vietnam.

[1] Thailand has formed a National AI Committee and Subcommittees comprising representatives from both the public and private sectors to oversee the implementation of its national AI strategy.
[2] "Generative AI in education: Summary of EdTech landscape 2024," *EY*, 2024.

However, these AI applications for PwDs are limited and often remain in the prototype stage.

2. Challenges/issues in AI adoption in nine Southeast Asian countries

The development and implementation of AI in education in nine Southeast Asian countries face significant challenges that impact the possibility of achieving the objective of "responsible, safe, inclusive" AI, including:

- Limited digital literacy and AI usage skills among educators and students
- Shortage of AI talent in developing AI applications due to a lack of AI-related specialized courses at universities and qualified teachers
- Lack of high-quality datasets in local languages to train AI
- Limited access to public and open high-performance computing infrastructure for researchers and innovators
- Absence of national policies or guidelines for the responsible and safe use of AI in education
- Limited integration of AI in government education management and public service delivery
- Limited number of commercially available AI applications for people with disabilities
- Digital divide by geographical areas and by gender, hindering equal accessibility to AI-related technologies
- Gender gaps persist in STEM (including ICTs) education and employment
- Lack of coordination between public and private stakeholders in AI research and innovation
- Limited financial support and technical support for startups to promote AI innovation

3. Recommendations on potential action points to unlock opportunities across nine Southeast Asian countries

Based on the analysis of the challenges/issues, gaps and leading practices reviews, as well as review the action points and use cases of the countries in the region, the study team proposes 15 potential action points to address these challenges. These action points are applicable to any of the nine Southeast Asian countries. They are categorized into two groups - high priority and low priority - depending on the assessment of their impact and the effort required for implementation.

There are 12 action points which have consistent ratings across all studied countries. Among these, nine classified as high priority and three as low priority. The classification of the remaining three action points varies depending on the group of countries, which are defined based on Government AI Readiness Index.[3]

[3] "Government AI Readiness Index 2024," *Oxford Insight*, https://oxfordinsights.com/ai-readiness/ai-readiness-index/, accessed 3 March 2025.

In conclusion, the integration of AI in the education sector across Southeast Asia presents both significant opportunities and formidable challenges. The proposed action points, categorized into high and low priority, would help enhance AI capabilities and address existing gaps in digital literacy, infrastructure, and policy frameworks. The relevant use cases for action points are described in detailed sections, which the UK FCDO could consider for potential collaboration.

Disclaimers

The information presented in this report has been compiled from various sources, including reputable publications, industry reports, articles, newspapers, and other publicly accessible sources, as well as validated through key informant interviews and consultative meetings conducted from January to February 2025. The information has been reviewed and validated to the best of our ability. The accuracy is dependent on the reliability of the original sources and may be subject to change as new information becomes available.

Due to the extensive research on the application of AI in education across nine Southeast Asian countries, along with the rapid development of AI applications and initiatives aimed at promoting responsible, safe, and inclusive AI in education, this report does not capture all the promising AI applications and initiatives. It is probable that there are further applications and initiatives in nine Southeast Asian countries that have not yet shown evidence of effectiveness or have not been officially published or are only available in local languages rather than English. Therefore, the list of AI applications and use cases in this report is not exhaustive but serves as illustrative examples.

Acknowledgements

This study is part of the project “AI for Sustainable Development in ASEAN (AISDA): Strengthening evidence toward promoting responsible, safe and inclusive AI to support sustainable development in Southeast Asia Education.”

The study was supported by South and Southeast Asia Research and Innovation Hub (SSEARIH), Foreign, Commonwealth & Development Office (FCDO), Government of UK. However, the views expressed herein do not necessarily reflect the official policies of Government of UK.

A diverse group of experts, stakeholders, and representatives from nine Southeast Asian countries contributed invaluable insights, including researchers, industry professionals, non-governmental organizations, and government officials from the region.

For any queries related to the study, please reach out to the designated contacts from the FCDO: Rizky Januar (rizky.januar@fcdo.gov.uk) and Jeremie Credo (jeremie.credo@fcdo.gov.uk), Ernst & Young Vietnam Limited: Long Viet Nguyen (long.viet.nguyen@vn.ey.com) and Vy Ha Tran (vy.ha.tran@vn.ey.com).

Section A: Research methodology

This study is conducted using both primary and secondary data.

For primary research: this has been done through consultative meetings and key informant interviews to understand the strategies and directions, challenges and issues in AI development and implementation, and any initiatives. The stakeholder list covers representatives from both public and private sectors.

For secondary research: the study team has performed desk research to collect information from different sources, including institutional research, articles, reports, and reputable data providers. To identify resources and search for literature and data for our analysis, the team uses the following approach:

- **Step 1 - Identification:** Search for materials on public and EY's internal sources, including:
  - Publications
  - Reports
  - Articles
  - Newspapers
  - Other publicly accessible sources
  - Duplicated sources will then be removed
- **Step 2 - Screening:** Based on the identified articles/reports from Step 1, screen and filter by title and abstract/executive summary
- **Step 3 - Eligibility:** Review the articles in full text to exclude the remaining documents that are not within the scope of this study. The data collected through secondary research is validated through consultative meetings and key informant interviews

Section B: Definitions

For the purposes of this report, we have defined “responsible”, “safe”, and “inclusive” AI as follows.

“Responsible AI”

“Responsible AI” is defined as “machine-based systems that are designed and developed in a fair, unbiased, ethical, safe, and trustworthy manner and implemented in a transparent, accountable, reliable, and inclusive manner, adhering to national, regional, and international governance frameworks.”[4]

“Safe AI”

“Safe AI” encompasses both safety and security aspects. Safety refers to “ensuring the safety of developers, deployers, and users of AI systems by conducting impact or risk assessments and ensuring that known risks have been identified and mitigated.” Security refers to “ensuring the cybersecurity of AI systems, which includes mechanisms against malicious attacks specific to AI such as data poisoning, model inversion, tampering of datasets, Byzantine attacks in federated learning, as well as other attacks designed to reverse engineer personal data used to train the AI.”[5]

This report focuses on the extent to which researchers and developers are ensuring and being transparent about the safety and security of AI systems, thereby ensuring the safety of users of AI systems.

“Inclusive AI”

Inclusion in education is defined by UNESCO as “an on-going process aimed at offering quality education for all while respecting diversity and the different needs and abilities, characteristics, and learning expectations of students and communities, eliminating all forms of discrimination.”[6]

In this study, the research team focuses on “inclusive AI in education” as ensuring the accessibility of AI in education for all, especially for women and PwDs. This is analysed from the perspectives of government policies, AI applications, and skill development for users of AI applications.

[4] For the purposes of this report, we have provided a definition for "Responsible AI" with reference to the guiding principles outlined in the ASEAN Guide on AI Governance and Ethics, available at ASEAN Guide on AI Governance and Ethics - ASEAN Main Portal
[5] Ibid.
[6] “Defining an Inclusive Education Agenda: Reflections around the 48th session of the International Conference on Education,” *UNESCO*, 2009.

Section C: Analysis of AI applications in education in nine Southeast Asian countries

I. Overview of current AI-related strategies and policies in education

In nine Southeast Asian countries, AI-related strategies and policies are at different stages of development. Some countries prioritize AI in education through national strategies and, including Indonesia, the Philippines, Malaysia, Vietnam, and Thailand. In contrast, Cambodia, Lao PDR, Timor-Leste, and Myanmar primarily focus on digital policies rather than AI-specific policies.

Through desk research and consultation meetings, governments in the nine Southeast Asian countries acknowledge the potential of AI in education but have not yet developed clear regulations and guidelines on responsible AI use in education. Currently, no country has dedicated AI policies and regulations for education. Instead, AI is governed by existing policies and regulations concerning data protection, cybersecurity, intellectual property, investment promotion, innovation and R&D, and talents and skills development.

The table below provides an overview of the AI-related strategies and policies in education in the selected countries.

Table 1: Overview of the AI-related strategies and policies, both broadly and within the education sector

Country	National AI strategy	Guidelines and regulations on ethics/ responsible AI	AI in education: Focus area in strategies/ roadmap[7]	Policies and regulations related to AI	
				Promotion policies (Investment promotion, innovation and R&D, talent and skills development)	**Risk mitigation policies** (Data protection and privacy, cybersecurity, copyright and intellectual property)
Indonesia	✓	✓	✓	✓	✓
Philippines	✓	-	✓	✓	✓
Malaysia	✓	✓	✓	✓	✓
Cambodia	-	-	-	✓	✓
Vietnam	✓	✓	✓	✓	✓
Thailand	✓	✓	✓	✓	✓

[7] The strategies, policies, or roadmaps for AI application in education have not been issued separately in the nine Southeast Asian countries. However, they are mentioned as a focus area in the national AI strategies.

Country	National AI strategy	Guidelines and regulations on ethics/ responsible AI	AI in education: Focus area in strategies/ roadmap[7]	Policies and regulations related to AI	
				Promotion policies (Investment promotion, innovation and R&D, talent and skills development)	**Risk mitigation policies** (Data protection and privacy, cybersecurity, copyright and intellectual property)
Lao PDR	-	-	-	✓	✓
Timor-Leste	-	-	-	✓	Lack of Cybersecurity Law
Myanmar	-	-	-	✓	✓

II. Government agencies, academia, and private sector

1. Government agencies

Most studied countries do not have national government agencies or regulators for the development and governance of AI, except for Thailand. Thailand has established a National AI Committee and Subcommittees comprising representatives from both the public and private sectors to oversee the implementation of its national AI strategy.

In the nine studied countries, responsibilities for the development and implementation of AI in education are distributed across various ministries. Ministries responsible for technology, science or digital primarily issue and govern national AI strategies, while the ministries responsible for education are specifically responsible for AI in education. Below is a summary of key agencies involved.

Table 2: Overview of the AI-related government agencies

Country	Responsible agencies for digital and technology strategy	Responsible agencies for AI in education	Other relevant agencies
Indonesia	The Ministry of Communication and Digital (KOMDIGI, formerly known as KOMINFO)	▪ Ministry of Higher Education, Science and Technology ▪ Ministry of Primary and Secondary Education ▪ Ministry of Manpower	▪ National Research and Innovation Agency (BRIN): Coordinate and managing research, technology, and innovation activities ▪ Collaborative Research and Industrial Innovation in AI (KORIKA): Implementing AI research and innovation collaboration ecosystem
Philippines	Department of Trade and Industry	▪ Department of Education ▪ Commission on Higher Education	▪ Department of Science and Technology: Oversee councils and institutes supporting AI initiatives ▪ Department of Information and Communications Technology: Issue

Country	Responsible agencies for digital and technology strategy	Responsible agencies for AI in education	Other relevant agencies
			policies and initiatives supporting the development of AI
Malaysia	Ministry of Science, Technology, and Innovation	▪ Ministry of Higher Education ▪ Ministry of Education ▪ Ministry of Human Resources	▪ Ministry of Digital: Lead digital transformation efforts ▪ Malaysia Digital Economy Corporation: Support MOSTI ▪ National AI Office (NAIO): Accelerate AI adoption, foster innovation, and ensure ethical development of AI
Cambodia	Ministry of Industry, Science, Technology & Innovation	▪ Ministry of Education, Youth and Sport ▪ Ministry of Labor and Vocational Training	Ministry of Posts and Telecommunications: Issue policies on personal data protection
Vietnam	Ministry of Science and Technology	Ministry of Education and Training	
Thailand	National AI Committee	▪ Ministry of Higher Education, Science, Research, and Innovation ▪ Ministry of Education	▪ National Science and Technology Development Agency: Ensure ethical development and use of AI ▪ Digital Economy Promotion Agency: Develop digital skills for Thai citizens ▪ Office of the National Digital Economy and Society Commission: Oversee Draft Royal Decree on Business Operations that Use Artificial Intelligence Systems

Country	Responsible agencies for digital and technology strategy	Responsible agencies for AI in education	Other relevant agencies
Lao PDR	Ministry of Technology and Communications	The Ministry of Education and Sports	
Timor-Leste	Ministry of Transport & Communications	▪ Ministry of Higher Education, Science and Culture ▪ Ministry of Education	Agency of Technology, Information and Communication Timor (TIC TIMOR): Govern and develop ICT infrastructure
Myanmar	Ministry of Transport & Communications	Ministry of Education	Ministry of Science and Technology: Advance scientific research and technological innovation

2. Academia

Academia encompasses both public and private universities and institutions that are dedicated to the education, research, and dissemination of knowledge related to AI. These institutions play a crucial role in developing AI talents through the integration of AI contents into curricula and offering specialized courses overing various aspects of AI (e.g., Chulalongkorn University, Mahidol University, King Mongkut's Institute of Technology Ladkrabang in Thailand, University of the Philippines, polytechnics and community colleges in Malaysia).

To ensure the AI curriculum remains current, these institutions are actively collaborating with international academia and industry partners. Furthermore, many universities and institutions across the nine Southeast Asian countries offer targeted training programs for both students and educators, aimed at enhancing digital literacy and AI competencies.

In addition to talents and skills development, universities and institutions are establishing AI labs and research centres (e.g., AI4LIFE Institute of Hanoi University of Science and Technology, Centre for Artificial Intelligence and Robotics (CAIRO) at Universiti Teknologi Malaysia, Tokopedia-UI AI Centre for Excellence - Universitas Indonesia, Cambodia Academy of Digital Technology). These facilities provide the necessary tools and environments for students and researchers to collaborate on cutting-edge projects, explore emerging technologies, and contribute to the advancement of AI. They also have various programs to collaborate with international universities and industries to enhance research capabilities.

Some institutions such as University of the Philippines and VinUniversity in Vietnam have developed guidelines and ethical frameworks for AI to ensure that its development and implementation are beneficial and responsible. Additionally, several institutions have created their own AI tools to enhance teaching and learning experiences, streamline administrative processes, and provide personalized support to students. Notable examples include the A1CE platform developed by CMKL University, which assists students in managing their individualized study plans, and the ChulaGENIE platform developed by Chulalongkorn University in collaboration with a major technology provider, which facilitates sophisticated research and content generation across multiple languages.

3. Private sector

The EdTech market in nine Southeast Asian countries is growing rapidly, encompassing both local and international providers. Countries such as Thailand, Vietnam, Malaysia, Indonesia and the Philippines feature a combination of local and international providers. There are some local providers making notable advancements in providing AI-enabled applications in education, including Ruangguru, CoLearn (Indonesia), Pandai Education (Malaysia), Frontlearners (Philippines), Educa Corporation, and ELSA (Vietnam). Timor-Leste, Myanmar, and Lao PDR, on the other hand, primarily depend on international providers for their educational technology needs. Some key international players in the market include Duolingo, Coursera, Turnitin, and Udemy.

In addition to EdTech companies, major tech firms are actively collaborating with academia institution across Southeast Asian countries to provide skills development programs. They engage in initiatives that promote AI adoption and invest in essential infrastructure and resources such as data centres and cloud computing services (e.g., Microsoft’s AI TEACH). Furthermore, these companies provide funding and investment to support AI startups, fostering a vibrant ecosystem for AI growth.

III. AI applications in education

AI-enabled applications could be categorized by end-users, including tools for learners (e.g., study tools and virtual tutors), educators (e.g., content creation), administrators (e.g., academic integrity and educational administration), and others (e.g., research and information). According to consultation results, the most popular AI-enabled applications used in nine Southeast Asian countries are ChatGPT, GitHub Copilot, and other Generative AI (GenAI) applications, which could be used by all stakeholders to provide information on a wide range topics, generate content, or summarize long text.

Some common AI-enabled applications offered by local providers are personalized study tools (e.g., Ruangguru, Pandai) that enhance learning experiences through providing tailored content to individual student needs. There are also virtual tutoring tools (e.g., ELSA, CoLearn) that offer features such as language learning, homework assistance, and instant solutions. Additionally, AI applications are utilized for streamlining administrative tasks, generating educational content, and enhancing workforce management.

Some notable AI applications in education across the selected countries are detailed in Table 3. The applications have been collated using the following criteria:

- Alignment with investment trends: The applications align with the investment trends in generative AI tools over the last two years (2022-2023), according to an EY report, as illustrated in Figure 1 in Appendix 2. Specifically, AI applications for learners (including study tools, virtual tutors, and workforce development tools) and educators (education content creation) were the most attractive to investors.
- Inclusiveness: The applications aim to remove barriers to education access for PwDs.
- Relevance to nine Southeast Asian countries' context: The applications have been used in at least one of nine Southeast Asian countries.

Table 3: Notable AI applications in education across the selected countries[8]

Application	Use case	Descriptions
Ruangguru	Personalized learning system	**Suppliers/Developers:** PT Ruang Raya Indonesia **Target users:** Students, teachers, parents, and businesses, in which students are the focus **Application details:** The application offers a variety of technology-driven educational services, including virtual classrooms, online exam platforms,

[8] Further in-depth analysis is required for any investment decisions regarding these applications, including but not limited to various due diligence by the product developers to ensure feasibility, viability, scalability and at the same time adapting the requirements of the responsible, safe, and inclusive AI principles.

Application	Use case	Descriptions
		subscription-based learning videos, etc. In 2022, it introduced AdaptoX, which combines interactive games and simulations with educational videos, enabling students to learn at their own pace through tailored lessons and gamified content. It develops the adaptive learning feature that can suit learners' level of understanding, which has succeeded in increasing student learning time by up to 86%.[9]
ELSA Speak	Virtual tutor tool	**Suppliers/Developers:** ELSA **Target users:** English learners worldwide, especially those looking to improve their pronunciation and communication skills **Application details:** ELSA Speak, launched in 2015, is a Personal AI-enabled English-speaking coach that allows users to speak in free-flowing, spontaneous, and engaging real-life conversations on any topic or scenario. It has 13 million of users worldwide and has received numerous awards and accolades for its innovative approach to language learning.[10]
Edusuite	Streamlining administration tasks	**Suppliers/Developers:** Edusuite Inc. **Target users:** Administrators, faculty, teachers, students, and parents **Application details:** Edusuite delivers versatile solutions to meet the varied needs of educational institutions. The platform's cloud-based system allows students to select courses with real-time availability updates, streamlining registration and fee payments. Edusuite's integration of AI and smart algorithms enables schools to optimize resources and make informed decisions. By 2020, Edusuite was serving over 25,000 students across more than 10 institutions, including Ateneo High School, CIIT College of Arts and Technology, and Benedictine International School, etc.[11]
Hear Me	AI applications	**Suppliers/Developers:** Universiti Malaysia Pahang **Target users:** Teachers and students with hearing disabilities

[9] "AdaptoX, an Interactive Game in the Midst of Super Fun Learning Videos!," *Ruangguru website*, https://www.ruangguru.com/blog/fitur-adaptox-ruangbelajar, 8 July 2022.
[10] "ELSA Speak," *ELSA*, https://vn.elsaspeak.com/en/homepage/, accessed 11 February 2025.
[11] "PH educ startup touts AI-powered school management system," *Newsbytes.PH*, https://newsbytes.ph/2020/07/30/ph-educ-startup-touts-ai-powered-school-management-system/, 30 July 2020.

Application	Use case	Descriptions
	in education for PwDs	**Application details:** In 2021, researchers from Universiti Malaysia Pahang developed an app called Hear Me, designed as a teaching tool for teachers and students with hearing disabilities to learn Manually Coded Malay (BMKT). The Hear Me app includes AI capabilities and various other features. The AI feature allows the app to recognize objects from pictures taken and convert them into the correct hand signal codes. Additionally, the app offers various interactive activities to aid the learning process, such as short answer exercises, fill-in-the-blank tasks, and matching activities.[12]
ChulaGENIE	Content creation	**Suppliers/Developers:** Chulalongkorn University **Target users:** Chulalongkorn University's faculty, staff, and students **Application details:** In January 2025, Chulalongkorn University introduced ChulaGENIE (Chula's Generative AI Environment for Nurturing Intelligence and Education). This initiative aligns with the university's strategy to prepare students and educators for AI-enabled transformations in the job market. A standout feature is its ability to not only answer questions but also provide tailored recommendations.[13] By 2025, the university envisions offering ChulaGENIE as a public service.[14]
Cakap	Workforce development tool	**Suppliers/Developers:** PT Cerdas Digital Nusantara **Target users:** Students, teachers, parents, and businesses, in which students are the focus **Application details:** Cakap is a leading Indonesian education platform leveraging technology to deliver high-quality courses, reputable certifications, and impactful upskilling opportunities. Utilizing AI-driven assessments and adaptive learning, Cakap improves engagement and accessibility for Indonesia's upskilling requirements through mobile and web applications.[15] Cakap's core offerings are tailored to diverse

[12] "Dr. Diyana creates Hear Me app to assist students with special needs", *Universiti Malaysia Pahang Al-Sultan Abdullah*, https://news.umpsa.edu.my/research/dr-diyana-creates-hear-me-app-assist-students-special-needs, 15 July 2021.
[13] "Chula embraces AI future with ChulaGENIE, its own gen-AI platform," *The Nation*, https://www.nationthailand.com/business/tech/40043692, 28 November 2024.
[14] "New Thai AI Platform ChulaGENIE Debuts at Chulalongkorn University," *Khaosod English*, https://www.khaosodenglish.com/net/2025/01/13/new-thai-ai-platform-chulagenie-debuts-at-chulalongkorn-university/#google_vignette, 13 January 2025.
[15] "Cakap," *Mandiri Capital*, https://mandiri-capital.co.id/portfolio/cakap, accessed 13 January 2025.

Application	Use case	Descriptions
		audiences, including Cakap Upskill that offers practical and vocational skills programs aligned with current job market demands and post-pandemic needs. By July 2024, Cakap had introduced an AI-driven image enhancement solution called Pixel, developed in collaboration with South Korea's 4by4 Inc, which improves the visual quality of its online learning content, enhancing the overall experience for users.[16]

AI-enabled applications for PwDs offer popular features, such as speech recognition tools for students with dyslexia and sign language translation services for hearing-impaired individuals. Nonetheless, the number of AI applications for PwDs in education remains limited. Many applications were developed for competitions, like the AI-enabled deaf assistance tool and AI-enabled sign & speech translator from the Microsoft AI4A Hackathon in Malaysia[17] and the AI-assisted Vietnamese Sign Language Bi-directional Translator by the AI4LIFE Institute of the Hanoi University of Science and Technology in Vietnam.[18] However, these applications have not progressed beyond the prototype stage, and there are currently no known plans for their commercialization or broader implementation.

[16] "S.Korea's 4by4 to supply AI solution to Cakap," *The Korea Economic Daily*, https://www.kedglobal.com/artificial-intelligence/newsView/ked202407110009, 11 July 2024.
[17] "Microsoft hosts first AI for accessibility hackathon in Malaysia and Asia Pacific," *Microsoft Malaysia News Center*, https://news.microsoft.com/en-my/2019/11/07/microsoft-hosts-first-ai-for-accessibility-hackathon-in-malaysia-and-asia-pacific/, 7 November 2019.
[18] Based on data and information collected from desk research and key informant interviews and consultative meetings.

IV. Summary of challenges/issues in AI adoption in education and lessons learned across nine Southeast Asian countries

This section provides a detailed explanation of each challenge, arranged in order from the most prevalent to the least common,[19] across nine Southeast Asian countries.

1. Limited digital literacy and AI usage skill among educators and students

The lack of digital skills among educators and students is a common challenge in the nine countries, potentially hindering their ability to utilize technology in education effectively. Most countries have launched various policies and initiatives to develop educators' and students' digital skills, including but not limited to: (i) national programs for developing digital skills for the public (e.g., Indonesia), (ii) issuing guidelines on the use of ICT in the K-12 education program (e.g., the Philippines), (iii) developing frameworks for integrating digital skills into educator training and national curricula (e.g., Vietnam, Thailand, Indonesia), and (iv) education ministries partnering with big tech companies to provide digital skill training to educators (e.g., Malaysia).

Particularly, the shortage of educators' training in developing skills for using AI applications is a significant issue. While there are some initiatives for developing AI skills for a wide range of audiences (e.g., AI skills development course for all Filipinos provided by big tech company,[20] "AI for All Thais" vision of Microsoft Thailand[21]), the number of initiatives specifically aimed at developing skills for using AI applications for educators and students is quite limited.

A notable program is Vietnam's development of an AI competency framework for students, which is a collaboration between the Vietnam Ministry of Education and Training's Institute of Educational Sciences (VNIES) and the United Nations International Children's Fund (UNICEF).[22] Other notable initiatives include the 'Train the Trainers - AI Summer Camp' initiated by STEAM for Vietnam, AI Teach for Indonesia, Thailand's "MHESI for AI" policy,[23] and Malaysia's DELIMa Certification Program.

There is limited information on the current state of initiatives to PwDs with skills to use AI applications. The identified initiatives largely focus on enhancing a broad spectrum of essential digital skills, including cybersecurity awareness, for PwDs. Examples include

[19] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[20] "Google Philippines launches free AI skills development course," *The Philippine Star*, https://www.philstar.com/headlines/2023/09/28/2299531/google-philippines-launches-free-ai-skills-development-course, 28 September 2023.
[21] "Microsoft Unveils "AI for All Thais" Vision, Empowering Thais with AI through Skill, Scale, and Secure," *Microsoft*, https://news.microsoft.com/th-th/2024/08/29/microsoft-unveils-ai-for-all-thais-vision-empowering-thais-with-ai-through-skills-scale-and-secure/, 29 August 2024.
[22] "Consultation on Artificial Intelligence Competency Framework for High School Students," *Bao Giao duc & Thoi dai*, https://giaoducthoidai.vn/tham-van-khung-nang-luc-tri-tue-nhan-tao-cho-hoc-sinh-pho-thong-post704866.html, 16 October 2024.
[23] "Thailand intensifies AI policy to transform economy," *Vietnam Investment Review*, https://vir.com.vn/thailand-intensifies-ai-policy-to-transform-economy-111562.html, 31 May 2024.

Indonesia's Jamboree for Children and Youth with Disabilities project[24] and the Philippines's Department of Education and Department of Information and Communications Technology's programs.[25]

2. Shortage of AI talents and challenges related to the availability of AI-related specialized courses at universities and qualified instructors

The shortage of AI professionals hinders the development and application of AI in the education sector. This is largely due to a lack of qualified instructors and limited AI course offerings, as observed in Vietnam, Cambodia, Lao PDR, Myanmar and Timor-Leste. There is a need for support in developing or enhancing specialized courses on AI in countries such as Lao PDR and Vietnam. Although some universities in the remaining countries have had AI-specialized courses (e.g., Universitas Indonesia, CMKL University), the quality of instructors and the AI course offerings need further consideration to enhance.

Indonesia and Vietnam are having various initiatives to develop AI talents through collaboration between the governments and industries, for example: Build for the AI future program in Vietnam,[26] the Pre-Employment Card Program Implementation Management in Indonesia.[27]

In Philippines, the initiative Community Learning Centres has been implemented to equip women, especially in underserved areas, with AI and data skills, providing jobs and livelihood opportunities.[28]

In addition, several universities included in the study are actively enhancing AI education through initiatives like the "Train-the-Trainer" model, used in the collaboration between Duy Tan University (Vietnam) and Carnegie Mellon University (The US) to transfer AI training programs.[29]

[24] "Technology in education: a case study on Indonesia," *UNESCO*, 2023.
[25] "Digital Literacy Training for PWDs in the Philippines," *OpenGov Asia*, https://opengovasia.com/2022/09/26/digital-literacy-training-for-pwds-in-the-philippines/, 26 September 2022.
[26] "NIC, Google launch 'Build for the AI Future' initiative to propel AI development in Việt Nam," *Viet Nam News*, https://vietnamnews.vn/economy/1659103/nic-google-launch-build-for-the-ai-future-initiative-to-propel-ai-development-in-viet-nam.html, 11 July 2024.
[27] "Prakerja and Microsoft Launch Talenta AI Indonesia Program to Empower 100,000 Youths with AI Skills," *Microsoft*, https://news.microsoft.com/id-id/2023/09/14/prakerja-and-microsoft-launch-talenta-ai-program-to-empower-100000-indonesian-youths-with-ai-skills/, 14 September 2023.
[28] "Digital Literacy Training for PWDs in the Philippines," *OpenGov Asia*, https://opengovasia.com/2022/09/26/digital-literacy-training-for-pwds-in-the-philippines/, 26 September 2022.
[29] "18 Duy Tan University lecturers attend Artificial Intelligence training course at Carnegie Mellon University (CMU, USA)," *Tien Phong*, https://tienphong.vn/18-giang-vien-dh-duy-tan-tham-gia-khoa-tap-huan-ve-tri-tue-nhan-tao-tai-dh-carnegie-mellon-cmu-my-post1571109.tpo, 22 September 2023.

3. Lack of high-quality datasets in local languages to train AI models

Countries in the region share the common challenge of having a limited number of high-quality datasets in local languages, especially a very limited number of datasets in ethnic minority languages. Most developers tend to rely on datasets in other languages, predominantly English. In Vietnam, Indonesia, Thailand, and Malaysia, the number of datasets in local languages is higher than in other countries.

Another challenge is that the use of datasets in education for training AI applications raises significant concerns, particularly regarding student privacy and intellectual property rights. Effective resolution requires clear data governance policies, which are currently lacking in many Southeast Asian countries.

The target to develop open-data sources is outlined in the national strategies of countries such as Malaysia, Vietnam, Thailand, and Indonesia. Lao PDR also seeks to promote open data. In Vietnam, the government developed datasets following the Tri Thuc Viet program.[31] Meanwhile, the Philippines has made strides in this area by developing the National Data Centre (NDC) and National Research Cloud (NRC) to provide access to many datasets and shared AI resources. In 2014, the Malaysian Administrative Modernization and Management Planning Unit (MAMPU), an agency under the Prime Minister's Department, led the Open Data initiatives in 2014 through developing the Open Data Portal (data.gov.my) as the government's platform for open data sharing.[32] However, the status of these datasets needs further validation.

4. Limited access to public and open high-performance computing infrastructure for researchers and innovators

Computing infrastructure varies across the nine countries, with limited accessibility for researchers and innovators. Lao PDR and Timor-Leste have yet to establish high-performance computing (HPC) infrastructures, while Cambodia launched its first HPC facility in 2023, allowing researchers to apply for access. In contrast, Thailand, the Philippines, Vietnam, Malaysia, and Indonesia have multiple HPC facilities.

However, there are limited HPC resources in universities across the region. While some universities do have computing capabilities, these resources are often inadequate to meet the increasing demands of AI research. As a result, researchers frequently depend on shared infrastructures or utilize resources from foreign universities and companies, primarily through cloud computing.

[31] "Tri Thuc Viet program," *Tri Thuc Viet program*, https://itrithuc.vn/, accessed 19 February 2025.
[32] "Open Government Data | Policy, Strategy and Governance | Open Data Guidelines and Data Stewards," *MyGOV*, https://malaysia.gov.my/portal/content/30588, accessed 28 December 2024.

Several initiatives have been launched to enhance and democratize access to computing resources for R&D and innovation. In the Philippines, the Analytics, Computing, and Complex Systems (ACCeSs) laboratory at the Asian Institute of Management (AIM) promotes public-private collaboration and strengthens competitiveness through advanced computing and modelling. Meanwhile, Indonesia has provided a state-owned HPC facility (hpc.brin.go.id), which has been freely accessible since 2014 to researchers, students, and lecturers conducting AI and scientific research.

5. Absence of national policies or guidelines for the responsible and safe use of AI in education

The increasing use of AI tools in education has raised concerns about academic misconduct, especially regarding AI-generated content and "AIgiarism". However, most Southeast Asian countries have yet to implement national policies or guidelines on AI use in education. AI is governed under policies and regulations on data protection, cybersecurity, and intellectual property.

Despite this gap, several universities are proactively addressing AI integration by establishing ethical frameworks and academic integrity measures. For instance, the University of the Philippines (the Philippines), VinUniversity (Vietnam), and Chulalongkorn University (Thailand) have introduced institutional guidelines to ensure responsible AI use in education. In the Philippines, most educational institutions already have academic integrity policies defining plagiarism and its consequences.[33] Similarly, the Malaysian Qualifications Agency has issued an advisory note on GenAI in higher education. These examples underscore the need for clear yet adaptable policy frameworks to effectively manage AI-related ethical challenges in education.

6. Limited integration of AI in government education management and public service delivery

Although digital strategies emphasize the need to integrate new technologies to enhance government management and public service delivery, it is observed that most countries do not yet have detailed roadmaps or initiatives to promote the use of AI in education management and public service delivery. Most countries have not yet integrated AI applications into their main education portals to support users, except for Indonesia. Indonesia's Ministry of Primary and Secondary Education portal, which includes public services such as Public Information Request e-PPID and Information &

[33] "Promoting institutional values through the development of student academic integrity statements," *MAAP Research Journal*, 30 March 2022, via ResearchGate.

Complaint Services, has already integrated a chatbot function that could assist with various user needs.

7. Limited number of commercially available AI applications for people with disabilities

Most of the applications with integrated AI to support PwDs have not yet been commercialized. Popular AI applications for PwDs include letter typing apps for blind students, live transcription for deaf children, and sound amplifiers for the deaf.

Countries such as Vietnam, Malaysia, Indonesia, the Philippines, and Thailand have developed several initiatives that support PwDs through hackathons. For example, Smile is a curriculum for teaching and learning sign language for deaf children in Vietnam;[34] the YehYeh NFC application simplifies the use of smart mobile devices for the blind in reading books in Vietnam;[35] and the Arabic Braille Converter is used in Indonesia.[36] The Hear Me app, designed to assist teachers and students with hearing disabilities and developed by university researchers in Malaysia, is one successful example that has been available for public use through many application store. However, there is limited information on AI applications for PwDs in the remaining countries.

Developing applications for PwDs is often perceived as “less economical” compared to applications aimed at the public, which may deter private sector investment. The lack of commercialization of these innovations can be attributed to several factors. These include the absence of dedicated teams and resources for translating research into commercial products, as well as funding limitations that hinder scaling up and mass production beyond academic publications. Some universities facilitate matchmaking between researchers and industry; however, success is often limited due to short project durations and budgetary constraints.[37]

8. Digital divide by geographical areas and by gender, hindering equal accessibility to AI-related technologies

The digital divide between urban areas and rural areas still exists in most of the Southeast Asian countries. This may hinder students’ and educators’ equal accessibility

[34] “Code N2036: Smile - AI application curriculum for teaching and learning sign language for deaf children,” *Doimoisangtao.vn*, https://doimoisangtao.vn/giai-thuong-dmst/mti-technology, 12 August 2020.
[35] “Seven winning solutions to empower people with disabilities,” *Microsoft*, https://news.microsoft.com/vi-vn/2020/12/03/bay-doi-dat-giai-cuoc-thi-ai-for-accessibility-hackathon-nang-cao-chat-luong-cuoc-song-cho-nguoi-khuyet-tat/, 3 December 2020.
[36] “Announcing Microsoft AI for Accessibility Hackathon APAC winners: Thailand, Singapore, and Philippines accelerate inclusive innovation,” *Microsoft*, https://news.microsoft.com/apac/2022/05/13/announcing-microsoft-ai-for-accessibility-hackathon-apac-winners-thailand-singapore-and-philippines-accelerate-inclusive-innovation/, 13 May 2022.
[37] Based on data and information collected from desk research and key informant interviews and consultative meetings.

to AI-related technologies. The digital divide is often due to slow and unreliable internet connectivity, internet affordability, and the inadequacy of affordable digital devices for learning and teaching.

Some countries have launched initiatives to address this challenge. For example, Indonesia is addressing the digital divide through initiatives like (i) the Palapa Ring Project, which expands internet infrastructure to underserved regions, and (ii) policies such as the Universal Service Obligation, which mandates telecom providers to enhance connectivity in remote areas.[38] The Philippines has launched the Public Education Network Program, which fast-tracks the provision of connectivity for all public schools. In Cambodia, the Kampuchea Action to Promote Education launched collaborative programs to equip schools across the country with digital devices such as computer labs, laptops, tablets, LCD projectors, and smart TVs.[39]

The digital divide issues across the studied countries are not only related to physical infrastructure but also to gender disparities. Women in several nations face additional hurdles, such as safety concerns, affordability, and low digital literacy, that significantly impede their full participation in the digital economy. Although various initiatives and policies, such as infrastructure projects, digital literacy improvement, and public-private partnerships, have been launched across the region to address these disparities, the digital divide remains a critical hurdle.

9. Gender gaps persist in STEM (including ICTs) education and employment

The underrepresentation of women in AI R&D presents significant challenges, particularly in ensuring diverse and unbiased AI systems. For instance, a lack of workforce diversity in coding and design of AI might result in the replication of stereotypes, such as the submissive role of voice-powered virtual assistants which are often represented by women.[40]

Addressing the gender gap in STEM education and AI employment is essential for developing inclusive and gender-sensitive AI solutions. While official statistics on female participation in AI-related studies and careers in Southeast Asia are limited, available data suggests that women remain underrepresented in key STEM fields, including ICT and AI-related disciplines (see Table below).

Table 4: Percentage of female tertiary graduates in STEM and ICTs (%)[41] [42]

[38] "Indonesia's Universal Service Obligation Fund," *Digital Regulation Platform*, https://digitalregulation.org/indonesias-universal-service-obligation-fund/, 24 September 2020.
[39] "Digital Education Program to be implemented in Phnom Penh and Kandal Province," *Khmer Times*, https://www.khmertimeskh.com/501506339/digital-education-program-to-be-implemented-in-phnom-penh-and-kandal-province/, 14 June 2024.
[40] "Gender-sensitive AI Policy in Southeast Asia," *UNU Collections*, 25 January 2023.
[41] "To be smart, the digital revolution will need to be inclusive: excerpt from the UNESCO science report," *UNESCO*, 2021.
[42] "Global Gender Gap 2024," *World Economic Forum*, 2024.

Country	Percentage of female tertiary graduates in STEM (%)	Percentage of female tertiary graduates in ICTs (%)
Cambodia	16.68	8.4
Indonesia	Data not available	34.7
Lao PDR	28.95	40.8
Malaysia	54.05	46.0
Myanmar	60.76	67.4
Philippines	43	48.1
Thailand	30.14	47.9
Viet Nam	36.51	26.4
Timor-Leste	Data not available	Data not available

10. Lack of coordination between public and private stakeholders in AI research and innovation

The collaboration between government agencies, academia, and industry remains slow across all Southeast Asian countries, impeding AI innovation. The lack of coordination among stakeholders hinders the effective sharing of resources, expertise, and data, slowing progress in AI adoption.

A key lesson comes from KORIKA Indonesia (Kolaborasi Riset dan Inovasi Industri Kecerdasan Artifisial), established under Indonesia's National AI Strategy. KORIKA fosters collaboration among government, industry, academia, and public communities to drive AI adoption nationwide.[43] Similarly, Malaysia's Artificial Intelligence Nexus 2024 (MY AI NEXUS) brings together AI experts, academic institutions, industry leaders, and government bodies to strengthen AI research and development.[44] These initiatives highlight the importance of structured collaboration in accelerating AI innovation.

[43] "KORIKA – Artificial Intelligence Industry Research and Innovation Collaboration," *KORIKA*, https://korika.id/, accessed 15 December 2024

[44] "My AI Nexus 2024: MOHE's First Step to Launch National AI Ideas," Ministry of Higher Education Official Portal, https://www.mohe.gov.my/hebahan/kenyataan-media/siaran-media-my-ai-nexus-2024-langkah-pertama-kpt-jayakan-gagasan-ai-negara, 10 May 2024.

11. Limited financial support and technical support for startups to promote AI innovation

Limited venture capital investment in AI innovation hinders the ability to scale up AI applications in education across nine Southeast Asian countries. For example, data from the Organization for Economic Co-operation and Development (OECD) indicates that the Philippines has not seen any substantial venture capital investments in AI for education and training since 2019.[45] Concerns over high AI deployment costs, data privacy, security risks, and the rapid changes in the education section (e.g. online learning) have further deterred EdTech investors.[46] Meanwhile, technology sectors like FinTech and MedTech continue to attract increasing investment.[47] [48]

Some countries have established dedicated public organizations to support AI R&D and innovation. For instance, Indonesia's KORIKA is expected to play a key role in accelerating AI R&D and innovation nationwide. In Malaysia, the National Technology and Innovation Sandbox (NTIS) provides a real-world testing environment for researchers, innovators, startups, and tech entrepreneurs. Within NTIS, the AI Sandbox, in collaboration with the Malaysian Research Accelerator for Technology & Innovation (MRANTI) and NVIDIA, promotes collaboration and knowledge sharing.[49]

Additionally, major international tech firms actively participate in providing both financial and technical support for startups and the community. Recently, a global technology firm introduced a cloud support program in the Philippines to empower emerging tech startups.[50] In Vietnam, the National Innovation Centre (NIC), in collaboration with leading tech firm, launched the "Build for the AI Future" initiative to support Vietnamese startups in the AI era by providing essential knowledge, facilitating connections with top AI experts, and granting access to cutting-edge technological resources.[51]

[45] "Total VC investments in AI by country and industry," *OECD.AI*, https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=total-vc-investments-in-ai-by-country-and-industry, 2025.
[46] "Investment in online education groups plummets following rise of AI," *Financial Times*, https://www.ft.com/content/54e8d249-8b95-44df-8bb4-c48ea20c7857, 23 December 2024.
[47] "Fintechs are an economic and social success. Here are 4 ways to keep up the momentum," *World Economic Forum*, https://www.weforum.org/stories/2024/11/fintechs-embracing-sustainable-growth/, 6 November 2024.
[48] "2024 Medtech Industry Insights: Investment Trends, M&A Activity, and Market Dynamics," *J.P.Morgan*, https://www.jpmorgan.com/content/dam/jpmorgan/documents/cb/insights/outlook/jpm-medtech-deck-q4-2024-final-ada.pdf, January 2025.
[49] "MOSTI: Pioneering the future of AI talent and ethical development in Malaysia," *The Edge*, https://theedgemalaysia.com/content/advertise/mosti-pioneering-the-future-of-ai-talent-and-ethical-development-in-malaysia, 27 May 2024.
[50] "Google Launches Initiative for AI Startups in the Philippines," *W.Media*, https://w.media/google-launches-initiative-for-ai-startups-in-the-philippines/, 3 October 2023.
[51] "Build for the AI future" initiative launching," *MPI website*, https://www.mpi.gov.vn/en/Pages/2024-7-12/-Build-for-the-AI-future-initiative-launchingfov0nq.aspx, 11 July 2024.

Section D: Recommendation on potential action points to unlock opportunities across nine Southeast Asian countries

I. Recommendation on potential action points and priorities

The list of potential action points to resolve the challenges and unlock the opportunities have been developed based on desk research and stakeholders' consultation results. A complete list of stakeholders consulted for the study can be found in Appendix 4.

The action points are assessed using a prioritization matrix that evaluates two dimensions:

- Impact: This is measured by coverage, gender equality and social inclusion (GESI) potential, and alignment with UK/FCDO's regional education priorities, as well as Southeast Asian countries' national strategies, priorities, and action plans.
- Effort: This is evaluated based on time, resource requirements, and complexity.

Each dimension is rated as high, medium and low (for further details, please refer to Appendix 5).

On the effort dimension, the rating of action points is influenced by the AI readiness of each country. The Government AI Readiness Index reveals that countries with a strong policy framework, developed digital economies, and robust infrastructure are generally better prepared for AI implementation.[52] In Southeast Asia, nine countries are classified into two group based on their AI readiness, including:

- Group 1 (G1): Indonesia, the Philippines, Malaysia, Vietnam, Thailand
- Group 2 (G2): Cambodia, Lao PDR, Myanmar, and Timor-Leste

The Government AI Readiness Index indicates a substantial score gap between G1 and G2 countries.[53] G1 countries demonstrate a much higher level of AI readiness, which means they might require less effort to implement action points than G2 countries (Appendix 6).

The final prioritization results, which combine impact and effort are outlined in Table 5. All the action points could be applicable to any of the nine Southeast Asian countries. There are 12 action points which have consistent ratings across all studied countries. Among these, nine are classified as high priority and three as low priority. For the remaining action points, labelled A.3 to A.5, the priorities differ between the two group of countries.

[52] "Accelerating AI in ASEAN: Addressing Disparities, Challenges, and Regional Policy Imperatives", *Economic Research Institute for ASEAN and East Asia*, November 2023.
[53] Descriptions of the three pillars are shown in Appendix 6.

Table 5: List of potential action points and priorities

Action points	Challenges/Issues	Impact	Effort	Priority
A.1. Issuing national ethics frameworks for the use of AI in education	Absence of national policies or guidelines for the responsible and safe use of AI in education	H	L	High
A.2. Developing AI ethics guidelines at educational institutions to govern the use of AI among students and educators	Absence of national policies or guidelines for the responsible and safe use of AI in education	H	L	High
A.3. Collaborating with tech companies, universities, and relevant disability advocacy organizations to develop AI solutions for people with disabilities	Limited number of commercially available AI applications for people with disabilities	H	L[54]	High
A.4. Leveraging AI-enabled virtual assistants to support users on education ministries' platforms	Limited integration of AI in government education management and public service delivery	H	M[55]	High
A.5. Implementing AI-enabled warning systems to forecast early dropout risks in education	Limited integration of AI in government education management and public service delivery	M	M[57]	High
A.6. Establishing an AI competency framework for educators across all educational levels	Limited digital literacy among educators and students	H	M	High
A.7. Establishing an AI competency framework and AI curriculum for students across all educational levels	Limited digital literacy among educators and students Shortage of AI talents and challenges related to the availability of AI-related specialized courses at universities and qualified instructors	H	M	High

[54] For G2 countries, the effort to implement action point A.3 is categorized as Medium, the priority is High.
[55] For G2 countries, the effort to implement action points A.4 and A.5 is categorized as High, the priority is Low.

Action points	Challenges/Issues	Impact	Effort	Priority
A.8. Offering training programs, competitions, and AI internship opportunities to enhance AI-related skills for educators and students	Limited digital literacy among educators and students	H	M	High
A.9. Establishing apprenticeship programs, talent incubation, and summits on AI to equip individuals with foundational and advanced AI knowledge, hands-on experience, financial support, and networking opportunities with AI experts	Shortage of AI talents and challenges related to the availability of AI-related specialized courses at universities and qualified instructors	H	M	High
A.10. Providing early education, mentorship, and community support for girls and women in STEM fields	Gender gaps persist in STEM (including ICTs) education and employment	H	M	High
A.11. Providing technical expertise, training, and financial support for AI researchers and innovators in education	Lack of coordination between public and private stakeholders in AI research and innovation	M	M	High
A.12. Developing AI in education startup acceleration program	Limited financial support and technical support for startups to promote AI innovation	M	M	High
A.13. Hosting EdTech awards to help startups in education gain awareness and recognition	Limited financial support and technical support for startups to promote AI innovation	M	H	Low
A.14. Providing researchers and innovators with access to high-performance computing or cloud infrastructures, offering both free and paid options with various benefits	Limited access to public and open high-performance computing infrastructure for researchers and innovators	M	H	Low
A.15. Providing access to affordable, stable internet for students and educators in rural areas	Digital divide by geographical areas and by gender, hindering equal accessibility to AI-related technologies	M	H	Low

II. Proposed potential action points to promote AI application in education across nine Southeast Asian countries

Action point 1: Issuing national ethics frameworks for the use of AI in education

Scope: Applicable to any of the nine countries

Objectives:

This action point aims to develop national AI ethical frameworks for education to complement national AI guidelines, ensuring responsible and equitable AI use in learning and teaching. These frameworks would protect student privacy and data security, establish clear policies on AI-enabled data collection, and align AI applications with educational goals to promote fairness, inclusivity, and improved learning outcomes. Furthermore, they could provide clear guidelines for students, educators, and policymakers to minimize the risks of misuse while fostering trust and transparency in AI-enabled education tools.

Actionable areas:

- Support competent agencies responsible for AI in education, primarily within ministries responsible for education, in developing ethical frameworks for the use of AI in education. The UK might consider leveraging its expertise from educational government bodies and leading educational institutions (public and private academia/research) specializing in AI ethics to provide insights and guidance tailored to the local context of each country. This could involve sharing knowledge through workshops, providing guidance on policy formulation, and facilitating peer-to-peer exchanges between UK institutions and counterparts in selected Southeast Asian countries. By utilizing UNESCO's AI Ethics in Education framework and Singapore's AI-in-Education (AIEd) Ethics Framework as references and adapting them to each country's specific context, policymakers could promote responsible AI adoption in education while ensuring equity, transparency, and data protection.
- Assist competent agencies in implementing nationwide awareness-raising programs such as workshops, training sessions or forums, featuring UK experts from institutions and local experts, for students, educators, parents, school administrators and other stakeholders regarding the application of AI ethical frameworks in education. The design of training materials could consider enhancing inclusivity and accessibility for all participants, for examples: incorporating sign language interpretation.

Potential counterparts: Ministries responsible for education, universities, academic/research institutions

Use case 1: Singapore's AI-in-Education (AIEd) Ethics Framework[56]

Country: Singapore

Implementers: Ministry of Education (MOE) of Singapore

Implementation timeline: 2019-present

Target audience/users of AI applications: Learners and educators in Singapore

Objectives: Ensure AI systems uphold student and teacher autonomy, provide equal opportunities, remain unbiased, and maintain a safe learning environment

Description:

The MOE of Singapore developed the AI-in-Education (AIEd) Ethics Framework, building on the national Model AI Governance Framework and integrating key principles from the Ethos of the Teaching Profession. This framework aims to ensure safe and responsible AIEd implementation by guiding MOE personnel and schools on governance and deployment and aligning AIEd practices with professional values outlined in the Ethos of the Teaching Profession. The MOE AIEd Ethics Framework is based on four core principles:

- Agency: Empowering students and teachers to retain control over learning and professional decisions, with AI serving as a supportive tool.
- Inclusivity: Ensuring all users, regardless of background or abilities, benefit from AIEd.
- Fairness: Keeping AI systems unbiased, accurate, transparent, and explainable.
- Safety: Protecting learners' privacy, well-being, and interests through safeguards for responsible AI use.

Beyond defining these principles, the AIEd framework also provides practical guidance on their implementation and includes case studies as illustrative examples to demonstrate their application features. Additionally, the MOE provides the MOE Ethical AIEd Implementation Checklist, available exclusively on the MOE Intranet, to support teachers conducting small-scale, localized trials of deploying AIEd applications in one or a few schools.

Overall, the AIEd framework ensures an appropriate level of human involvement in AI-supported decision-making, guiding teachers to exercise professional judgment in using AI meaningfully. This approach facilitates the continued development of critical competencies, including those necessary for success in the 21st century.

[56] "AI in Education Ethics Framework," *Singapore Student Learning Space (SLS) Info-Site*, https://www.learning.moe.edu.sg/ai-in-sls/responsible-ai/ai-in-education-ethics-framework/, accessed 28 January 2025.

Action point 2: Developing AI ethics guidelines at educational institutions to govern the use of AI among students and educators

Scope: Applicable to any of the nine countries

Objectives:

Developing and implementing AI ethics guidelines at institutions, aligned with national AI ethical frameworks, is crucial for ensuring the safe, fair, and responsible use of AI by students and educators.

Actionable areas:

- Facilitate peer exchanges between UK institutions who have developed AI ethics guidelines and selected educational institutions in Southeast Asian countries to co-develop and refine ethical AI guidelines. UK institutions could share best practices, evaluation tools, and implementation frameworks for responsible AI use in education. The result of the pilot will serve as the foundation for further adoption of AI ethics guidelines. To achieve this goal, AI Ethics toolkit might be developed to equip practical guidance for educators and school administrators. The toolkit might include:
  - Handbooks outlining ethical principles for AI use in classrooms
  - Guidelines on AI transparency, bias mitigation, and student data protection
  - Case studies demonstrating best practices from pilot schools and universities
- Develop and execute awareness-raising programs at educational institutions, such as training or communication campaigns, to spread AI ethics awareness. The design of training materials could consider enhancing inclusivity and accessibility for all participants, for examples: incorporating sign language interpretation.

Potential counterparts: Ministries responsible for education, universities, academic/research institutions

Use case 2: VinUni's Guidelines on Student Use of Generative Artificial Intelligence (GenAI)

Implementers: VinUniversity

Implementation timeline: 2024-Present

Targets: Undergraduate and graduate students

Objective: These guidelines provide details on the principles and regulations of the ethical and responsible use of GenAI in academic work at VinUniversity. These

guidelines aim to provide clear direction on how students can leverage these tools while maintaining academic integrity[57]

Description:

These guidelines are intended to complement the policy on academic integrity at VinUniversity without replacing it. They are applicable to all students, both undergraduate and graduate. Faculty members are required to integrate these guidelines into their course planning and explicitly convey the specific expectations regarding GenAI to students in their syllabi, assignment instructions, and during discussions throughout the course. The guiding principles are:

- Alignment with Learning Objectives: While VinUniversity embraces the potential of GenAI, it is committed to developing students' holistic academic skills such as critical thinking, original thought, and creative expression. GenAI should enhance learning, not replace it. The use of GenAI tools must align with and support the learning outcomes of each course, when appropriate.
- Transparency: The extent to which GenAI is permitted in any assessment or learning activity is at the discretion of the course faculty. Faculty should clearly communicate their expectations and limits of GenAI use in major assessments through the AI Assessment Scale (AIAS). The AIAS clearly outlines the acceptable thresholds for GenAI usage for each major assignment and is effectively communicated to students (e.g., No AI Use, Full AI Use, AI for Planning). The AIAS enables faculty to determine the suitable level of GenAI usage tailored to their specific contexts and intended learning outcomes.
- Honest Disclosure: When GenAI use is permitted, students must be transparent about their use of these tools and clearly acknowledge how GenAI was used. Submitting GenAI content as one's own work without proper acknowledgment is a violation of academic integrity.
- Critical Engagement: Students should use GenAI tools with a critical lens to evaluate the quality, relevance, accuracy, and bias of AI-generated content. They should use GenAI to enhance critical thinking and problem-solving skills rather than replace them.
- Faculty, Program, and Discipline Variations: Faculty, programs, and disciplines each have their own levels of comfort, familiarity, and use cases of GenAI. Tolerances of GenAI will vary, so students should proactively consult with their faculty on the appropriate use of GenAI in their courses. Faculty and students are encouraged to explore and share ethical and effective ways of using GenAI in academic work to create a culture of experimentation and openness.

[57] "Guidelines on Student Use of Generative Artificial Intelligence," *VinUniversity website*, https://policy.vinuni.edu.vn/all-policies/guidelines-on-student-use-of-generative-artificial-intelligence/, accessed 17 December 2024.

- Continuous Refinement: GenAI technology is rapidly evolving, so these guidelines and the broader Academic Integrity Policy will be reviewed periodically and updated to ensure that they remain relevant and effective.

Use case 3: University of the Philippines Open University (UPOU) Guidelines on AI in Teaching and Learning

Countries: Philippines

Implementers: The University of the Philippines Open University (UPOU)

Implementation timeline: 2024-Present

Target audience/users of AI applications: Students and teaching staff at the university

Objective: Recognize the transformative impact of AI on education in the digital age and affirm UPOU's acknowledgment of AI's role in content creation, adaptive learning, language support, assessment, and feedback

Description:

In January 2024, the UPOU issued its official Guidelines for the Use of AI in Teaching and Learning. These guidelines reflect the university's recognition of AI's role in content creation, adaptive learning, language support, assessment, and feedback.[58] The implementation of these guidelines commenced at the beginning of UPOU's Second Term (2nd Trimester/2nd Semester) for the academic year 2023-2024. They will be available on the UPOU website for reference.

Educators are encouraged to integrate AI into course design and delivery to enhance students' comprehension and facilitate more effective learning experiences. AI should be used to support learning outcomes by catering to diverse learning preferences and fostering essential skills such as critical thinking and lifelong learning. However, instructors must clearly communicate the permissible extent of AI use in learning activities, student engagement, and assessment.[59]

Students must adhere to ethical AI use by properly citing AI-generated content, avoiding plagiarism, and transparently disclosing AI involvement in data collection for coursework. Unauthorized or unethical AI applications by teachers and students, particularly for deception or misconduct, are strictly prohibited.

UPOU is committed to equipping teachers, students, and academic support staff with the necessary competencies for ethical AI integration in education. To this end, training

[58] "UPOU Releases Guidelines on AI Use for Teaching and Learning," *University of the Philippines Open University website*, https://www.upou.edu.ph/news/upou-releases-guidelines-on-ai-use-for-teaching-and-learning/
[59] "Guidelines on the use of AI in Teaching and Learning," *University of the Philippines Open University website*, https://www.upou.edu.ph/wp-content/uploads/2024/01/Guidelines-on-Use-of-AI-in-Teaching-and-Learning.pdf

programs, open educational resources, and relevant technologies will be provided. Additionally, UPOU will continuously monitor AI advancements to ensure its academic community remains aligned with evolving educational standards and ethical considerations.

Action point 3: Collaborating with tech companies, universities, and relevant disability advocacy organizations to develop AI solutions for people with disabilities

Scope: Applicable to any of the nine countries

Objectives:

This action point aims to leverage diverse expertise from various partners and provide financial support to develop and scale up AI solutions for PwDs, for example: translating Khmer or English into Khmer Braille to assist blind or visually impaired students. The goal is to ensure that these technologies are effective, user-friendly, and genuinely inclusive, ultimately improving the quality of life for PwDs.

Actionable areas:

- Offer technical support to create and expand AI applications for PwDs by collaborating with experts from UK institutions or top EdTech companies that have successfully developed AI solutions for PwDs. The UK stakeholders could collaborate with local partners to create tools like machine translation for Khmer Braille in Cambodia and an AI-assisted bi-directional translator for Vietnamese Sign Language.
- Establish partnerships between universities, institutions, tech companies, and investors in the UK. This partnership would facilitate technical assistance for the development and scaling of AI applications for PwDs. Additionally, UK institutions could consider launching short-term exchange fellowships or sabbaticals for researchers and developers from Southeast Asian universities. This would give them the opportunity to receive training at UK centres of excellence in AI and accessibility.
- Provide technical policy advisory support to assist competent agencies in selected countries to draft or revise policies that promote AI solutions for PwDs. This could be achieved through the collaboration with relevant UK government bodies and institutions.

Potential counterparts: Ministries responsible for education, labour and social affairs, universities, academic/research institutions, private sector

Use case 4: Khmer Braille Machine Translation[60]

Countries: Cambodia

Developers: The Cambodia Academy of Digital Technology (CADT), in collaboration with the National Institute for Special Education and the Krousa Thmey Foundation

[60] "Introducing Machine Translation Khmer Braille," *YouTube*, https://www.youtube.com/watch?v=hpJxbWnjM5g, 12 January 2025.

Development status: Ongoing

Target audience/users of AI applications: Blind/visually impaired students

Objectives: Assist teachers with preparing reading materials in Khmer Braille for children and students who are blind or visually impaired

Description:

The CADT researchers, in collaboration with the National Institute for Special Education Cambodia and the Krousa Thmey Foundation, have been developing "Khmer Braille Machine Translation." The project aims to create a system for translating Khmer or English into Khmer Braille, focusing on two primary goals.

Firstly, it aims to replace the licensed software currently utilized in special education institutions, which face challenges with complex Khmer scripts and require expensive updates. Secondly, it aims to improve access to Braille documents, allowing teachers and individuals, regardless of their proficiency in Khmer Braille, to easily produce Braille materials whenever needed. It simplifies word processing and improves efficiency, particularly when printing embossed Braille texts for students.

In 2025, this application received the gold medal for "Digital Inclusivity" in the "ASEAN Digital Awards 2025", held in Bangkok, Thailand, as part of the 5th ASEAN Digital Ministers Meeting, which included the participation of ASEAN Digital Ministers.[61]

Use case 5: AI-assisted Vietnamese Sign Language Bi-directional Translator[62]

Countries: Vietnam

Developers: Researchers from the AI4LIFE Institute of the Hanoi University of Science and Technology (HUST)

Development status: Ongoing

Target audience/users of AI applications: Deaf students at a special school for deaf children in Hanoi, Vietnam

Description:

The research team from the AI4LIFE Institute has been developing a smartphone application that helps hearing-impaired individuals communicate seamlessly with hearing individuals and vice versa. It is a virtual translation application facilitating seamless bi-directional translation between Vietnamese and Sign language. This

[61] "Khmer Braille Machine Translation Wins Gold Medal at ASEAN Digital Awards 2025," *CADT website*, https://cadt.edu.kh/news/cambodia-academy-of-digital-technologys-khmer-braille-machine-translation-wins-gold-at-asean-digital-awards-2025/, 20 January 2025.
[62] Information of this application is collected from interview with AI4LIFE Institute of the Hanoi University of Science and Technology.

application acts as a transformative tool, facilitating seamless communication between deaf and hearing individuals. It translates spoken language into sign language and vice versa, empowering deaf users to engage in natural conversations. Furthermore, its automatic sign language translation of spoken language within audio-visual content fosters inclusivity by granting hearing-impaired individuals full access to a broader media spectrum.

Along with the application, the team has built a Vietnamese Multi-view Sign Language dataset comprising 1,000 characters from the Vietnamese Sign Language dictionary. Each character's representation was captured from three different angles and performed by multiple signers. This is the first multi-view sign language dataset in Vietnam.

Action point 4: Leveraging AI-enabled virtual assistants to support users on education ministries' platforms

Scope: Applicable to any of the nine countries

Objectives:

AI-enabled virtual assistants serve as intelligent chatbots that assist users in quickly finding answers to questions and providing information in multiple languages and formats, such as text, links, or contact details for further assistance.

Actionable areas:

- Provide technical assistance and advisory support to ministries responsible for education in Southeast Asian countries to integrate AI-enabled virtual assistants into their websites. This could be done with the support from AI solution providers and educational bodies that have developed virtual assistants from the UK.
- Provide capacity building, including training and sharing experience, to IT centres within ministries responsible for education across Southeast Asian countries. This would facilitate the integration of AI-enabled virtual assistants and support their ongoing operations. The training, capacity building and experience sharing could be conducted by experts, AI solution providers and educational government bodies from the UK that have successfully developed virtual assistants.

Potential counterparts: Ministries responsible for education

Use case 6: Talib - AI-powered tool of Qatar's Ministry of Education and Higher Education

Country: Qatar

Implementers: Qatar's Ministry of Education and Higher Education

Implementation timeline: 2024-Present

Target audience/users of AI applications: All public users

Objectives: Assist users with queries related to the documents of the Ministry of Education and Higher Education (MoEHE)

Description:

To enhance digital transformation in the education sector, the MoEHE has launched 'Talib', a sophisticated AI-driven chatbot that offers prompt and intelligent answers to questions from students, parents, and the public in both Arabic and English.[63]

[63] "MoEHE launches'Talib' chatbot to support students," *Gulf Times*, https://www.gulf-times.com/article/687604/qatar/moehe-launchestalib-chatbot-to-support-students, 30 July 2024.

Talib achieves a 99% accuracy rate in its responses, streamlining communication and saving time and effort. If Talib cannot answer a query, it will be directed to the appropriate department within the ministry for further support.

This initiative is part of MoEHE's strategy to incorporate AI into its systems and services, aligning with Qatar's Digital Transformation Strategy 2030, which aims to utilize AI technologies in public services.

Action point 5: Implementing AI-enabled warning systems to forecast early dropout risks in education

Scope: Applicable to any of the nine countries

Objectives:

AI-enabled warning systems utilize machine learning (ML) and data analytics to identify students at risk of early dropout. By analysing student data, these systems detect early warning signs and provide real-time alerts, enabling educators to implement timely interventions.

Actionable areas:

- Deliver capacity-building programs (e.g. workshops, masterclasses, online courses) for data teams, teachers, and administrators in selected Southeast Asian schools and universities to develop AI models that identify at-risk students. This could be delivered by experts from UK EdTech companies or institutions who have experience in developing AI-enabled warning systems.
- Facilitate experience exchanges with UK schools and universities already using predictive analytics tools for student retention.
- Provide funding and technical mentorship for selected pilot institutions in Southeast Asia to design and customize early warning platforms, inspired by examples like CMKL University's A1CE platform.
- Collaborate with UK EdTech companies to offer relevant platforms or solutions that Southeast Asian schools and universities could adapt and localize.

Potential counterparts: Universities, academic/research institutions

Use case 7: A1CE - AI-assisted Learning Platform[64]

Country: Thailand

Developers: CMKL University

Development status: Ongoing

Target audience/users of AI applications: Students and teachers

Objectives: A platform that analyses and suggests learning paths for each student

Description:

[64] "A1CE: A Scalable AI-enabled Education Platform to Build the Digital Workforce," *AIEI website*, https://site.cmkl.ac.th/aiei-blogs/a1ce-a-scalable-ai-enabled-education-platform-to-build-the-digital-workforce, 15 February 2023.

CMKL University offers a unique undergraduate program called AiCE (AI and Computer Engineering). The AiCE curriculum is self-directed, and competency-based. Instead of courses, students select competencies to study and master.

The A1CE platform, developed by CMKL University, is designed to assist students in managing their individualized study plans. This platform encourages students to complete assessments and earn a new competency card for each skill set they master. Additionally, it offers tools for students to create a roadmap of competencies for each semester. Students can choose to add competencies one by one or utilize suggested roadmaps provided by the program, which they can then customize to fit their needs.

Instructors can use A1CE to oversee the competencies they teach and track students' progress toward their personal objectives. The platform could record all the interactions of the students as an input to suggest a proper learning schedule for students. In the future, the university has plans to integrate a few more features into this platform.

However, the university has faced challenges related to high computing infrastructure costs and limited funds to train or fine-tune the model. Additionally, the data points are not sufficient to provide a comprehensive view of student interactions and performance. They are planning to collaborate with the industry to develop and scale up this platform.[65]

Use case 8: Dropout Identification System (DEWS) in Wisconsin (The US)

Country: The US

Implementers: Wisconsin Information System for Education and Wisconsin Department of Education

Implementation timeline: 2013-2023

Target audience/users of AI applications: District-level administrative agencies and educational institutions

Objectives: Identify students at risk of falling behind to implement timely interventions for their academic progression

Description:

In 2013, the Wisconsin Information System for Education (WISE), in collaboration with the Wisconsin Department of Education, developed the Dropout Early Warning System (DEWS) as part of the "Every Child, a Graduate" initiative. The objective was to support districts in improving administration and enable educational institutions to better understand students to enhance learning outcomes.

[65] Based on data and information collected from desk research and key informant interviews and consultative meetings.

DEWS used ML algorithms to identify 9th- and 10th-grade students at risk of falling behind and to help them transition successfully to the next educational level. Each student was assigned a probability of on-time graduation and a risk level across four subdomains: academics, attendance, behaviour, and mobility. Key indicators for the model included attendance, discipline, mobility, state test results, and demographic data such as test scores, suspension history, and participation in state subsidy programs.

The model's accuracy was periodically validated, and the data was thoroughly checked before being published on the WISEdash, which organizes historical data in a user-friendly format accessible to administrators, schools, parents, and the public.

To ensure the effective use of DEWS, the Wisconsin Department of Education provided ongoing training for local agencies, focusing on data management and planning. Transparency regarding the model's strengths, limitations, and confidence levels has been crucial for its success.

However, DEWS was discontinued on October 12, 2023. The Department of Public Instruction is currently assessing the future of these early warning systems.[66]

[66] "Dropout Early Warning System," *Wisconsin Department of Public Instruction website*, https://dpi.wi.gov/ews/dropout, accessed 20 November 2024.

Action point 6: Establishing an AI competency framework for educators across all educational levels

Scope: Applicable to any of the nine countries

Objectives:

To equip educators with necessary AI knowledge and skills for effective teaching, curriculum integration, and responsible AI use, selected Southeast Asian countries could develop AI competency frameworks tailored to their unique educational and technological landscapes.

Actionable areas:

- Support competent agencies to conduct nationwide surveys of educators and education leaders to assess AI readiness levels. Use the findings to develop a structured AI competency framework for educators, aligning competency levels with their current expertise and training needs. This action could be implemented in collaboration with UK government bodies and educational institutions who have experience in developing AI competency framework.
- Utilize UK experience in digital competency assessments to help competent agencies to develop AI competency frameworks for educators and define core competency areas. The framework could consider aligning with UNESCO's AI Competency Framework for Educators and local education policies.
- Launch awareness-raising initiatives for educators and other stakeholders to promote understanding and implementation of the AI competency framework. The design of training materials could consider enhancing inclusivity and accessibility for all participants, for examples: incorporating sign language interpretation.

Potential counterparts: Ministries responsible for education

Action point 7: Establishing an AI competency framework and AI curriculum for students across all educational levels

Scope: Applicable to any of the nine countries

Objectives:

To develop students' AI literacy, critical thinking, and ethical awareness to navigate an AI-enabled world, the selected Southeast Asian countries could develop AI competency frameworks tailored to different learning levels and national unique educational and technological landscapes. These frameworks could then serve as a foundation for integrating AI courses into current curriculum, equipping students with AI-related skills and fostering responsible innovation practices among students.

Actionable areas:

- Provide technical expertise in localizing AI competency frameworks for students, drawing on the UK's experience in national curriculum reform[67] and digital education strategies. This support could help competent agencies in selected Southeast Asian countries to adapt global frameworks such as the UNESCO AI Competency Framework for Students or the OECD AI & Digital Literacy Guidelines. For instance, Vietnam and Indonesia have already developed AI competency frameworks for students in alignment with UNESCO guidelines.
- Provide tools, question banks, and methodologies developed by UK educational government bodies to assist ministries responsible for education in designing and implementing nationwide surveys about AI awareness and literacy levels of students. This will help identify AI competency gaps which is basic to develop AI curriculum.
- Leverage UK experts from institutions and government bodies who have experience in developing AI curriculum to support ministries and institutions in designing AI-focused curriculum modules across primary, secondary, and tertiary levels. It is essential to involve educators in this process, and materials could be pilot tested before implementation. Additionally, all materials could also be designed to be inclusive and accessible for all users, which includes using clear language or providing alternative formats (e.g., audio, visual).

Potential counterparts: Ministries responsible for education, universities, academic/ research institutions

[67] "Government launches Curriculum and Assessment Review," *GOV.UK website*, https://www.gov.uk/government/news/government-launches-curriculum-and-assessment-review, 19 July 2024.

Use case 9: Artificial Intelligence Competency Framework for K-12 Students in Vietnam

Country: Vietnam

Implementers: Vietnam Institute of Educational Sciences (VNIES) under the Ministry of Education and Training (MOET)

Implementation timeline: Ongoing

Target audience/users of AI applications: K-12 students

Objectives: Equip K-12 students with both technical expertise and ethical awareness to foster responsible AI development, enabling them to use technology for societal benefit

Description:

To prepare Vietnamese students for the future, an AI Competency Framework has been being developed.[68] This framework draws upon UNESCO's guidelines, Vietnamese digital skills research, the 2018 General Education Program, and global AI education initiatives. Educational administrators, curriculum developers, and technology experts provided feedback through multiple consultations, refining the framework. It focuses on four key areas: (1) Human-centred thinking, (2) Ethical AI usage, (3) Foundational AI knowledge and skills, and (4) AI system design.

This framework aims to equip students with both technical skills and ethical awareness, enabling them to use AI responsibly and contribute positively to society. By learning about AI beyond traditional subjects, students will develop fundamental AI knowledge and gain the confidence and adaptability needed for AI-related careers in the digital age.

However, the detailed implementation of this "AI Competency Framework for K-12 Students" is still pending an official announcement.

[68] "Consultation on Artificial Intelligence Competency Framework for High School Students," *Bao Giao duc & Thoi dai*, https://giaoducthoidai.vn/tham-van-khung-nang-luc-tri-tue-nhan-tao-cho-hoc-sinh-pho-thong-post704866.html, 16 October 2024.

Action point 8: Offering training programs, competitions, and AI internship opportunities to enhance AI-related skills for educators and students

Scope: Applicable to any of the nine countries

Objectives:

AI training programs, competitions, and internship programs in these countries are needed to enhance AI skills, foster innovation, and fully integrate AI into education. This action point aims to provide technical training, support educator development, engage student, and raise awareness of ethical AI practices, while promoting STEM/STEAM education.

Actionable areas:

- Establish nationwide AI training programs for educators in selected countries. This could be delivered in collaboration with implementers of global AI education models (e.g., AI Teach Program) or leading UK educational institutions and tech companies. The training could cover essential topics for educators, including AI literacy and ethics (e.g., bias detection, responsible AI use); AI-enabled teaching tools (e.g., chatbots, adaptive learning systems); and hands-on AI applications where applicable (e.g., robotics, coding). Universities, and AI research institutes, and tech companies could be involved to provide AI education certifications and to offer AI teaching tools respectively. In addition, AI training and certification fees might be subsidized for underprivileged students.
- Endorse and co-organize AI hackathons and competitions in collaboration with competent agencies, tech companies, AI research institutes, leading universities, and national innovation hubs.
- Offer scholarships and mentorship programs for students, especially for female and underprivileged participants.

Potential counterparts: Ministries responsible for education, universities, academic/research institutions, private sector

Use case 10: Providing a quality, equitable, and free STEAM education for teachers and students[69]

Country: Vietnam

Implementers: STEAM for Vietnam in collaboration with leading tech companies, consulting and finance companies, educational institutions, multinational corporations, and Vietnamese organizations

[69] "STEAM for Vietnam," *STEAM for Vietnam website*, https://www.steamforvietnam.org/, accessed 18 January 2025.

Implementation timeline: 2020-Present

Target audience/users of AI applications: Vietnamese teachers, students, and parents, with a primary focus on students

Objectives: Provide a quality, equitable, and free STEAM education for all Vietnamese children so they can confidently step into the world

Description:

STEAM for Vietnam is a non-profit organization founded in May 2020 by Tran Viet Hung. Its mission is to provide world-class, free STEAM education to millions of Vietnamese youths. The foundation has delivered high-quality courses across Science, Technology, Engineering, Arts, and Mathematics to over 50,000 students nationwide.

With the strategic transition to STEAM 2.0, the organization integrates AI into five core activities to personalize learning experiences and prepare students for an AI-enabled future. Courses are designed using the Live MOOC (Massive Open Online Courses) model, combined with OMO (Online-merge-Offline) Superclass for an interactive and immersive learning environment.

Key programs include:

- Train the Trainers: A professional development initiative providing educators with training in STEAM and AI in collaboration with leading institutions such as MIT, Scratch Foundation, and HUST. The program has engaged over 8,000 educators from all 63 provinces, resulting in more than 5,000 student projects and over 750 certified teachers.
- Student Training: Comprehensive STEAM courses from introductory to advanced levels, covering topics such as Scratch, Python, Robotics, and Digital Arts. The initiative has successfully reached over 50,000 students across Vietnam.
- Vietnam VEX Robotics National Championship: A national robotics competition for students under 19, featuring VEX IQ and VEX V5 challenges. Participants receive free, exclusive training resources. The event is co-organized by STEAM for Vietnam, the American Centre, and HUST.
- STEAMese Festival: A hands-on event where students engage in AI exploration, programming, and robotics while parents participate in innovative family activities, stay updated on modern educational trends, and support their children's STEAM journey. Educators connect with international experts, learn STEAM and AI applications, and adopt innovative teaching methodologies. The festival is organized in partnership with UNICEF, the U.S. Mission to Vietnam, and the Scratch Foundation.

Use case 11: AI Teach Program - Skills for AI-Enabled Economy[70]

Countries: Indonesia and Malaysia

Implementers: Microsoft and ASEAN Foundation in collaboration with local non-profits, workforce institutions, and governments

Implementation timeline: 2024-Present

Target audience/users of AI applications: Technology Vocational Education and Training (TVET) educators/ teachers and students in ASEAN countries

Objectives: Drive the region's technological advancement by emphasizing AI expertise as a fundamental element of success

Description:

The ASEAN Foundation and Microsoft launched the AI TEACH for ASEAN program in 2024 to enhance AI fluency among TVET educators and students in ASEAN, with a focus on Indonesia and Malaysia.[71] The program aims to train 6,200 teachers and educators, support 400,000 students, certify 80,000 students, and host three regional hackathons. Using the program's Microsoft AI Trainer Toolkit, educators will learn to teach AI concepts effectively, while students will gain skills through Microsoft and LinkedIn Career Essentials in Generative AI. Key activities of the program include:

- TVET Educator Training: A training-of-trainers approach across 10 ASEAN countries, with government support through the ASEAN Secretariat and Senior Officials Meeting on Education. In Indonesia and Malaysia, AI training will be implemented via Memorandums of Understanding (MOU) with TVET institutions. Educators have free access to all training and content from Microsoft AI Teach.
- Hackathons: Nationwide hackathons in Indonesia and Malaysia (July-September 2024), followed by a Regional Hackathon in Indonesia (October-December 2024).
- Regional Policy Roundtable: A forum for policymakers, AI experts, and non-profits to share insights on AI in TVET education.

Specifically, the Microsoft AI Trainer Toolkit covers the following topics: Introduction to AI, Introduction to GenAI, AI Toolbox for Trainers, and Responsible AI Use in Education. Educators completing the program receive certificates from Microsoft and the regional implementing partner, while students earn LinkedIn certifications.[72]

[70] "Microsoft AI Teach - Biji-biji Initiative," *Microsoft AI Teach website*, https://www.biji-biji.com/microsoft/microsoft-ai-teach/#toolkit, accessed 5 February 2025.
[71] "ASEAN Foundation and Microsoft Launch AI TEACH for ASEAN Programme to Shape the Region's Tech Future," *ASEAN Foundation website*, https://www.aseanfoundation.org/asean_foundation_and_microsoft_launch_ai_teach_for_asean_programme_to_shape_the_regions_tech_future, 2 February 2024.
[72] "ASEAN Foundation and Microsoft Launch AI TEACH Programme for Tech Future," *Asia Education Review*, https://www.asiaeducationreview.com/technology/news/asean-foundation-and-microsoft-launch-ai-teach-programme-for-tech-future-nwid-1052.html#google_vignette, 30 January 2024.

Working closely with Microsoft, the ASEAN Foundation helps to manage the AI TEACH programs in Indonesia and Malaysia, led by Yayasan Plan International Indonesia (YPII) and Biji-biji Initiative, tailored to each country's needs. It will also host a regional AI policy roundtable and hackathon. Other programs' partners include the Social Security Organisation (PERKESO), Malaysia Digital Economy Corporation (MDEC), Sarawak Digital Economy Corporation (SDEC), and Mereka Corporate Solutions.

Action point 9: Establishing apprenticeship programs, talent incubation, and summits on AI to equip individuals with foundational and advanced AI knowledge, hands-on experience, financial support, and networking opportunities with AI experts

Scope: Applicable to any of the nine countries

Objectives:

Apprenticeship programs, training boot camps, and summits on AI would provide financial support and networking opportunities with AI experts to foster the development of AI talent. This action point aims to bridge the gap between theoretical knowledge and industry needs, ensuring participants are well-prepared to contribute to the AI ecosystem. This support both individuals starting their AI journey and professionals looking to enhance their skills in the field.

Actionable areas:

- Develop apprenticeship programs in related topics such as AI, ML to train individuals with foundational and advanced AI knowledge. This could be delivered by UK institutions or leading tech companies. These programs would provide hands-on, real-world project experience, enabling participants to become skilled practitioners. Participants would receive monthly stipends based on experience and gain direct experience in deploying AI models, providing them with pathways to AI-related roles in UK leading tech companies and research institutions.
- Organize AI Summit in collaboration with UK government bodies, institution, and tech companies to facilitate knowledge exchange, networking, and collaboration among AI experts, policymakers, and industry leaders. The submit would feature key sessions on AI trends, workshops, webinars, and policy roundtables on AI governance. Communication channels and platforms could also be established for stakeholders to connect, share ideas, and foster collaborations. The submits could rotate organized locations among Southeast Asian countries.

Potential counterparts: Ministries responsible for education, universities, academic/research institutions, private sector

Use case 12: AI Apprenticeship Programme (AIAP)[74]

Country: Singapore

Implementers: AI Singapore (AISG), with key collaborators including coordinating agencies such as NRF Singapore, Smart Nation Singapore, and the Infocomm Media

[74] "AI Apprenticeship Programme," *AI Singapore website*, https://aiap.sg/apprenticeship/, accessed 16 February 2025.

Development Authority (IMDA), as well as research partners such as the National University of Singapore (NUS), Singapore Management University (SMU), and Singapore University of Technology and Design (SUTD)

Implementation timeline: 2018-Present

Target audience/users of AI applications: Self-motivated and passionate individuals who possess foundational AI technical knowledge and skills but may lack the opportunity to work on real-world AI projects

Objectives: Identify, train, and nurture Singaporean AI talents

Description:

The AIAP, recognized as a premier AI deep-skilling initiative both in Singapore and globally, is dedicated to identifying, training, and nurturing Singaporean AI talent. The AIAP is spearheaded by AISG, which is fully funded by the Singapore government. AISG unites local research institutions, AI startups, and companies to advance use-inspired research, develop tools, and grow talent for Singapore's AI initiatives.

Apprentices gain hands-on experience by working on practical AI projects while deepening their expertise in AI, ML, and software engineering, including deploying AI models into production. Conducted as a full-time program, apprentices work at the AISG office Monday through Friday, from 9AM to 6PM.

Participants receive a monthly training allowance of S$3,500 to S$5,500, based on prior experience and qualifications. The 9-month program structure consists of a 3-month deep-skilling course followed by six months of project work.

To apply, applicants must undergo a rigorous selection process, including a technical assessment on exploratory data analysis and end-to-end ML pipeline design as well as an interview comprising a technical interview and a group case study exercise.

In seven years, AIAP has approved approximately 180 projects, with over 100 completed. More than 400 Singaporeans have been trained as AI engineers, and most now work in AI-related roles.[75] AIAP apprentices have been hired by several leading companies, including Gojek, Grab, IBM, and TikTok.

Use case 13: 100Experiments (100E)[76]

Country: Singapore

Implementers: AI Singapore (AISG)

[75] "Scaling AI talent: An AI apprenticeship model that works," *CIO website*, https://www.cio.com/article/3602562/scaling-ai-talent-an-ai-apprenticeship-model-that-works.html, 12 November 2024.
[76] "100Experiments," *AI Singapore website*, https://aisingapore.org/innovation/100e/, accessed 20 February 2025.

Implementation timeline: 2017-Present

Target audience/users of AI applications: Organizations that need AI solutions

Objectives: Solve industries' AI problem statements and help them build their own AI teams

Description:

The 100 Experiments (100E), an AI Singapore's flagship program, aims to address industry-specific AI challenges and build AI capabilities within organizations. It allows organizations to propose problem statements that lack off-the-shelf AI solutions but can be tackled by AI Singapore's engineering team within a 9-month collaboration.

To address the AI talent shortage, 100E provides co-funding of up to S$180,000 per project for a 7-month effort for AI Singapore's team, including full-time engineers and AIAP participants to work on the organization's problem statement. Upon completion, the organization receives a minimum viable AI model, and three to five certified Singaporean AI Engineers. Organizations are required to match the funding through both in-kind contributions (e.g., AI, engineering, IT, or domain expertise) and cash.

In addition to building the AI model, AI Singapore collaborates with project sponsors to define the AI problem statement, design AI infrastructure and architecture (if necessary), and connect sponsors with AI engineers-apprentices who have completed the AIAP. The apprentices involved are Singaporeans with a passion for data, AI, and ML who have self-taught AI/ML skills and will contribute to a real-world AI project valued at up to S$360,000. As of 2020, AI Singapore has increased its support for 100E projects from 100 to 200.

Action point 10: Providing early education, mentorship, and community support for girls and women in STEM fields

Scope: Applicable to any of the nine countries

Objectives:

This action point aims to provide early education, mentorship, and community support for girls and women in STEM fields. The goal is to increase their participation and skill development while empowering them to pursue careers in these areas. By building confidence and creating networking opportunities, participant could connect with role models and professionals in the field. This support aims to challenge gender stereotypes, leading to a more diverse workforce that drives innovation.

Actionable areas:

- Collaborate with non-governmental organizations (For example: Girls Who Code), competent agencies and selected local schools in nine countries to launch summer immersion programs for high school female students. This action could be carried out in collaboration with leading UK tech companies, institutions that have program to support girls and women in STEM fields. The programs focus on project-based learning in AI, emerging tech, web development, and more. Female students would be provided with equipment (e.g., laptops), a tailored curriculum covering coding languages, and real-world projects.
- Collaborate with non-governmental organizations, competent agencies, selected institutions and universities to develop a STEAM mentorship program connecting girls and young women with female STEM professionals to inspire and guide them toward tech careers. This program could include virtual mentoring sessions, career workshops, and shadowing opportunities. STEM professionals could be invited from UK leading tech companies, universities, and regional industries.
- Provide scholarships for female students to pursue STEM degrees, as well as internships and job placements to support female graduates in entering STEM professions. This action would be achieved through partnerships with leading UK universities known for their STEM education and leading tech companies.

Potential counterparts: School, universities, academic/research institutions, private sector, non-governmental organizations

Use case 14: Girls Who Code[84]

Countries: The US, Canada, India, and the UK

[84] "Girls Who Code," *Girls Who Code website*, https://girlswhocode.com/, accessed 17 January 2025.

Implementers: Girls Who Code team and their partners

Implementation timeline: 2012-Present

Target audience/users of AI applications: Girls, women, and nonbinary individuals internationally, including the US, Canada, India, and the UK

Objectives: Prepare women students pursuing coding for in-demand jobs in emerging technology and AI, ensuring that they keep pace with a rapidly changing tech industry

Description:

Girls Who Code is a non-profit organization founded in 2012 by Reshma Saujani to close the gender gap in technology and engineering. It introduces girls to coding at a young age, provides female role models and mentors, and creates a supportive community. By offering a robust curriculum that includes both technical and soft skills, Girls Who Code helps girls build confidence and envision themselves in STEM careers, thereby addressing gender disparities in these fields.

Key activities and programs:

- Summer Immersion Program: Girls Who Code offers a free, 7-week summer program for high school girls, where they learn computer science skills through hands-on projects. Participants work on real-world projects, collaborate with peers, and receive mentorship from female professionals in the tech industry.
- After-School Clubs: The organization provides resources and support for after-school clubs in schools and community organizations. These clubs offer girls the opportunity to learn coding and computer science in a fun and supportive environment, typically led by a facilitator.
- Curriculum and Resources: Girls Who Code develops a comprehensive curriculum that includes lessons on coding languages, web development, and computer science concepts. They provide free resources, including lesson plans and activities, to educators and club leaders.
- College Loops: This program connects college-aged women who are interested in technology with each other and with industry professionals. It provides networking opportunities, mentorship, and resources to support their academic and career goals.
- Workshops and Events: Girls Who Code hosts workshops, hackathons, and events that bring together girls and women in tech. These events provide opportunities for skill-building, networking, and collaboration on tech projects.
- Advocacy and Awareness: The organization advocates for gender equality in the tech industry and raises awareness about the importance of diversity in technology. They work to change the narrative around girls and coding through campaigns and partnerships.

- Alumni Network: Girls Who Code has a growing alumni network that connects former participants with resources, job opportunities, and mentorship as they pursue careers in technology.

Action point 11: Providing technical expertise, training, and financial support for AI researchers and innovators in education

Scope: Applicable to any of the nine countries

Objectives:

This action point aims to fosters AI research and innovation in education by combining technical expertise and financial support. Collaboration between the public and private sectors by providing researchers with high-quality training, hands-on experience, and industry networks, ultimately bridges the gap between academia and the job market.

Actionable areas:

- Collaborate with leading tech companies, institutions in the UK to facilitate mentorship programs and host networking events. The programs aim to connect researchers and innovators with experienced professionals in the tech industry. The networking events help to connect researchers and innovators with potential collaborators, investors, and industry leaders.
- Provide scholarships or connect with UK tech companies, institutions to support AI researchers and innovators in covering research costs, training expenses, and the development of AI-enabled solutions in education. Competent agencies could identify and support potential research teams and innovators within leading universities and educational institutions. Notable examples include the Hanoi University of Science and Technology (HUST) in Vietnam, Universitas Indonesia (UI), Tokopedia-UI AI Centre of Excellence in Indonesia, CMKL University in Thailand, the Cambodia Academy of Digital Technology (CADT) in Cambodia.

Potential counterparts: Universities, academic/research institutions, private sector

Use case 15: ELLIS PhD & Postdoc Program[87]

Country: Europe

Implementers: European Laboratory for Learning and Intelligent Systems (ELLIS)

Implementation timeline: 2018-Present

Target audience/users of AI applications: PhD students and postdocs

Objectives: Develop top talent in machine learning by pairing outstanding students with leading academic and industrial experts across Europe

Description:

[87] "PhD & Postdoc Program," *ELLIS website*, https://ellis.eu/phd-postdoc

The ELLIS PhD program is a key pillar of the ELLIS initiative that supports excellent young researchers by connecting them to leading researchers across Europe. Each PhD student is co-supervised by one ELLIS Fellow/Scholar or Unit Member and one ELLIS Fellow/Scholar, Unit Member or Member based in different European countries.

Students conduct an exchange of at least 6 months with the international advisor during their degree and can choose one of three Tracks:

- Academic Track – Collaboration in AI/Machine Learning with an academic partner in another country
- Industry Track – Collaboration in AI/Machine Learning with an Industry partner
- Interdisciplinary Track – Cross-domain collaboration with an academic partner specialised in a field unrelated to AI (e.g., biology, law, finance)

The program also offers a wide range of activities, including summer schools and workshops, such as:

- ELLIS Doctoral Symposium (EDS): The EDS is organized by and for PhD students and gives young researchers the chance to meet, collaborate and interact with each other in person through content-driven poster sessions and tooling presentations, while also facilitating interactive moments for networking with each other, with senior researchers and with companies.
- ELLIS Machine Learning Summer Schools: ELLIS aims to host at least one machine learning summer or winter school each year. The event offer networking and training opportunities for graduate students and researchers in different topics through lectures, research challenges, discussion
- ELLIS Reading Groups: ELLIS aims to connect PhDs and postdocs in the network and supports them in creating opportunities to discuss science. Currently, two student-led reading groups on machine learning-related topics meet regularly to discuss a paper the group previously voted on.

Upon being an ELLIS PhD student, participants can join a global network of more than 400 top PhD students in Machine Learning in academia and industry, receive joint supervision from leading European researchers and get advisor-funded support for research and conference travel.

Action point 12: Developing AI in education startup acceleration program

Scope: Applicable to any of the nine countries

Objectives:

This action point aims to establish a comprehensive program that provides startups with technical support and financial support to develop and scale educational applications, including AI-enabled solutions. Eligible startups could leverage these resources to develop innovative educational applications, such as personalized learning systems, intelligent tutoring, and automated assessments.

Actionable areas:

- Collaborate with ministries responsible for education, regional EdTech hubs, or UK tech companies to develop AI in education programs to incubate and scale up startups. This support might encompass providing sandboxes for testing AI applications, offering free access to computing resources, implementing capacity-building programs, and organizing mentorship programs or hackathons. Notable examples include the MRANTI AI Programme.
- Collaborate with UK tech companies and other relevant stakeholders seeking innovative ideas in AI to identify promising startups that can benefit from support in developing and scaling AI applications. This might include grant programs, seed funding, or connecting startups with potential investors, venture capitalists, or funding partners.

Potential counterparts: Ministries responsible for education, universities, academic/research institutions, private sector

Use case 16: MRANTI AI Programme[88]

Country: Malaysia

Implementers: Malaysian Research Accelerator for Technology & Innovation (MRANTI) and National Technology & Innovation Sandbox (NTIS)

Implementation timeline: 2024-Present

Target audience/users of AI applications: Public and private researchers, technology-based startups, corporate and university innovators, and university spin-off companies

Objectives: Implement advanced AI solutions to enhance business innovation ideas and workforce efficiency

Description:

[88] "Innovators Learn - MRANTI AI," *MRANTI website*, https://mranti.my/innovators/learn/ai, accessed 20 November 2024.

Established in 2024, the MRANTI AI programme is designed to provide businesses with access to a distinguished ecosystem of academic institutions, emerging startups, and industry leaders. It aims to advance AI infrastructure, cultivate talent, and ensure the ethical deployment of AI technologies. The program offers a structured support system tailored to different stages of AI innovation, covering the following key areas:

- Capacity Building in AI Technologies: Participants are equipped with advanced technical competencies and domain-specific knowledge essential for AI development. This includes comprehensive technological support across domains such as GenAI, Visual Analytics, and Data Engineering.
- Facilitation of AI Funding: The program streamlines access to financial resources, enabling AI technology integration without requiring multiple rounds of fundraising. MRANTI AI connects participants with a robust network of venture capitalists and funding partners to facilitate investment in AI-enabled initiatives.
- Accelerator Programme: To further enhance innovation and talent development, participants engage in curated activities, including hackathons, demonstration sessions, and competitive pitching events. These initiatives serve as catalysts for refining AI solutions and fostering industry engagement.
- Technology Commercialization Support: The program provides tailored technological solutions aligned with market needs while offering strategic guidance in critical areas such as intellectual property management, regulatory compliance, and international business practices.
- Technical Support and Regulatory Compliance: Participants gain essential technical support from technology partners to improve AI product development processes and capabilities. The initiative also offers opportunities for product testing and guidance on regulatory compliance.

The curriculum is structured into three progressive levels:

- Level 1 - Introduction to AI Technologies: Participants are introduced to contemporary advancements in AI, with insights from MRANTI's technology collaborators.
- Level 2 - Hands-on R&D Product Development: This phase emphasizes practical engagement with AI experts, facilitating product enhancement, regulatory adherence, and ethical AI deployment. It also includes mentorship, consultation, and regulatory sandboxing.
- Level 3 - AI Application Development: Participants collaborate with industry representatives from sectors such as healthcare, agriculture, and sustainability to develop AI-enabled solutions that address sector-specific challenges.

To qualify for the program, businesses must meet the following requirements:

- A minimum of 51% Malaysian ownership

- A demonstrable Proof of Concept or Prototype, which will be assessed for alignment with appropriate AI development pathways
- Priority consideration is given to companies engaged in in-house AI technology development
- The business must have been established for no more than 10 years

Action point 13: Hosting EdTech awards to help startups in education to gain awareness and recognition

Scope: Applicable to any of the nine countries

Objectives:

EdTech awards could provide significantly advantages to startups in education by enhancing their visibility and credibility. These awards attract media attention, helping startups reach a broader audience and potential investors. Additionally, recognition from such awards validates their innovations and solutions, facilitating partnerships and building customer trust.

Actionable areas:

- Collaborate with Ministries responsible for education, tech companies, universities and institutions to organize EdTech awards and networking events alongside the awards ceremony. This would enable startups in education to connect with potential investors, partners, and industry leaders from UK. The event could include workshops and panel discussions during the awards event focused on key topics in the EdTech sector, such as funding strategies, scaling solutions, and leveraging technology for educational impact.
- Develop and launch targeted promotion campaigns to promote the awards. Utilize social media, press releases, and strategic partnerships with relevant organizations to attract media attention, helping potential EdTech startups reach a broader audience and potential investors.

Potential counterparts: Ministries responsible for education, universities, academic/research institutions, private sector.

Action point 14: Providing researchers and innovators with access to high-performance computing or cloud infrastructures, offering both free and paid options with various benefits

Scope: Applicable to any of the nine countries

Objectives:

This action point focuses on strengthening regional AI research and innovation capacity by supporting the development of shared HPC infrastructure and cloud-based resources accessible to the education, research, and startup communities across nine Southeast Asian countries. Hence, they could conduct advanced research, process large datasets, and accelerate AI and other scientific breakthroughs. By offering both free and paid options, the action point caters to various needs, ensuring that users from startups to established researchers could access the resources required to push their projects forward.

Actionable areas:

- Facilitate collaborations with financial institutions such as the World Bank and Asian Development Bank (ADB) to fund or co-finance the development of shared HPC centres or national supercomputing facilities. Ensure these resources are open to academic, public sector, and AI innovation ecosystems.
- Support to design and deliver training programs and experience sharing sessions to enhance the skills of researchers and professionals in utilizing HPC resources effectively. This would be delivered by experienced UK institutions in collaboration with ASEAN entities.
- Collaborate with trusted cloud providers in the UK to offer startups, researchers, and innovators a mix of free and paid cloud credits, technical training, and mentorship.
- Integrate UK-based supercomputing resources with cloud-based virtual environments, enabling researchers and innovators to simulate AI applications' performance, train AI models, prototype scalable solutions, and share open-source educational resources through cloud hosting.

Potential counterparts: Government agencies, universities, academic/research institutions, private sector

Use case 17: High-performance computing infrastructure and capacity for ASEAN Data Utilization project

Country: ASEAN countries

Implementers: ASEAN Secretariat, ASEAN High-Performance Computing Task Force (ASEAN HPC TF), Korea Institute of Science and Technology Information (KISTI),

Korea Government (Ministry of Foreign Affairs, Ministry of Science and ICT), Korea-ASEAN Cooperation Business Team (AKPMT), Tech Design Team, Indonesian Government National Research and Innovation Agency (BRIN)

Implementation timeline: 2024-2028

Target audience/users of AI application: 10 ASEAN countries

Objectives: Enhance digital infrastructure in ASEAN to advance big data and AI research, fostering innovation and sustainable progress in science and technology

Description:

In May 2024, Korea's Minister of Science and ICT and the ASEAN Secretary-General marked 35 years of diplomatic ties, highlighting digital and scientific collaboration for shared prosperity. A key initiative is the Korea-ASEAN Digital Innovation Flagship (KADIF) project, which includes the Building HPC Infrastructure and HPC Capacity for ASEAN Data Utilization program. This program, funded by KRW14.7bn from the ASEAN-Korea Cooperation Fund,[91] aims to establish a graphics processing unit (GPU)-based HPC cluster across all 10 ASEAN countries.[92] The HPC initiative is carried out through a collaborative framework involving multiple stakeholders:

- ASEAN Secretariat oversees business management and acts as the Project Steering Committee's general management body.
- ASEAN HPC TF serves as the official consultative body coordinating HPC development among ASEAN nations.
- Korea's Ministry of Foreign Affairs & Ministry of Science and ICT manage governmental oversight and international cooperation.
- KISTI leads project execution, including business management, goal setting, performance analysis, training, and external collaboration.
- Tech Design Team is governed by KISTI and ASEAN HPC TF to handle technical aspects of data centre design and construction.
- Indonesia's BRIN provides the HPC site, infrastructure, and operational support.

The initiative focuses on three key areas:

- ASEAN HPC Data Centre: A HPC centre developed by KISTI in partnership with BRIN will be established in Indonesia to support large-scale data processing.
- National Science and Technology Knowledge Information Service (NTIS): Selected ASEAN countries will adopt NTIS, modelled after Korea's system, to enhance

[91] "KISTI Promotes 1st Training on HPC Infrastructure Establishment for ASEAN Data Utilization," *CCNNEWS*, https://www.ccnnews.co.kr/news/articleView.html?idxno=361885, 11 February 2025.
[92] "Building HPC infrastructure and capabilities for ASEAN data utilization," *KISTI*, https://repository.kisti.re.kr/bitstream/10580/19241/1/KISTI%20%EC%9D%B4%EC%8A%88%EB%B8%8C%EB%A6%AC%ED%94%84%20%EC%A0%9C76%ED%98%B8.pdf, 27 November 2024.

access to R&D data, improve information sharing on research projects, and boost efficiency in funding and productivity.

- Specialized HPC Training Program: KISTI's Science Data Education Centre will train 160 HPC experts over four years, ensuring effective use of the HPC infrastructure for AI research and digital transformation. The HPC system will feature 3.5 TFLOPS performance and 3PB storage on a GPU cluster, integrated into ASEAN's research network. KISTI will design the system based on cutting-edge HPC technology, with expert consultations guiding final approvals. Infrastructure specialists will assess power supply, cooling, and other technical needs to ensure seamless deployment.

Once operational, the system is expected to provide stable supercomputing services for at least three years, with maintenance and user feedback mechanisms in place.

Use case 18: Fugaku supercomputer[93]

Country: Japan

Implementers: RIKEN's Centre for Computational Science (R-CCS) in collaboration with Fujitsu

Implementation timeline: 2021-Present

Target audience/users of AI application: Researchers and users from academia and industry, both in Japan and globally

Objectives: Advance Japan's development by addressing societal and scientific challenges, achieving globally recognized outcomes, and supporting the realization of the Society 5.0 vision

Description:

The Fugaku supercomputer, developed collaboratively by RIKEN and Fujitsu, is an advanced system comprising about 160,000 nodes and 8 million CPU cores. Since its trial phase in April 2020 and its full operational launch in March 2021, Fugaku has delivered remarkable results across a wide range of applications, particularly in advancing societal implementations.[94] The Fugaku supercomputer is accessible to researchers in Japan and abroad as mandated by law. Project approval is required, and proposal submissions are open to all, with eligibility varying by usage category.[95]

A significant innovation stemming from Fugaku is its integration with a cloud service provider to create Virtual Fugaku, which replicates the supercomputer's environment on its cloud. This virtualized solution enables software developed for Fugaku to operate

[93] "About Fugaku," *RIKEN Website*, https://www.r-ccs.riken.jp/en/fugaku/about/, accessed 11 February 2025.
[94] "Supercomputer Fugaku retains first place worldwide in HPCG and Graph500 rankings," *Fujitsu*, https://www.fujitsu.com/global/about/resources/news/press-releases/2024/1119-01.html, 19 November 2024.
[95] "User Guide," *RIKEN Website*, https://www.r-ccs.riken.jp/en/fugaku/user-guide/, accessed 11 February 2025.

seamlessly, allowing organizations to conduct advanced research securely and confidentially.

Japanese researchers have developed Fugaku-LLM, a LLM with 13 billion parameters aimed at advanced Japanese language processing. It outperforms other Japanese models and scores highly on the Japanese MT-Bench, especially excelling in humanities and social sciences with a score of 9.18. Fugaku-LLM was trained using Japanese datasets from CyberAgent and is available for research and commercial use under specific licensing. The model's source code can be found on GitHub and Hugging Face.[96]

Fugaku has achieved unparalleled success in HPC, securing the top position for ten consecutive cycles in two major rankings: HPCG and Graph500 BFS (Breadth-First Search).

Use case 19: ASEAN HPC School programme

Countries: Southeast Asian countries

Implementers: ASEAN, the EU, and Japan

Implementation timeline: 2021-Present

Target audience/users of AI applications: Southeast Asian researchers, mainly those pursuing postgraduate studies[97]

Objectives: Build expertise and foster the exchange of knowledge and practical experience in the application and advancement of HPC technologies[98]

Description:

The ASEAN HPC School programme aims to provide a platform for young researchers from ASEAN, the EU, and Japan to advance their research and form collaborative partnerships. The program includes plenary sessions on current HPC trends, quantum computing, and ASEAN's HPC infrastructure, featuring an interactive session with Dr. Leslie Lamport, an Association for Computing Machinery (ACM). Participants also gain

[96] "Release of "Fugaku-LLM" – a large language model trained on the supercomputer "Fugaku"," *Fujitsu*, https://www.fujitsu.com/global/about/resources/news/press-releases/2024/0510-01.html, 10 May 2024.
[97] "ASEAN continues High-Performance Computing (HPC) School programme after successful partnership with EU and Japan," *EEAS*, https://www.eeas.europa.eu/delegations/association-southeast-asian-nations-asean/asean-continues-high-performance-computing-hpc-school-programme-after-successful-partnership-eu-and_en?s=47, 11 December 2023.
[98] "BRIN Holds The ASEAN HPC (High Performance Computing) School 2023 to Support the Improvement of Capability in the Use and Development of High Performance Computers for Researchers in ASEAN," *BRIN website*, https://www.brin.go.id/en/news/117092/brin-holds-the-asean-hpc-high-performance-computing-school-2023-to-support-the-improvement-of-capability-in-the-use-and-development-of-high-performance-computers-for-researchers-in-asean-2, 10 December 2023.

hands-on experience with leading supercomputers, such as Japan's Fugaku, Europe's LUMI, and Meluxina.[99]

The EU, through the Enhanced Regional EU-ASEAN Dialogue Instrument (E-READI), in collaboration with Japan and ASEAN, facilitated the first EU-ASEAN HPC School (virtually in 2021) and the second EU-ASEAN HPC School at Kasetsart University, Thailand, in 2022. The Indonesian National Research and Innovation Agency (BRIN) organized the ASEAN HPC School 2023, which was held in Bogor, Indonesia, from December 11 to 16, 2023. The event engaged over 80 selected participants in discussions on HPC applications in life sciences, urgent computing, climate science, and computer science. This marks a significant milestone with an ASEAN Member State managing the event, further promoting digital connectivity, fostering innovation, and facilitating resource optimization and cost-sharing in HPC.

[99] "EU, ASEAN empower next-generation high-performance computing leaders," *ASEAN Main Portal*, https://asean.org/eu-asean-empower-next-generation-high-performance-computing-leaders-2/, 10 December 2022.

Action point 15: Providing access to affordable, stable internet for students and educators in rural areas

Scope: Lao PDR, Cambodia, Timor-Leste, Myanmar

Objectives:

This action point aims to enhance digital connectivity in rural and remote regions to enable equitable access to AI-powered personalized learning tools, remote teaching, and expert educational content. Improved connectivity helps bridge the digital divide, improve learning outcomes, and increase opportunities for educators and students in underserved communities.

Actionable areas:

- Support to establish partnerships with financial institutions such as the World Bank, ADB, and relevant regional development banks to fund or co-finance internet infrastructure projects that target schools and learning centres in underserved regions. This includes providing access to various connectivity options such as wireless, Wi-Fi, or fixed broadband to ensure reliable connectivity in rural areas.

Potential counterparts: Ministries responsible for education, private sector

Use case 20: Public Education Network (PEN) Program

Countries: Philippines

Implementers: Department of Information and Communications Technology (DICT) and Department of Education (DepEd)

Implementation timeline: 2020-2021

Target audience/users of AI applications: public school students, teachers, and DepEd offices

Objectives: This aimed to modernize the delivery of education and governance within the DepEd system

Description:

DICT and DepEd partnered to establish the Public Education Network (PEN) to strengthen the delivery of education through broadcast, connectivity, and digital security via the PEN program.[104] This collaboration established a framework of cooperation between DepEd and DICT, which includes advocacy for the presence of ICT service providers in public school premises, provision of online resources, materials, and

[104] "DepEd, DICT team up to roll out Public Education Network," *Department of Education of the Philippines website*, https://www.deped.gov.ph/2021/04/19/deped-dict-team-up-to-roll-out-public-education-network/, 19 April 2021.

systems for educational use, and coordination with the National Telecommunications Commission (NTC), among others.[105] The main activities of this program included:

- Establishing digital connectivity for public schools and DepEd offices nationwide
- Providing access to platforms like DepEd TV, DepEd Commons, and other learning tools
- Strengthening governance platforms such as the DepEd Enterprise Resource Planning System (DERPS) and the Learner Information System (LIS)
- Promoting digital education through ICT services and online resources

Use case 21: Internet Connection and Computers for Students program

Countries: Vietnam

Implementers: Ministry of Information and Communication (MoIC) and the Ministry of Education and Training (MoET)

Implementation timeline: 2021

Target audience/users of AI applications: Students and educators in disadvantaged and remote areas who lack internet access and digital devices

Objectives: It is expected that by the end of the program, one million disadvantaged students will be equipped with electronic devices for online learning

Description:

The program was carried out in partnership with the MoIC and the MoET. Both ministries collaborated with local authorities and private sector to identify beneficiaries, develop the implementation plan, and maintain transparency throughout the program's execution. The program has three components:[106]

- Ensure mobile internet coverage in available in all 283 localities that lacked mobile internet and were under lockdown in September 2021, as well as in all 1,910 localities without mobile internet connectivity in Viet Nam by the end of 2021.
- Facilitate online learning by donating one million electronic devices to students from low-income families and in remote areas in 2021, aiming for 100% of these students from low-income families and in remote areas to have electronic devices for online learning between 2022 and 2023.
- Provide other support measures, including offering 100% free use of online learning platforms in Viet Nam and free 4Gb per day for one million students from low-income families and in remote areas.

[105] "Technology in education: a case study on the Philippines," *UNESCO,* 2023.
[106] "Tackling Unequal Access to Digital Education in Viet Nam during the COVID-19 Pandemic," *ADB*, 2022.

Appendix 1: Detailed analysis of AI adoption in education across nine Southeast Asian countries

1. Indonesia

1.1. Government strategies, regulation and institutional frameworks on AI in education

There is no national government agency who are responsible for AI development and implementation in Indonesia. The responsibility for AI development and governance is shared among several government agencies and bodies, including:

- The Ministry of Communication and Digital (KOMDIGI, formerly known as KOMINFO) serves as the main coordinator for implementing the National AI Strategy.
- The Ministry of Higher Education, Science and Technology, along with the Ministry of Primary and Secondary Education, are key agencies responsible for initiatives aimed at developing AI applications in the education sector. They also focus on cultivating AI talents and skills across all educational levels, including K-12 and higher education.
- The Ministry of Manpower is responsible for talents and skill development. They are formulating policies to address the challenges and opportunities posed by digitization and AI, ensuring that labour regulations evolve in tandem with technological progress.

The Indonesia's National AI Strategy which was first launched in 2020 is an all-encompassing framework intended to steer the development, application, and governance of AI technologies across the country. This strategy aims to ensure that AI advancements are ethical, inclusive, and beneficial society as a whole. Under the Strategy, 'Education and research' is one of the five national priorities for AI, which seeks to harness AI to enhance educational outcomes and research capabilities, ensuring Indonesia's competitive edge in the knowledge economy.

The Strategy also outlines a clear roadmap for AI innovations in Education for the 2020-2045 period, including those for students, teachers, and education administrators:

- For the 2020-2024 period: Intelligent online education, Smart course content with AR/VR, Virtual laboratory, Adaptive learning system, Adaptive assessment system, Adaptive classification system, Serious game in education, and Precision learning system
- For the 2025-2045 period: AI-assisted study planning tools, AI-assisted lesson planning tools, Student admission analytics, Student performance analytics, Teacher performance analytics, Analytics for education policy, Chatbot asks and answers

learning materials, Interactive learning system for PwDs, Automated content (text) translator, Real time speech translator, Personalized learning system

The National AI Strategy acknowledges several challenges in developing and implementing AI in Indonesia, such as the need for: skilled AI professionals, adequate infrastructure, higher investment in research and education, strengthened AI R&D/innovation collaborations between industrial sectors and universities/research institutions, competent training capacity to support AI learning, robust data governance, public and open data and infrastructure for AI R&D/innovation, addressed copyright infringement concerns, and so on.

Regarding AI governance and ethics, Indonesia adopts the G20 AI principles, UNESCO's Recommendation on the Ethics of Artificial Intelligence and the ASEAN Guide through its membership in these international/multilateral organizations. Additionally, Circular Letter No. 9/2023 which is published by KOMDIGI in December 2023 provides guidelines to ensure ethical practices in the development and implementation of AI. This document outlines key aspects such as the definition of AI, ethical considerations for its use, and the responsibilities that come with implementing AI technologies.

Indonesia is also actively updating regulations and policies to address risks and issues when integrating AI into education. However, they are currently stated in other regulations and policies. For example, the Personal Data Protection Law, enacted on October 17, 2022, emphasizes the protection of personal data, including that of students, and outlines requirements for obtaining explicit consent, ensuring data security, and upholding data subjects' rights.[107] The government has also implemented policies to combat academic dishonesty, such as the Ministry of National Education Regulation No. 17 of 2010, which focuses on preventing and addressing plagiarism in higher education.[108]

1.2. AI applications in education

Indonesia EdTech market is expected to grow by 2.4 times from US$7.03bn in 2022 to US$16.95bn in 2028, driven by a commitment to using technology to improve education.[109] The market offers various AI-powered products to improve the learning experience for students, teachers, and administrators. Key local players in the market include PT Ruang Raya Indonesia, CoLearn, Cakap, and PT Zenius Education. They provide a range of AI-integrated products designed to enhance learning experience and

[107] "Personal Data Protection (PDP) Law of Indonesia," *Thales*, https://cpl.thalesgroup.com/compliance/apac/indonesia-personal-data-protection-law, accessed 12 December 2025.
[108] "Reviewing Plagiarism: An Input for Indonesian Higher Education," *Journal of Academic Ethics*, March 2015, via ResearchGate.
[109] "APAC EdTech Market - Focused Insights 2023-2028," *Focus Reports*, https://www.focusreports.store/report/apac-edtech-market-focused-insights, February 2024.

offer support for learners, educators, and administrators. Some potential applications are outlined below:

1.2.1. Personalized learning system

- Application name: Ruangguru (https://www.ruangguru.com/)
- Target users: Students, teachers, parents, and businesses, in which students are the focus
- Suppliers/Developers: PT Ruang Raya Indonesia
- Application details:

Ruangguru, established in 2014 by Belva Devara and Iman Usman, is a leading educational technology platform in Indonesia. Both founders have been honoured by Forbes' "30 Under 30 Asia" list in the Consumer Technology category for their entrepreneurial success. Ruangguru's mission is to use technology to provide quality education to students anytime, anywhere. Additionally, it seeks to improve the quality of teaching by creating employment opportunities and additional income for educators in Indonesia.[110]

The application offers a variety of technology-driven educational services, including virtual classrooms, online exam platforms, subscription-based learning videos, a private tutoring marketplace, and other educational content. In 2022, it introduced AdaptoX, which combines interactive games and simulations with educational videos, enabling students to learn at their own pace through tailored lessons and gamified content. Its adaptive learning feature is tailored to suit leaners' level of understanding, which has succeeded in increasing student learning time by up to 86%.[111]

Currently, Ruangguru supports over 22 million users and manages a network of 300,000 teachers, providing services in more than 100 subject areas. Its contributions have earned it numerous local and international awards such as the MIT Solver, Atlassian Prize, UNICEF Innovation to Watch, etc.

1.2.2. Virtual tutor tool

- Application name: Roboguru (https://roboguru.ruangguru.com/)
- Target users: Students
- Suppliers/Developers: PT Ruang Raya Indonesia
- Application details:

Roboguru, launched by Ruangguru in 2021, is an AI-driven "homework solver" designed to assist students in finding answers to their questions.[112] It is available free of charge

[110] "About Ruangguru," *Ruangguru website*, https://www.ruangguru.com/about-us, accessed 11 December 2025.
[111] "AdaptoX, an Interactive Game in the Midst of Super Fun Learning Videos!," *Ruangguru website*, https://www.ruangguru.com/blog/fitur-adaptox-ruangbelajar, 8 July 2022.
[112] "Indonesia's edtech sector remains red-hot as Ruangguru snags another USD 55 million," *KrAsia*, https://kr-asia.com/indonesias-edtech-sector-remains-red-hot-as-ruangguru-snags-another-usd-55-million, 19 Apr 2021.

through multiple channels: the Ruangguru application, roboguru.ruangguru.com, the standalone Roboguru application, and WhatsApp 0815-7815-0000.

Students can submit questions on a variety of subjects and academic levels by uploading an image or typing their query and then selecting the appropriate subject and level. The platform provides comprehensive answers, which include detailed image explanations, ten recommended similar questions, and suggestions for video discussions and conceptual summaries available on the Ruangguru application. Additionally, if the initial response does not fully address the query, students have the option to post their questions for further assistance from a Master Teacher.[113]

1.2.3. Virtual tutor tool

- Application name: CoLearn (https://colearn.id/)
- Target users: Students
- Suppliers/Developers: CoLearn
- Application details:

Founded by Abhay Saboo, Marc Irawan, and Sandeep Devaram (a former BYJU product team member), CoLearn initially operated as an offline business in 2018 before transitioning to a hybrid model.

CoLearn, a Jakarta-based educational technology company, has achieved over 3.5 million downloads, with approximately one million active users, primarily students from grades 7 to 12. Committed to enhancing Indonesia's educational standards, CoLearn aims to significantly improve the country's performance in the Programme for International Student Assessment (PISA), where it currently ranks in the bottom 10% for math, science, and reading. The company aspires to elevate Indonesia into the top 50% of PISA rankings within the next five years.

The CoLearn app features a library of over 250,000 pre-recorded videos offering homework assistance, designed to engage students and encourage enrollment in the platform's live online classes.[114] A standout feature of the app is its AI-powered "automated doubt-solving" tool, which provides instant solutions and step-by-step explanations for math problems, enhancing learning efficiency.[115]

1.2.4. Workforce management tool

- Application name: Cakap (https://cakap.com/en/)

[113] "Roboguru, Ruangguru's Feature Makes Online Learning as Effective as Face-to-Face," *CNN Indonesia*, https://www.cnnindonesia.com/teknologi/20211221153035-190-736827/roboguru-fitur-ruangguru-bikin-belajar-daring-seefektif-tatap-muka, 22 December 2021.
[114] "Indonesian edtech CoLearn gets $10M Series A led by Alpha Wave Incubation and GSV Ventures," TechCrunch, https://techcrunch.com/2021/04/19/indonesian-edtech-colearn-gets-10m-series-a-led-by-alpha-wave-incubation-and-gsv-ventures/?guccounter=1, 19 April 2021.
[115] "Democratizing the Future of Education in Indonesia," *Read.cv*, https://read.cv/reza/colearn.

- Target users: Students, teachers, businesses, and employees, in which students and employees are the main focus
- Suppliers/Developers: PT Cerdas Digital Nusantara
- Application details:

Cakap is a leading Indonesian education platform leveraging technology to deliver high-quality courses, reputable certifications, and impactful upskilling opportunities. Founded in 2019, Cakap benefits from a team of experienced founders and advisors with extensive expertise in both the private and public sectors.

The platform also connects qualified students with employers, bridging the gap between education and career advancement.

Cakap's core offerings are tailored to diverse audiences:

- Cakap Language: Focused on enhancing the communication skills of Indonesia's workforce and younger generation through foreign language training
- Cakap Upskill: Offers practical and vocational skills programs aligned with current job market demands and post-pandemic needs
- Cakap Business: Designed to empower employees by boosting productivity and setting businesses on the path to success
- Cakap Kids Academy: Provides an integrated learning solution to develop children's cognitive, motor, and holistic abilities through a balance of soft and hard skills

By July 2024, Cakap introduced an AI-driven image enhancement solution called Pixel, developed in collaboration with South Korea's 4by4 Inc.[116] This innovation improves the visual quality of its online learning content, enhancing the overall experience for users. With more than 5.2 million registered students, over 2.8 thousand global and local teachers, and partnerships with 1.1 thousand institutional clients, Cakap continues to make a significant impact. The app boasts over 3.6 million downloads and maintains an impressive 4.9/5.0 rating.[117]

1.2.5. AI applications in education for people with disabilities

- Application name: Bookbot (https://www.bookbot.id/)
- Target users: Children with dyslexia
- Suppliers/Developers: Bookbot
- Application details:

Bookbot, supported by the UNICEF Venture Fund, is part of the A.I. & Data Science Cohort. Founded by Adrian DeWitts in 2021, Bookbot was introduced to Indonesia through INOVASI, an Australian government aid program. Since then, the team has

[116] "S.Korea's 4by4 to supply AI solution to Cakap," *The Korea Economic Daily*, https://www.kedglobal.com/artificial-intelligence/newsView/ked202407110009, 11 July 2024.
[117] "About Cakap," *Cakap website*, https://cakap.com/en/about-us/, accessed 20 November 2024.

created over 1,000 phonics-level books designed to enhance reading skills by aligning content with the interests of young users.

The app's speech recognition technology listens as children read aloud, providing real-time feedback. It is compatible with mobile devices and can be used offline, ensuring access to educational resources even in areas with limited internet connectivity. By fostering improved literacy skills, Bookbot contributes to achieving Sustainable Development Goals in Indonesia, empowering children with the tools they need for a brighter future.[118]

Key features of Bookbot's AI-powered reading tutor include:

- Engaging Interactive Robots: Virtual tutors that make reading enjoyable and interactive
- Personalized Learning Paths: Tailored to address each child's specific reading challenges
- Progress Tracking: Monitors development for both students and educators
- Extensive Phonics-Based Library: Offers decodable books in multiple languages
- Global Scalability: Adaptable to various countries and languages

Bookbot's unique approach combines advanced AI with proven educational methodologies rooted in the science of reading. This ensures that literacy education is not only effective but also accessible and engaging for children regardless of their circumstances or location.[119] By fostering improved literacy skills, Bookbot contributes to achieving SDGs in Indonesia, empowering children with the tools they need for a brighter future.

1.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

1.3.1. Limited integration of AI in public service delivery in the education sector

It has been observed that the primary portal of the Ministry of Higher Education, Science and Technology along with its associated sub-pages, has not yet integrated AI. The Ministry of Primary and Secondary Education portal has also not yet integrated a chatbot on its main page. However, some sub-pages that provide public services have incorporated AI applications, such as the Public Information Request (e-PPID)[120] and the Information & Complaint Services.[121]

[118] "Bookbot: A gamified app that provides real-time, on-device speech recognition technology in Bahasa Indonesian," *UNICEF*, https://www.unicefventurefund.org/story/bookbot-gamified-app-provides-real-time-device-speech-recognition-technology-bahasa, 8 November 2022.
[119] "Bookbot & University of Dar es Salaam," *AI-for-Education.org*, https://ai-for-education.org/lbd-bookbot-and-uni-dar-es-salaam/, accessed 21 December 2024.
[120] "Public Information Request (e-PPID)," *PID Kemendikdasmen website*, https://ppid.kemdikbud.go.id/, accessed 5 December 2025.
[121] "Information & Complaint Services," *Kementerian Pendidikan Dasar dan Menengah*, https://ult.kemdikbud.go.id/, accessed 6 December 2025.

On the e-PPID sub-page, citizens can fill out a form to request specific data from the public database. The site features an Accessibility Menu, designed like a chatbot that facilitates page translations into several languages, adjusts features to accommodate PwDs (e.g., colour blindness), and modifies text format (e.g., font size, text colour, highlighting).

In the Information & Complaint Services sub-pages, citizens can fill out a report form on a page called SP4N-LABOR or contact the call centre. There is also a chatbot available to assist users by prompting them for basic personal information, complaint type, and content. Additionally, users can engage in live chat with Ministry officers during working hours.

The Ministry of Higher Education, Science and Technology currently provides other public services like the Whistle Blowing System, a website to report employees/officials at the Ministry of Education or public universities for any violations, and the Excellent Scholarship, a website for students to apply for scholarships from the Ministry. Both platforms could benefit from AI integration, such as chatbots to improve the responsiveness and quality of services to the citizens.

1.3.2. Lack of specific guidelines for the ethical use of AI tools in education

The emergence of AI tools like ChatGPT has introduced new challenges related to "AI-giarism", where students may use AI to generate content, leading to potential academic misconduct. Studies indicate that many educational institutions lack specific guidelines for the ethical use of AI tools, underscoring the need for flexible and iterative policy frameworks to address these issues effectively.[122]

1.3.3. The digital divide by geography and gender hindering educational equality

Internet and supporting infrastructure are unevenly distributed in Indonesia's rural areas. Even where infrastructure exists, it does not ensure equitable access or usage, including for women. Furthermore, following Global Gender Gap Index, Indonesia ranks 79th which highlights significant gaps in access to the digital economy and participation in the AI sector. This digital divide is particularly pronounced in rural areas, especially affecting women and individuals with disabilities.[123]

Digital divide is also evident in gender disparities in mobile ownership (13%) and mobile internet adoption (8%), indicating that women are 13% and 8% less likely to own a mobile phone and to use mobile internet than men.

The top barriers to mobile internet adoption and use for women include affordability, safety and security concerns (such as concerns related to the reliability of information

[122] "From Guidelines to Governance: A Study of AI Policies in Education," *Communications in Computer and Information Science*, 2 July 2024, via Springer, Cham.
[123] "Gender-sensitive AI Policy in Southeast Asia," *UNU Collections*, 25 January 2023.

found online, scams, fraud, information security, exposure to harmful content), and literacy and digital skills.[124]

Indonesia is addressing the digital divide through initiatives like the Digital Indonesia Roadmap 2021–2024 and the Palapa Ring Project, which expand internet infrastructure to underserved regions. Policies such as the Universal Service Obligation (USO) mandate telecom providers to enhance connectivity in remote areas.[125] Collaborative efforts, including partnerships with technology providers like Starlink[126] and the UNDP Policy Dialogue Series,[127] further support equitable access to digital opportunities.

1.3.4. Uneven digital literacy for students and teacher in applying AI in education

In Indonesia, the population's digital literacy is uneven, with many lacking essential skills. A survey conducted in 2022 revealed that digital safety scored the lowest among digital literacy pillars, indicating that students and educators in Indonesia are less aware of personal information protection and cybersecurity practices.[128]

UNESCO reported that in 2019, only 29% of Indonesian teachers had received training in using digital technologies for teaching, and just 12% had been trained in AI or adaptive learning technologies.[129] This lack of training and professional development restricts teachers' abilities to integrate AI into their teaching and enhance students' digital literacy and computational thinking skills. Additionally, access to technical training is unequally distributed, particularly affecting marginalized groups such as women and rural residents.[130]

The "AI-Data Science & Women Leadership" initiative, led by Universitas Indonesia, seeks to enhance digital literacy in AI and data science among Indonesian women. Its primary objective is to empower women with essential skills in these fields. Sixty participants from various provinces were selected for the program, which featured a curriculum designed to provide hands-on, industry-relevant knowledge. Participants gained practical expertise in Python programming, data science fundamentals, and data pre-processing, strengthened by evaluations and real-world case studies. Additionally,

[124] "The Mobile Gender Gap Report 2024," *GSMA*, May 2024.
[125] "Indonesia's Universal Service Obligation Fund," *Digital Regulation Platform*, https://digitalregulation.org/indonesias-universal-service-obligation-fund/, 24 September 2020.
[126] "Elon Musk launches Starlink satellite internet service in Indonesia," *Politico*, https://www.politico.com/news/2024/05/19/elon-musk-starlink-indonesia-00158789, 19 May 2024.
[127] "UNDP Launches a Policy Dialogue Series on Narrowing Digital Divide in Indonesia," *UNDP website*, https://www.undp.org/indonesia/press-releases/undp-launches-policy-dialogue-series-narrowing-digital-divide-indonesia?=, 11 May 2023
[128] "Digital literacy index in the education sector in Indonesia in 2022, by type," *Statista*, https://www.statista.com/statistics/1396028/indonesia-digital-literacy-index-in-education-sector-by-type/?utm
[129] "A comparative study of artificial intelligence in education psychology: the cases of Indonesia and Thailand," *Bulletin of Social Informatics Theory and Application*, 2 May 2024.
[130] "Bridging the AI Divide: Indonesia's Ethical Approach to Technology in Developing Nations," *Modern Diplomacy*, https://moderndiplomacy.eu/2024/09/28/bridging-the-ai-divide-indonesias-ethical-approach-to-technology-in-developing-nations/?utm, 28 September 2024.

the program emphasized leadership development with sessions on modern leadership, strategic thinking, and innovation, equipping participants with the tools and confidence to assume leadership roles in their fields.[131]

To improve AI skills among students, the Indonesian Primary and Secondary Education Minister announced plans to include AI as an optional subject in future curriculum updates, contingent on each school's readiness in terms of ICT facilities and infrastructure, as not all schools currently have advanced ICT devices or high-speed internet.[132]

In late 2024, the Ministry of Communication and Digital, in collaboration with Microsoft, launched ElevAIte Indonesia, an AI training initiative aimed at equipping one million Indonesian talents with the necessary skills to adopt AI responsibly by 2025. This initiative brings together stakeholders from government, industry, educational institutions, and local communities.

ElevAIte Indonesia is structured around five key pillars, with Biji-Biji Initiative and Dicoding serving as training partners:[133]

- AI Capacity Building for Government Institutions, which focuses on empowering government agencies to lead national AI skill development.
- AI Integration in National Strategic Industries, which aims at accelerating AI transformation across key industries.
- AI Skills Development in Education, which seeks to revolutionize learning across Indonesia's education system by equipping educators with AI competencies and nurturing a new generation of AI developers.
- AI Skills for Communities, which provides AI training to underserved and underrepresented groups, including women, PwDs, and individuals in remote areas. NUCare Global and Microsoft Innovative Educator Expert are among the program's partners, with more collaborators to be announced.
- Democratizing AI for Individuals, which ensures equal access to AI education for all. As part of this effort, Microsoft launched the AI Skills Navigator equipped with an AI assistant to help learners find AI courses tailored to their needs. Accessible via aiskillsnavigator.microsoft.com, an Indonesian version is coming soon.

The government has also launched national initiatives to enhance digital literacy and skills for a wide range of audiences:

[131] "Indonesia: Empowering Women in AI and Data Science," *OpenGov Asia*, https://opengovasia.com/2024/07/22/indonesia-empowering-women-in-ai-and-data-science/, 22 July 2024.
[132] "Education ministry to prepare AI and coding school subjects," *Antara*, https://en.antaranews.com/news/333661/education-ministry-to-prepare-ai-and-coding-school-subjects, 11 November 2024.
[133] "Ministry of Communication and Industry and Microsoft Launch elevAIte Indonesia: Equip 1 Million Talents with AI Skills," *Microsoft*, https://news.microsoft.com/id-id/2024/12/02/kemkomdigi-dan-microsoft-luncurkan-elevaite-indonesia-bekali-1-juta-talenta-dengan-keterampilan-ai/?msockid=27764091726566920972 53ff733f67de, 2 December 2024.

- The Ministry of Communication and Digital has introduced national Digital Training Programs, including the National Movement of Digital Literacy (GNLD), Digital Talent Scholarship Program (DTS), and Digital Leadership Academy (DLA). In 2023 alone, 92,192 participants completed the program, with a target of 600,000 participants by 2025.[134] In 2024, the Ministry launched the DLA program, successfully training 1,236 participants.[135]
- The Coordinating Ministry of Economic Affairs, in collaboration with Microsoft, aims to provide free digital literacy and job preparation to one million Indonesians by 2024 through the Skills for Jobs program.[136]
- To address the lack of digital resources for students with disabilities, the government launched the "IT Jamboree for Children and Youth with Disabilities", enhancing ICT literacy and skills for young PwDs. This initiative, which began in 2016-2017, attracted 499 participants and evolved to include training in E-Tools (Excel and Word), E-Life Map (Internet), E-Design (PowerPoint and blogs), basic programming, Adobe Photoshop, and Internet skills. By 2020, participation grew to 1,336, including trainers from remote areas, with an updated curriculum that included modules on topics such as Excel, 2D design, and e-commerce.
- Additionally, the Indonesian government, with support from EdTech providers, has implemented the Kurikulum Merdeka (Emancipated Curriculum) via the Merdeka Mengajar platform (PMM), focusing on contextual relevance, flexibility, and 21st-century skills. This curriculum strongly focuses on digital literacy, incorporating lessons on digital technology and its ethical, critical, and productive application, into all subjects.[137]

1.3.5. Lack of AI talents for development of AI applications and gender gaps in the ICT education and employment

There is a shortage of digital talent that needs to be addressed to sustain Indonesia's digital competitiveness. Presently, Indonesian companies face a limited AI talent pool, with a shortfall of 600,000 digital professionals annually compared to the demand from the tech sector.[138]

Although official statistics on the proportion of female students studying in AI-related curricula are not available, existing data shows that gender gaps persist in some STEM sub-sectors. Specifically, female graduates are outnumbered by male graduates in engineering and ICT fields, with the percentage of female tertiary graduates in these

[134] "Govt looking to create 100,000 digital talents in 2024," *Antara*, https://en.antaranews.com/news/303372/govt-looking-to-create-100000-digital-talents-in-2024, 18 January 2024.
[135] "Spurring Digital Leadership to Shape Indonesia's Future," *OpenGov Asia*, https://opengovasia.com/2024/07/09/spurring-digital-leadership-to-shape-indonesias-future/, 9 July 2024.
[136] "Supporting Indonesia's inclusive digital economy through skills," *Microsoft*, https://news.microsoft.com/id-id/2023/06/17/supporting-indonesias-inclusive-digital-economy-through-skills/, 17 June 2023.
[137] "Technology in education: a case study on Indonesia," *UNESCO*, 2023.
[138] "AASYP's Digital Dialogues 2022," *ASEAN-Australia Strategic Youth Partnership website*, https://aasyp.org/2023/06/10/the-digital-economy-landscape-in-indonesia/, 10 June 2023.

fields being 24.9% and 34.7%, respectively.[139] Additionally, there remains a notable gap between educational attainment and labour force participation, with women representing only 22% of the technology workforce.[140]

Several initiatives are underway to develop AI talents in Indonesia through government-industry collaborations and private sector efforts:

- The Pre-Employment Card Program Implementation Management (Prakerja), under the Ministry of Economic Affairs, partnered with Microsoft to launch the Talenta AI Indonesia Program, aiming to empower the workforce to adapt to AI-driven changes.[141]
- The Plan International Indonesia Foundation and Microsoft introduced AI TEACH for Indonesia, aiming to train 5,000 TVET educators in AI fluency. [142]
- Indonesian government has partnered with Huawei to establish Huawei Techday, an initiative focusing on providing ICT knowledge to develop digital talent. In 2024, Huawei partnered with the National Cyber and Encryption Agency (BSSN) and Mulawarman University, focusing on knowledge transfer and building a digital ecosystem to foster ICT talent in Kalimantan.[143]
- IOH collaborated with Nokia to provide Bell Labs' learning and certification programs to university students, aiming to enhance digital talent competencies in AI adoption within Indonesia.[144]
- The government, in partnership with Telkom, implemented the Bridging the Disability Divide through Digital Technologies initiative,[145] offering certified entrepreneurship and IT training for PwDs. This program involved 368 participants across two stages in Indonesia. This program aims to enhance skills for PwDs, unlock their productive potential, and promote inclusion in social and cultural activities.
- Generation Girl:[146] This program engages girls and women in STEM from a young age through a variety of innovative programs, such as holiday clubs and hackathons. The initiative emphasizes the creation of a secure community environment where girls can learn through student-centred, project-based methods. By leveraging

[139] "Women in Science, Technology, Engineering, and Mathematics (STEM) in the Asia Pacific," *UNDP*, January 2024.
[140] "Gender-sensitive AI Policy in Southeast Asia," *UNU Collections*, 25 January 2023.
[141] "Prakerja and Microsoft Launch Talenta AI Indonesia Program to Empower 100,000 Youths with AI Skills," *Microsoft*, https://news.microsoft.com/id-id/2023/09/14/prakerja-and-microsoft-launch-talenta-ai-program-to-empower-100000-indonesian-youths-with-ai-skills/, 14 September 2023.
[142] "Plan Indonesia and Microsoft Launch AI TEACH for Indonesia Program, Targeting AI Training for 300,000 Vocational School Students in Indonesia," *Microsoft*, https://news.microsoft.com/id-id/2024/02/06/plan-indonesia-and-microsoft-launch-ai-teach-for-indonesia-program-targeting-ai-training-for-300000-vocational-school-students-in-indonesia/, 6 February 2024.
[143] "BSSN-Huawei TechDay 2024 Promotes Equitable Sharing of ICT Knowledge and Strengthening of Digital Ecosystems, Supporting IKN," *Antara*, https://en.antaranews.com/news/309018/bssn-huawei-techday-2024-promotes-equitable-sharing-of-ict-knowledge-and-strengthening-of-digital-ecosystems-supporting-ikn, 21 March 2024.
[144] "Indosat, Nokia to Boost Indonesia's Digital Talent and AI Adoption Capabilities," *Telecom Review*, https://www.telecomreviewasia.com/news/network-news/4041-indosat-nokia-to-boost-indonesia-s-digital-talent-and-ai-adoption-capabilities/, 4 March 2024
[145] "5 Telkom Programs That Encourage Digitalization in the Education Sector," *Selular.ID*, https://selular.id/2023/01/5-program-telkom-yang-mendorong-digitalisasi-di-sektor-pendidikan/, 16 January 2023.
[146] "Gender barriers to basic digital skills for employment in the ASEAN region: A review of promising practices," *Australian Council for Educational Research*, 2024.

technology, the organization also fosters the development of soft skills like critical thinking and problem-solving. It emphasizes the establishment of a secure community environment where girls can learn through student-centred, project-based methods.

1.3.6. Insufficient research budget and shortage of skilled personnel for AI labs in universities

There are barriers to creating and scaling AI labs in universities. These include a shortage of faculty and researchers with AI and machine learning expertise, weak industry partnerships for funding and mentorship, low effectiveness and quality of research funded by the government. Limited research budget might result in subpar and non-impactful university research.[147]

Currently, Indonesia has several AI labs in universities, primarily established through partnerships with corporations (e.g., the Tokopedia-UI AI Centre of Excellence at Universitas Indonesia and the AI Research and Development Centre at BINUS University with NVIDIA), as well as publicly funded initiatives (e.g., Institute of Technology's Centre for AI) and fully private funding (e.g., Research Centre for Artificial Intelligence for Learning and Optimization at Telkom University).

1.3.7. Limited number of datasets in local languages for AI development, data localization restrictions, and cybersecurity threats

Indonesia's linguistic diversity poses challenges for developing AI applications tailored to local contexts, as there is a limited availability of native datasets in local languages. While initiatives like IndoNLP and IndoNLU support Indonesian natural language processing, comprehensive datasets covering the country's many local languages and dialects are still scarce,[148] hindering the creation of culturally relevant AI applications.

Additionally, data localization policies require certain data to be stored domestically for national security. However, these measures can restrict cross-border data flows, limiting access to diverse datasets essential for AI development and constraining government initiatives due to reduced data availability and international collaboration.[149] Achieving seamless interoperability and integration between datasets remains a challenge, which is critical for effective AI development.[150]

Significant cybersecurity incidents have exposed vulnerabilities in data protection. For example, a cyberattack in June 2024 on the national data centre disrupted services for over 40 government agencies, including immigration and airport operations, with

[147] National AI Strategy 2020-2045 (Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045)
[148] "IndoNLP," *IndoNLP website*, https://indonlp.github.io/, accessed 29 November 2024.
[149] "Indonesia won't go with the flow on data," *East Asia Forum*, https://eastasiaforum.org/2022/08/10/indonesia-wont-go-with-the-flow-on-data/?utm, 10 August 2022.
[150] "Realising Trustworthy and Inclusive Artificial Intelligence for Indonesia," *IBM Center for The Business of Government*, 2024.

attackers demanding a US$8m ransom. This incident underscores the urgent need for robust cybersecurity measures to safeguard sensitive data.[151]

To address these challenges, the Indonesian government has initiated several policy measures, including:

- Indonesia's National AI Strategy 2020-2045 focuses on developing robust cloud infrastructure, secure data-sharing systems, and enhancing government and industrial datasets to foster an environment conducive to AI innovation. It promotes data standardization, sharing, ethical AI development, and data privacy.
- The One-Data Indonesia initiative (Presidential Regulation No. 39/2019) aims to improve data management and sharing by establishing standards and protocols for data collection, management, and sharing, promoting interoperability and accessibility, and creating a centralized repository of accurate, up-to-date, and integrated data for government agencies.
- The Personal Data Protection Law serves as the primary authority for formulating policies and strategies for personal data protection, supervising data protection operations, enforcing violations, and facilitating alternative dispute resolution. However, ongoing data leaks and ransomware attacks pose challenges, and the regulations remain too broad to effectively address privacy and data protection in AI development.

1.3.8. Underutilization of high-performance computing facilities

Indonesia has made great effort in developing HPC infrastructure, particularly through the National Research and Innovation Agency (BRIN). However, they still pose challenges such as underutilization of existing HPC facilities, low domestic interconnection bandwidth, and sustainable funding issues.[152] However, there are a lot of efforts from both public and private sectors to enhance the country's HPC landscape and provide access to computing resources for AI research and development.

The High-Performance Computing facility (hpc.brin.go.id), established by BRIN in 2013 and made freely accessible in 2014, supports researchers, students, and lecturers, and has been aiding industrial activities since 2018. Additionally, AI labs formed through partnerships between universities and enterprises, such as the Tokopedia-UI AI Centre for Excellence and BINUS University's AI Research Centre, democratize access to computing infrastructure for researchers.

In the private sector, telecommunications companies like Indosat Ooredoo Hutchison (IOH) and PT Telkom Data Ekosistem, along with global players (i.e., Huawei, Alibaba)

[151] "More than 40 Indonesian agencies hit by cyberattack on data centres," *Reuters*, https://www.reuters.com/world/asia-pacific/more-than-40-indonesian-agencies-hit-by-cyberattack-data-centres-2024-06-26/?utm, 26 June 2024.
[152] "Indonesia HPC, Grid Infrastructure, and Its Connectivity," *Brin*, https://indico.cern.ch/event/1411901/contributions/6077357/attachments/2919949/5124962/ATCF8-Indonesia.pdf, 3 September 2024.

are expanding their data centre offerings in Indonesia to support AI workloads. For instance, in September 2022, Huawei Cloud announced plans for a new data centre region in Indonesia to enhance local businesses' access to advanced cloud services for AI development.[153] Furthermore, in December 2024, BDx Indonesia, in partnership with Indosat Ooredoo Hutchison and Lintasarta, launched the country's first sovereign AI data centre, powered by renewable energy and equipped with NVIDIA's AI platform, aiming to position Indonesia as SEA's AI hub.[154]

[153] "Huawei Cloud to Launch the Indonesia Region," *Huawei Cloud*, https://www.huaweicloud.com/intl/en-us/news/20220929152536748.html, 29 September 2022.
[154] "BDx Data Centers Introduces Indonesia's First Sovereign AI Data Center, Built With NVIDIA Accelerated Computing," *Antara*, https://en.antaranews.com/news/336917/bdx-data-centers-introduces-indonesias-first-sovereign-ai-data-center-built-with-nvidia-accelerated-computing?utm, 4 December 2024.

2. Philippines

2.1. Government strategies, regulation and institutional frameworks on AI in education

The Philippines currently lacks a national government agency for overseeing AI use. Instead, the responsibility for AI development and governance is shared among several government agencies and bodies, each playing a distinct role in promoting, regulating, and supporting AI initiatives. The key entities involved include:

- Department of Trade and Industry (DTI): DTI fosters innovation and supports AI initiatives through programs such as the Startup Assistance Program.
- Department of Education (DepEd) and Commission on Higher Education (CHED): These agencies oversee AI initiatives in education, nurturing future AI talent, while DTI focuses on workforce upskilling and reskilling. The Technical Education and Skills Development Authority (TESDA) manages technical and vocational education and training (TVET) programs in the Philippines.
- Department of Science and Technology (DOST): The main government agency coordinating and promoting scientific and technological research in the Philippines, overseeing councils like the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) that support AI initiatives.
- Department of Information and Communications Technology (DICT): DICT develops and promotes ICT in the Philippines, creating policies that support AI and digital technology growth.

On May 5, 2021, the DTI launched the National AI Strategy Roadmap. This roadmap emphasizes four strategic dimensions, including Digitization and Infrastructure, Workforce Development, Regulation, and Research and Development. The roadmap identifies major challenges in developing an AI ecosystem, including the need to upgrade network infrastructure, increase cloud resources, improve data access, and build an AI-ready workforce.

On July 3, 2024, the DTI, with support from ADB, introduced the National Artificial Intelligence Strategy Roadmap 2.0 (NAISR 2.0) and the Centre for AI Research (CAIR). This updated roadmap builds on the initial 2021 framework, integrating advancements like GenAI and addressing emerging issues such as ethics and governance. However, public information on these initiatives remains limited.

The Philippines currently lacks legislation specifically regulating AI or a comprehensive set of AI guidelines. However, some existing laws may apply to AI systems:

- Data Privacy Act of 2012:[155] This law ensures that learners' information is protected and handled responsibly by educational institutions.

[155] "Republic Act 10173 - Data Privacy Act of 2012," *National Privacy Commission*, https://privacy.gov.ph/data-privacy-act/#w3.

- Intellectual Property Code: This framework protects various forms of intellectual property, including patents, copyrights, trademarks, and trade secrets, applicable to AI innovations. However, current policy states that copyrightable works must be created by a "natural person." The Intellectual Property Office of the Philippines (IPOPHL) is discussing how to address copyright for products partially generated by AI technology.
- Pending Legislation: Several relevant bills are currently in the House of Representatives, for example:
  - House Bill No. 7396 – Artificial Intelligence Development and Regulation Act
  - House Bill No. 7913 – Artificial Intelligence Regulation Act
  - House Bill No. 9448 – Protection of Labor Against Artificial Intelligence Automation Act
- Draft Guidelines: In April 2024, the DICT released a draft memorandum outlining principles and guidelines for the ethical and trustworthy use of AI in government, based on international frameworks like the ASEAN AI Guide and OECD AI Principles.[156]

2.2. AI applications in education

In 2023, a survey of Instructure revealed that Filipino educators and students are familiar with GenAI (42% and 43%, respectively). Educators use GenAI tools mostly for creating assignment/test materials (62%), personalized learning (53%), and research and writing (56%). Meanwhile, students commonly use AI for research and writing (83%) and test preparation, such as practice questions and study guides (52%). The market offers some AI-powered products aimed at enhancing the experience and helping learners, educators, and administrators. Outlined below are some potential applications:

2.2.1. Personalized learning system

- Application name: Frontlearners (https://frontlearners.com/teachaid/)
- Target users: Students
- Suppliers/Developers: Frontlearners
- Application details:

Established in 2013, Frontlearners is a pioneering Philippine-based EdTech application committed to transforming the learning experience for students across all grade levels. Its interactive e-learning platform provides comprehensive and high-quality educational resources designed to enhance student engagement and mastery.

Frontlearners offers a wide range of materials, catering to students from Grade 1 to Senior High School. These include modules specifically tailored for Senior High School

[156] "DPA Digest: DPA Digital Digest: Philippines [2024 Edition]," *Digital Policy Alert*, https://digitalpolicyalert.org/digest/dpa-digital-digest-philippines, 29 October 2024.

and resources aligned with the Philippine Science High School National Comprehensive curriculum. Subjects span a broad spectrum, such as Araling Panlipunan, Arts, English Grammar, Filipino Gramatika, and more.

To address the persistent challenge of unreliable internet connectivity in various regions, Frontlearners has made its platform accessible offline, enabling students to continue learning anytime, anywhere. The platform also features AI-powered Adapted Released Items, which provide personalized quiz experiences. Students can retake quizzes multiple times, promoting mastery learning and ensuring they fully understand the material.

2.2.2. Streamlining admin tasks

- Application name: Edusuite (https://www.edusuite.asia/home)
- Target users: Administrators, faculty, teachers, students, and parents
- Suppliers/Developers: Edusuite Inc.
- Application details:

Established in 2017 by CEO Niel Dagondon and CTO Calen Legaspi, Edusuite raised Php12m (US$235,000) from the Manila Angel Investors Network (MAIN). By 2020, Edusuite was serving over 25,000 students across more than 10 institutions, including Ateneo High School, CIIT College of Arts and Technology, and Benedictine International School.[157] Edusuite delivers versatile solutions to meet the varied needs of educational institutions, including:[158]

- K12 for enhancing enrolment, grading, and deliberation processes in basic education
- Uni for leveraging smart algorithms to support decision-making in higher education
- Admissions for managing large volumes of applications and improving applicant communication

The platform's cloud-based system allows students to select courses with real-time availability updates, streamlining registration and fee payments. Edusuite's integration of AI and smart algorithms enables schools to optimize resources and make informed decisions.[159]

[157] "PH educ startup touts AI-powered school management system," Newsbytes.PH, https://newsbytes.ph/2020/07/30/ph-educ-startup-touts-ai-powered-school-management-system/, 30 July 2020.
[158] "Products," *Edusuite*, https://www.edusuite.asia/products, accessed 16 January 2025.
[159] "Home," *Edusuite,* https://www.edusuite.asia/home, accessed 16 January 2025

2.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

2.3.1. Lack of a national policy or guidelines for the use of AI in education

There are currently no official guidelines from the DepEd for students and teachers on the use of AI in education. However, the DepEd is studying the potential of developing policy standards or guidelines to ensure the responsible use of AI in schools, including its extent and limitations.[160]

There are also no specific national guidelines or regulations that exclusively address AI-giarism in education. Most educational institutions in the Philippines have their own academic integrity policies that define plagiarism and specify the consequences for academic dishonesty.[161]

Despite the lack of national policies and guidelines at the national level, universities in the Philippines are actively creating their own principles and guidelines for using AI in education:

- The University of the Philippines (UP) has introduced the Principles for Responsible and Trustworthy Artificial Intelligence, which cover general principles, as well as specific guidelines for AI in research and education. It has also formed the UP AI Advancement Committee to develop an AI code of conduct, promote AI research, provide AI literacy and upskilling programs, and enhance digital infrastructure for equitable AI use in teaching and research at the University.[162]
- University of the Philippines Open University (UPOU) released its official Guidelines for the Use of Artificial Intelligence (AI) for Teaching and Learning in January 2024. These guidelines outline how teachers should use AI for course design and delivery. Students are required to properly cite AI-generated content, avoid plagiarism, and inform respondents about AI use in data collection for their coursework. The UPOU is committed to providing training, open educational resources and technologies to ensure that teachers, students, and staff can use AI effectively and ethically.[163]

2.3.2. AI applications not yet integrated in public services in education

Both the DepEd and CHED have not yet integrated any AI applications into their main portals. The National AI Strategy Roadmap does not include specific guidance on applying AI in public service delivery.

[160] "DepEd studying policy on use of AI in schools," *The Philippine Star*, https://www.philstar.com/headlines/2024/10/26/2395424/deped-studying-policy-use-ai-schools, 26 October 2024.
[161] "Promoting institutional values through the development of student academic integrity statements," *MAAP Research Journal*, 30 March 2022, via ResearchGate.
[162] "University of the Philippines Principles for Responsible and Trustworthy Artificial Intelligence," *University of the Philippines website*, https://up.edu.ph/up-principles-for-responsible-artificial-intelligence/, accessed 27 November 2024.
[163] "UPOU Releases Guidelines on AI Use for Teaching and Learning," *University of the Philippines Open University website*, https://www.upou.edu.ph/news/upou-releases-guidelines-on-ai-use-for-teaching-and-learning/, accessed 27 November 2024

Infrastructure limitations significantly hinder the digitalization of public services in the Philippines. Issues such as poor internet connectivity, frequent power outages, and inadequate digital infrastructure in remote areas impede the effective delivery and expansion of digital public services. Additionally, disparities in digital literacy pose a critical challenge, as the lack of digital skills results in unequal access to and use of these services. This issue is further intensified by limited awareness of digital platforms and insufficient training programs.[164]

2.3.3. Digital divide by geography and lack of digital skills of students and teachers

There are significant inequalities in digital access and poor ICT infrastructure, particularly in rural areas, leading to a digital divide among Filipino learners. Several factors contribute to this issue include:

- Poor quality of communications technology: There is a limited number of users and inadequate internet bandwidth speeds.
- High cost of broadband internet: Compared to neighbouring countries, broadband internet in the Philippines is more expensive. The policy environment for affordable broadband is among the least favourable in ASEAN.[165]

Additionally, there is a notable shortage of digital skills and considerable inequalities among students and teachers, especially regarding digital competencies. Data from the 2020-2021 school year reveal several challenges within the digital landscape of public schools, exacerbating these disparities:

- Limited access to computers: While over 80% of public schools have functional computers, the low ratio of computer units to learners, especially in elementary schools (1:19), limits opportunities for both students and teachers to develop essential digital skills.[166]
- Limited internet access: Only 64.2% of elementary schools, 72.2% of junior high schools, and 67.3% of senior high schools have internet access,[167] with just 1.8% offering free public Wi-Fi. This lack of access restricts teachers' ability to use online resources, engage in professional development, and integrate digital tools into their teaching.[168]

[164] "The Public Service Digitalization in the Philippines Towards a National Program to Capacitate Digital Frontliners," *International Journal for Multidisciplinary Research*, 2024.
[165] "Updating policies to upgrade the Internet for all Filipinos," *World Bank Blogs*, https://blogs.worldbank.org/en/eastasiapacific/updating-policies-upgrade-internet-all-filipinos, 25 January 2024.
[166] "Technology in education: a case study on the Philippines," *UNESCO,* 2023.
[167] "The Philippines Basic Education Development Plan (BEDP) 2030," *DepEd website*, https://www.deped.gov.ph/wp-content/uploads/2022/05/DO_s2022_024.pdf, 30 May 2022.
[168] "USAID launches tech-based reading program in NegOcc," *Philippine News Agency website*, https://www.pna.gov.ph/articles/1170464, 23 March 2022.

- Insufficient training and experience for teachers in using technologies in their work.[169]

The Philippines has several initiatives to address the challenges related to digital divide and digital skills:

- Republic Act No. 11927 emphasizes the importance of digital skills, defining them as a combination of behaviours, expertise, and critical understanding necessary for using digital devices and networks. The Act mandates that the Philippine government ensure Filipinos are equipped with these skills.[170]
- Community Learning Centres under the Bureau of Alternative Learning System offer free education, including basic computer classes for out-of-school youth and individuals with disabilities. The DICT also conducts training sessions for PwDs to enhance their ICT skills and improve employment opportunities. These sessions cover topics like Computer and Internet Essentials, Productivity Tools, and Troubleshooting.[171]
- The DICT Laguna Provincial Office leads efforts to boost digital literacy through capacity development sessions tailored for various groups, including senior citizens and PwDs. Training focuses on essential digital skills, such as layout design, smartphone photography, and cybersecurity awareness.[172]
- Tech4ED Program**:** Implemented by the DICT, this program aims to provide digital literacy and ICT resources to underserved and marginalized communities. It offers access to e-learning, e-agriculture, e-health, e-commerce, and e-government services, as well as training and capacity-building for community members.[173]
- The Learning Resource Management and Development System launched by the DepEd: Provides an online library offering free downloadable teaching and learning materials, and ICT literacy programs for primary and secondary education.[174]
- Initiatives by Microsoft: In 2024, Microsoft is launching initiatives to accelerate AI adoption in the Philippines, aiming to provide AI and cybersecurity skills to one million K-12 students. In partnership with the TESDA, Microsoft plans to equip over 100,000 women learners with essential digital skills. Training will be developed in

[169] "Understanding the Use of EduTech in Schools in the Philippines: Recommendations for Effectiveness," *Engineering Science Letter*, April 2023. via ResearchGate
[170] "Republic Act No. 11927," *The LAWPHIL Project*, https://lawphil.net/statutes/repacts/ra2022/ra_11927_2022.html, accessed 18 January 2025.
[171] "Digital Literacy Training for PWDs in the Philippines," *OpenGov Asia*, https://opengovasia.com/2022/09/26/digital-literacy-training-for-pwds-in-the-philippines/, 26 September 2022.
[172] "Bridging the Digital Divide in the Philippines," *OpenGov Asia*, https://opengovasia.com/2024/03/21/bridging-the-digital-divide-in-the-philippines-2/, 21 March 2024.
[173] "Technology in education: a case study on the Philippines," *UNESCO,* 2023.
[174] "Learning Resource Portal," *DepEd Learning Resource Portal website*, https://lrmds.deped.gov.ph/, accessed 21 December 2024.

collaboration with educational institutions, nonprofit organizations, and corporate partners.[175]

- DepEd Order No. 12, Series of 2021, titled "Implementing Guidelines on the Use of ICT in the K-12 Education Program": Provides guidelines for incorporating ICT into the K-12 curriculum. Key points include the integration of ICT across subjects and the requirement for teachers to receive training to enhance their ICT skills, although it may not specifically address AI content.

To address the issue of low quality of communications technology, the government has promoted several programs to enhance internet access to all Filipinos, including:

- Government Partnerships with Telecommunications Companies: To improve the quality of communications technology, the government has allowed new telecommunication companies to invest and provide better internet services. Partnerships with telecommunications companies aim to strengthen connectivity, especially in schools in remote areas.[176]
- Public Education Network (PEN) Program: Established by DICT in partnership with the DepEd, this program fast-tracks the provision of connectivity for all public schools and DepEd offices, allowing learners to have wider access to online learning platforms such as DepEd TV and DepEd Commons.[177]
- National Broadband Plan and Free-Wi-Fi for All (FWFA) Program: These initiatives aim to provide affordable and reliable internet access to all Filipinos, especially those in underserved and unserved areas. The FWFA program provides free internet access in select public places such as parks, airports, and schools.[178]

2.3.4. Lack of AI talents for developing AI applications

According to the World Bank, digital skills among Filipinos are relatively weak compared to neighbouring countries in the region. JobsFit 2022 Labor Market Information Report (DOLE 2021) addressed unmet demand for high-level and middle-level skills in specific job titles such as software development, IT user support, computer network operation, business services, and administration.[179] The National AI Strategy Roadmap 1.0 highlights the scarcity of data experts in industries, particularly those that have begun investing in AI and Data Science.

The government has implemented several initiatives to support AI talents and skills development in the Philippines.

[175] "Microsoft joins U.S. Presidential Trade and Investment Mission and announces targeted initiatives to accelerate AI adoption in the Philippines," *Microsoft*, https://news.microsoft.com/en-ph/2024/03/11/microsoft-joins-u-s-presidential-trade-and-investment-mission-and-announces-targeted-initiatives-to-accelerate-ai-adoption-in-the-philippines/, 11 March 2024.
[176] "Technology in education: a case study on the Philippines," *UNESCO,* 2023.
[177] "DepEd, DICT team up to roll out Public Education Network," *Department of Education website*, https://www.deped.gov.ph/2021/04/19/deped-dict-team-up-to-roll-out-public-education-network/, 19 April 2021.
[178] "Free Wi-Fi for all Midterm Review and Evaluation," *UNDP*, July 2021.
[179] "Digital Transformation of Philippine Higher Education," *World Bank*, 2022.

- The government launched the National AI Strategy Roadmap with the direction to develop an AI-ready workforce through several strategic imperatives. Additionally, the Republic Act No. 11927 established an Inter-Agency Council composed of several administrative agencies tasked with creating policies and programs to ensure that the Filipino workforce possesses the essential digital skills and competencies.[180]
- On March 2024, the DTI signed a MOU with rinna Co., Ltd. to advance AI in the country. The partnership supports the National AI Strategy Roadmap through developing AI skills, making them accessible to diverse youth, and integrating AI into local academic curricula through rinna's AICademy.[181]

The private sectors actively take part in developing the AI skill for Filipinos, including:

- Future Skills Now (FSN) is an initiative of Advocacy group Philippine Business for Education (PBEd). It provides free skills training program for underprivileged Filipino youth aged 18 to 28, aiming to develop essential digital and career skills through work-based training and mentorship by industry experts. Since 2023, the program has provided training in technical skills such as GenAI, data analytics, web design, IT support, cybersecurity, network technology and digital marketing, as well as soft skills including presentation, collaboration, interpersonal relations, agility at work, and problem-solving.[183]
- DTI and Connected Women signed a MOU to equip Philippine women with AI skills to provide job and livelihood opportunities. The partnership provides online skill development, knowledge sharing, cybersecurity, AI education, industry identification and remote work opportunities for women. It aims to equip 300,000 women, especially in underserved areas, with AI and machine learning skills within three years.[184]
- Elevate AIDA (Artificial Intelligence Data Annotation): Implemented by the Aboitiz Foundation and Connected Women, aims to empower vulnerable women, including stay-at-home mothers and displaced workers, with skills to become remote data annotators. By early 2024, Elevate AIDA had trained 1,070 women, resulting in an increase of 8.4 million in household income, achieved through collaborations with stakeholders promoting job development and economic empowerment.[185]

[180] "DNA ASEAN Guide to: How the Use of Artificial Intelligence is Regulated in Southeast Asia," *Drew Network Asia*, 16 July 2024.
[181] "DTI and rinna Co., Ltd unite efforts for AI-Driven growth and advancement in the Philippines," *Department of Trade and Industry website*, https://www.dti.gov.ph/archives/news-archives/dti-rinna-co-ltd-unite-efforts-ai-driven-growth-advancement-philippines/, 27 March 2024.
[183] "PBEd: Continuous skills development of workforce vital in addressing threat of AI," *Philippine Business for Education*, https://pbed.ph/news/pbed-continuous-skills-development-of-workforce-vital-in-addressing-threat-of-ai/, 18 July 2024
[184] "DTI, Connected Women partner to equip Filipinas with AI skills," *Philippine News Agency website*, https://www.pna.gov.ph/articles/1220397, 8 March 2024.
[185] "Tech partnership empowers women through digital skills training," *The Philippine Star*, https://www.philstar.com/business/biz-memos/2024/04/26/2350651/tech-partnership-empowers-women-through-digital-skills-training, 26 April 2024.

2.3.5. Lack of computing resources for AI research and development

The available HPC power in the Philippines is not sufficient to adequately meet the needs of all researchers in the country.[186] The Philippines readily operates mid-size HPC centres and smaller resources around the country. Nonetheless, there is a need to expand the available infrastructure.

There have been initiatives for enhancing access to computing resources for AI researchers and developers in the country:

- The DOST-ASTI provides researchers with computational power necessary for computationally intensive requirements such as molecular simulations, quantum mechanics calculations, and others through Saliksik High-Performance Computing (HPC) cluster.[187]
- Some universities in the Philippines have been active in developing advanced computing infrastructure. The Asian Institute of Management's ACCeSs lab houses the one of the region's fastest AI supercomputers, named 'Super Jojie'. The UP has the "UP Data Commons" HPC and storage facility at its College of Science, UP Diliman, primarily used by faculty and researchers.[188] In 2023, UP's College of Engineering received a significant boost with a new HPC Facility from the UP-Engineering Research and Development Foundation, Inc. (UPERDFI).[189]
- In 2023, a global tech firm introduced a cloud support program in the Philippines to empower emerging tech startups. The program offered eligible startups up to Php20m (around US$350,000) in cloud computing credits. It targeted pre-seed startups without funding and those with seed to series A funding. Successful applicants would receive cloud credits over two years, along with training, access to AI experts, and networking opportunities.[190]

2.3.6. Gender gaps in STEM related education and employment

The Philippines ranks as the top Asian country in the Global Gender Gap Report for 2024, placing 25th globally.[191] While women in STEM possess skills and competencies comparable to men, a gender gap still exists. A study on Filipino youth's perspectives on STEM revealed that girls account for only 43% of STEM enrolments. ICT has the smallest gender gap among STEM fields, with women making up 48% of graduates.

[186] "High Performance Computing (HPC) for Covid-19," *ASEAN Main Portal*, https://asean.org/wp-content/uploads/2023/11/HPC-and-COVID-19-v-25092023-FINAL.pdf, July 2023.
[187] "High-Performance Computing (HPC)," *COARE*, https://asti.dost.gov.ph/coare/wiki/Main/using-coare/hpc/, accessed 28 November 2024.
[188] "UP Data Commons," *Data Commons website*, https://datacommons.up.edu.ph/about-updc/, accessed 16 December 2024.
[189] "UPD CoE receives High Performance Computing (HPC) Facility in turn-over ceremony," *UPD College of Engineering website*, https://coe.upd.edu.ph/2023/02/15/upd-coe-receives-high-performance-computing-hpc-facility-in-turn-over-ceremony/, 15 February 2023.
[190] "Google Launches Initiative for AI Startups in the Philippines," *W.Media*, https://w.media/google-launches-initiative-for-ai-startups-in-the-philippines/, 3 October 2023.
[191] "Global Gender Gap 2024," *World Economic Forum*, 2024.

Additionally, 72% of technical vocational graduates employed in science and technology occupations are men, while only 28% are women.[192]

Initiatives have been launched, aiming to address the gender gaps in STEM education and employment and to ensure gender-sensitive AI solutions:

- AI Dialogue: Gender-Based AI Policy in the Philippines:[193] The initiative was hosted by the DICT, in collaboration with the International Telecommunications Union (ITU), identifying crucial opportunities for gender-sensitive AI policy in the region, specifically:
  - The proposal to establish an AI Societal Impacts Committee, tasked with conducting gender and societal impact assessments for high-risk AI applications
  - The development of Gender and AI Guidelines to support the public and private sectors in creating gender-inclusive AI products
  - The importance of standardizing AI safety across the region, which would include technical standards for every stage of the AI lifecycle, such as the use of gender-disaggregated datasets, testing, and system monitoring
  - The need to invest in women-focused AI networks, training programs, entrepreneurial support, and policy-making involvement
  - Strategies for promoting AI ethics and policy awareness in the Philippines, including advocating for open data and science initiatives, improving adherence to sex-disaggregated data in national databases, and co-developing AI standards for its entire development cycle
  - Integrating data ethics into educational curricula and identifying female role models in AI
- Women in AI (Philippines): Their Masterclass webinar series equips female students with essential skills for thriving in the digital era.[194]
- Scholarships for female students in STEM fields:
  - The ASEAN-UK SAGE Scholarship and British Council Women in STEM Scholarship support women in STEM across ASEAN and other regions, including the Philippines.[195]
  - SHESTEMS Scholarship Awards: UN Women Philippines has initiated its four-year country programs, which include the UN Women Mentoring & Leadership Program. The aim is to empower, support, and cultivate role models for women in STEM. In 2024, scholarships were granted to 12 Filipina STEM college students

[192] "Filipinas stare through the glass ceiling in STEM fields," *UNESCO*, https://www.unesco.org/en/articles/filipinas-stare-through-glass-ceiling-stem-fields, 30 March 2023.
[193] "DICT Partners with ITU to Deliver "AI Dialogue: Gender-Based AI Policy in the Philippines" Workshop," *ICT Knowledge Portal*, https://ictstatistics.dict.gov.ph/dict-partners-with-itu-to-deliver-ai-dialogue-gender-based-ai-policy-in-the-philippines-workshop/, 14 April 2023.
[194] "WAI - Masterclass in the Philippines," *Facebook*, https://www.facebook.com/photo.php?fbid=298156902793859&set=pb.100077986535574.-2207520000&type=3, 12 August 2023.
[195] "Empowering Women in STEM: ASEAN-UK SAGE Women in STEM Scholarships," *British Council*, https://www.britishcouncil.id/en/programmes/education/asean-uk-sage/women-in-stem-scholarships, accessed 13 December 2024.

in need, each with a minimum GPA of 1.75 (cum laude standing), providing at least Php120,000 annually for their education. Recipients must commit to pursuing a career in STEM within the Philippines.[196]

2.3.7. Insufficient investment in AI for education

Data from the OECD indicates that the Philippines has not seen any substantial venture cap investments in AI for education and training since 2019.[197] This is attributed to investors growing increasingly reluctant to fund innovation, especially in the EdTech sector, due to:

- The ongoing decline in macro economy: The International Monetary Fund (IMF) forecasts a continued decline in global growth to 2.9% in 2024, down from 3% in 2023.[198]
- Increasing concerns about data privacy protection: Concerns over high AI deployment costs, data privacy, security risks, and the rapid changes in the education section (e.g. online learning) have further deterred EdTech investors.[199] Recently, Byju's, the leading EdTech company and India's most valuable startup, experienced a misconfiguration that exposed sensitive student data. This incident resulted in the exposure of some students' names, phone numbers, addresses, and email IDs.[200]
- The reduced appeal of online education solutions as demand for online learning has decreased post-COVID-19: Technology sectors like FinTech and MedTech continue to attract increasing investment. When investors in the Philippines were asked about the sectors they intend to explore, the most common response was Fintech, followed by medical and healthcare. Education ranked only third in popularity, despite the survey being conducted in 2020.[201]

[196] "SHE STEMS Scholarship Awards," *HER LEGACY Project website*, https://www.herlegacy.ph/her-stories-she-stems-scholarship-awards, accessed 17 November 2024.
[197] "Total VC investments in AI by country and industry," *OECD.AI*, https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=total-vc-investments-in-ai-by-country-and-industry, 2025.
[198] "What does 2024 have in store for the economy? Leading chief economists give their views," *World Economic Forum*, https://www.weforum.org/stories/2024/01/economic-outlook-2024-recession-inflation/, 15 January 2024.
[199] "Investment in online education groups plummets following rise of AI," *Financial Times*, https://www.ft.com/content/54e8d249-8b95-44df-8bb4-c48ea20c7857, 23 December 2024.
[200] "Byju's exposed sensitive student data, including loan details," *TechCrunch*, https://techcrunch.com/2023/08/25/byjus-student-data-exposed/, 25 August 2023.
[201] "An In-Depth Look at the State of Startups in the Philippines," *Esquire*, https://www.esquiremag.ph/money/industry/startups-in-the-philippines-a00304-20200225-lfrm?s=gmk1rr2fffp4n0h0stvtbvf2sp, 25 February 2020.

3. Malaysia

3.1. Government strategies, regulation and institutional frameworks on AI in education

Malaysia does not have a national AI regulator, with the Ministry of Science, Technology, and Innovation (MOSTI) serving as the primary coordinator, supported by the Malaysia Digital Economy Corporation (MDEC). MOSTI is tasked with establishing AI governance, promoting research and development, and improving digital infrastructure for AI integration.[202]

The Ministry of Higher Education (MOHE) and the Ministry of Education (MOE) lead initiatives for AI talent and skills development, while the Ministry of Human Resources (MOHR) focuses on attracting and retaining AI talent, including empowering and attracting latent AI Talents, especially female AI Talents.

In 2021, the MOSTI released the Malaysia National Artificial Intelligence Roadmap 2021-2025 (AI-RMAP), which aims to create a sustainable AI innovation ecosystem through six strategies. While it emphasizes the role of education in developing AI talent under Strategy 4, the roadmap lacks specific actions for promoting AI in the education sector. The AI-RMAP also proposes national AI use cases for various priority areas, including education.[203]

Malaysia has yet to enact specific legislation for AI applications. Existing laws on data protection, intellectual property, contracts, employment, product liability may also apply. There are also no AI standards in Malaysia. Currently, the government of Malaysia has actively participated in subcommittee ISO/IEC JTC 1/SC 42 of ISO and IEC to safeguard national interest and influence the standards development.

Malaysia follows governance frameworks such as the ASEAN Guide on AI Governance and Ethics and UNESCO's Recommendation on AI Ethics, as part of its membership in these organizations. In September 2024, MOSTI introduced the National Artificial Intelligence Governance and Ethics Guidelines (AIGE), which centres on 7 Responsible AI principles that address key safety aspects to support the AI-RMAP implementation.[204]

3.2. AI applications in education

The Malaysian EdTech market is expected to follow a double-digit growth trajectory and is projected to accelerate further during the forecast period from 2024 to 2028. According to Malaysia Edtech 2024, the Malaysian EdTech market experienced

[202] "DNA ASEAN Guide to: How the Use of Artificial Intelligence is Regulated in Southeast Asia," *Drew Network Asia*, 16 July 2024.
[203] "Artificial Intelligence Roadmap 2021-2025," *Malaysian Science, Technology Information Centre*, https://mastic.mosti.gov.my/publication/artificial-intelligence-roadmap-2021-2025/, December 2023.
[204] The National Guidelines on AI Governance & Ethics, Malaysian Science, Technology Information Centre, https://mastic.mosti.gov.my/publication/the-national-guidelines-on-ai-governance-ethics/, September 2024.

remarkable growth in 2023, achieving a growth rate of 12.7%. The use of AI in higher education in Malaysia is increasing, although it remains largely voluntary.

According to the Malaysian AI Roadmap Survey conducted in 2021, AI adoption and development within academia remains relatively low, at approximately 14%.[205] The market features some AI-enabled solutions designed to enhance the learning experience and support students, educators, and administrators. Outlined below are some examples of potential applications:

3.2.1. Personalized learning system

- Application name: Pandai (https://blog.pandai.org/)
- Target users: Students, teachers, and parents, in which students are the focus
- Suppliers/Developers: Pandai Education
- Application details:

Based in Kuala Lumpur, Pandai has grown rapidly since its launch in January 2020. The platform provides comprehensive practice questions designed to help students build a strong conceptual understanding of key subjects aligned with the Malaysian National Curriculum. To enhance engagement, Pandai incorporates gamification elements, motivating students to self-study effectively. Its advanced diagnostic tools analyse each student's strengths and weaknesses, offering tailored recommendations for lessons and practice to improve performance.

Beyond academics, Pandai also supports extracurricular achievement, providing preparation materials for competitions in mathematics, science, and computational thinking. The Pandai ecosystem extends beyond students with dedicated apps for parents (Pandai Parents) and educators (Pandai Guru). Pandai has received various achievements and recognitions such as YC Summer 2021, SUPERB Winner, MyHackathon Winner, and more.

Pandai's commitment to educational excellence is further strengthened through affiliations with notable organizations, namely the MOE, MOSTI, the National STEM Association, the University of Malaysia, and MDEC.[206]

Ask PBot, the latest feature integrated into Pandai, serves as a personalized study assistant with the following capabilities:[207]

- Human-Like Chatbot: Communicates naturally, making study sessions feel like a conversation with a friend

[205] "Call for contributions: artificial intelligence in education and its human rights - based use at the service of the advancement of the right to education," *United Nations website*, 16 October 2024.
[206] "About Us," *Pandai website*, https://pandai.org/en/about-us, accessed 31 October 2024.
[207] "Meet Ask PBot: Your Ultimate Study Buddy in Pandai!," *Pandai Blog*, https://blog.pandai.org/meet-ask-pbot-your-ultimate-study-buddy-in-pandai/, 14 February 2024.

- Personalized Learning: Adapts to each student's pace, preferences, and learning style to maximize effectiveness
- Real-Time Feedback: Identifies and corrects errors instantly for a more efficient learning process
- Content Variety: Covers a wide range of subjects and topics aligned with the national curriculum, ensuring comprehensive support for all grades
- Emotional Intelligence: Response with empathy, recognizing and addressing the student's emotional state
- Context Retention: Maintains context across sessions, providing a seamless and personalized learning experience

3.2.2. AI applications in education for people with disabilities

- Application name: Hear Me
- Target users: Teachers and students with hearing disabilities
- Suppliers/Developers: Universiti Malaysia Pahang (UMP)
- Application details:

In 2021, researchers from UMP developed an app called Hear Me, designed as a teaching tool for teachers and students with hearing disabilities to learn Manually Coded Malay.

The Hear Me app includes AI capabilities and various other features. The AI feature allows the app to recognize objects from pictures taken and convert them into the correct hand signal codes. Additionally, the app offers various interactive activities to aid the learning process, such as short answer exercises, fill-in-the-blank tasks, and matching activities.

The Hear Me app recently won a gold medal and a special award for the National STEM Association Award and Euro Business-Haller Award categories in the Malaysia Technology Expo COVID-19 Special Edition 2021. This app has secured intellectual property rights and is currently gathering data for project enhancement.[208]

3.2.3. AI applications in education for people with disabilities

- Application name: AI-powered deaf assistance tool and AI-powered sign & speech translator from Microsoft AI4A Hackathon[209]
- Target users: Deaf students
- Suppliers/Developers: Team AI.D and Smart Ears of XiaMen University in the Microsoft AI for Accessibility (AI4A) Hackathon

[208] "Dr. Diyana creates Hear Me app to assist students with special needs", *Universiti Malaysia Pahang Al-Sultan Abdullah*, https://news.umpsa.edu.my/research/dr-diyana-creates-hear-me-app-assist-students-special-needs, 15 July 2021.
[209] "Microsoft hosts first AI for accessibility hackathon in Malaysia and Asia Pacific," *Microsoft Malaysia News Center*, https://news.microsoft.com/en-my/2019/11/07/microsoft-hosts-first-ai-for-accessibility-hackathon-in-malaysia-and-asia-pacific/, 7 November 2019.

- Application details:

Through the initiative, Microsoft AI for Accessibility (AI4A) Hackathon, several AI applications and prototypes for PwDs have been developed. For instance, team AI.D, from Axiata, Monash, and NXP, developed an AI app that helps deaf individuals perceive their environment and be more aware, enabling them to respond and act to stimuli. Team Smart Ears of Xiamen University developed a smart wearable that translates sign language to text and speech to text or sign language using emotion and sound detection.[210] These applications were created solely for participation in the Microsoft Hackathon and have not progressed beyond the competition. As of now, there is no information about any plans to commercialize or launch these applications.

3.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

3.3.1. AI applications not yet integrated in public service delivery in the education sector

The MOE in Malaysia has yet to incorporate AI applications on their websites to enhance customer service. Both the Malaysia Digital Economy Blueprint (MyDIGITAL) and the Malaysia Education Blueprint 2013-2025 aim to improve the scope and quality of public service delivery using digital technologies. Additionally, the AI-RMAP prioritizes funding to implement AI use cases for education and public service during 2024 - 2025, which is from the MOSTI's Malaysia Grand Challenge fund.

3.3.2. Lack of national policies or guidelines on the application of AI in education

MOE has not yet issued any formal guidelines for learners, educators, or administrators regarding the effective, responsible, safe, and inclusive integration of AI in educational settings. However, some governmental departments have issued guidelines or policies to govern AI-relevant aspects in education. Specifically, the Malaysia Computer Emergency Response Team, operating under CyberSecurity Malaysia within the Ministry of Digital, has issued an advisory document titled "ChatGPT and Security Best Practices." This document provides guidance on the secure use of ChatGPT, addressing topics such as security risks, privacy considerations, and the potential misuse of the platform.[211]

The Malaysian Qualifications Agency has also released an advisory note regarding the use of GenAI in higher education. The note recommends that educational institutions

[210] "Microsoft hosts first AI for accessibility hackathon in Malaysia and Asia Pacific," *Microsoft Malaysia News Center*, https://news.microsoft.com/en-my/2019/11/07/microsoft-hosts-first-ai-for-accessibility-hackathon-in-malaysia-and-asia-pacific/, 7 November 2019.
[211] "MA-912.022023: MyCERT Advisory - ChatGPT and Security Best Practices," *Malaysia Computer Emergency Response Team website*, https://www.mycert.org.my/portal/advisory?id=MA-912.022023, 21 February 2023.

develop clear guidelines for academic staffs and students on the use of GenAI applications in teaching, research, and academic writing. Furthermore, it emphasizes the importance of regularly reviewing and updating policies, guidelines, and practices related to GenAI to ensure continuous improvement in academic quality and the strengthening of management frameworks.[212]

3.3.3. Digital divide by geography and gender hindering the application of AI in education

A significant challenge to accessing digital learning and education services is the digital divide, as students in rural and underserved areas often lack high-speed internet and adequate technology infrastructure. Despite Malaysia's efforts to improve access to technology, many students still do not have access to the internet or the necessary devices to access online educational contents. In Malaysia, the gender digital divide is not primarily a matter of internet access. Overall, internet use by both men and women has been increasing over the years, with the gender gap narrowing in the past four years.[213] However, rural females faced a more pronounced digital divide, lagging behind rural males in three dimensions of digital skills.[214]

3.3.4. Lack of digital skills and gender gaps in STEM related education and employment

While Malaysian students demonstrate moderate to high digital skills in basic tasks (e.g., web browsing, social media use), they struggle with more complex skills like coding and programming. Despite government initiatives to incorporate digital skills into the national education system, the status of digital skills among schoolchildren, particularly in rural areas, remains disappointing. The AI-RMAP also specifies the shortage of AI talents in the market represents the biggest issue in AI talent sourcing.

The gender divide has also emerged among schoolchildren with male students surpass females in most areas. A gender divide is evident in all dimensions of digital skills.[215] In Malaysia, 54.05% of female tertiary graduates have completed education in STEM fields overall, with 46% having completed tertiary education specifically in the ICT field. However, Malaysia goes against global trends when it comes to women in STEM education but not in employment. Although women constitute a larger proportion of STEM graduates from local tertiary education institutions, male STEM graduates are

[212] "Advisory note on the use of generative AI in higher education," *Malaysian Qualifications Agency website*, https://www.mqa.gov.my/new/document/2023/edited/MQA%20Advisory%20Note%20No.22023-%20AI%20Generatif.pdf, 2023.
[213] "Malaysia's gender gap in STEM education and employment," *Khazanah Research Institute website*, https://www.krinstitute.org/assets/contentMS/img/template/editor/2303%20Gender%20Gap%20in%20STEM.pdf, 8 March 2023.
[214] "Technology in education: a case study on Malaysia," *UNESCO*, 2023.
[215] Ibid.

hired at higher rates than women.[216] Data from 2021 by Jobstreet shows that women make up only around 35% of the technology workforce in Malaysia overall.[217]

The Malaysia Government has developed many plans and programs to increase the AI skills and competencies for learners, teachers, educators and developers. Some programs and initiatives delivered by both public and private sectors include:

- Strategy 4 of AI-RMAP aims to develop Malaysia's AI talents and skilled workforce by 2025. Strategy 4.3 focuses on increasing the number of AI talents by re-engaging latent talents and creating new ones from the unemployed workforce. The AI-Latent-Workforce-Back-to-Work (AI-LWBW) program, running alongside the Women-in-AI (WAI) program, seeks to empower and attract latent AI talents, especially women.
- The government has implemented various policies for talent and skills development in ICT. The MOE's Digital Education Policy (DEP) aims to ensure digital learning is accessible to all students and foster a competitive, digitally fluent generation.[218] The Malaysia Education Blueprint - Shift 1 emphasizes strengthening STEM education as part of the Kurikulum Standard Sekolah Rendah (KSSR) and Kurikulum Standard Sekolah Menengah (KSSM) initiatives for primary and secondary education. Additionally, MyDIGITAL seeks to cultivate a digitally skilled workforce by enhancing digital education and training programs, including upskilling and reskilling initiatives to prepare Malaysians for jobs in the digital economy.
- The MOE also collaborated with tech companies on several initiatives to enhance digital literacy and education, including digital skill training for teachers in Malaysia. One such initiative is a training program that provided 5,000 public school teachers with certified educator credentials as part of the DELIMa Certification Program in 2021.[219]
- In partnership with NVIDIA, MOSTI and its agency, Malaysian Research Accelerator for Technology & Innovation (MRANTI), have launched the national AI Sandbox pilot program to accelerate AI adoption in Malaysia. The initiative aims to support 900 AI startups and develop over 13,000 AI talents by 2026. The program includes upskilling and reskilling initiatives focused on AI-related skills, equipping the local workforce with the knowledge and expertise to effectively leverage AI in their fields.[220]

[216] "Malaysia's gender gap in STEM education and employment," *Khazanah Research Institute website*, https://www.krinstitute.org/assets/contentMS/img/template/editor/2303%20Gender%20Gap%20in%20STEM.pdf, 8 March 2023.
[217] "Women in Science, Technology, Engineering, and Mathematics (STEM) in the Asia Pacific," *UNDP*, January 2024.
[218] "Call for contributions: artificial intelligence in education and its human rights - based use at the service of the advancement of the right to education," *United Nations website*, 16 October 2024.
[219] "Technology in education: a case study on Malaysia," *UNESCO*, 2023.
[220] "MOSTI: Pioneering the future of AI talent and ethical development in Malaysia," *The Edge*, https://theedgemalaysia.com/content/advertise/mosti-pioneering-the-future-of-ai-talent-and-ethical-development-in-malaysia, 27 May 2024.

3.3.5. The data quality and data privacy to support AI application development remains as a concern

The need to develop an open data sharing systems for AI development and implementation is emphasized in the AI-RMAP and the National 4IR Policy. In 2014, the Malaysian Administrative Modernization and Management Planning Unit (MAMPU), launched the Open Data initiatives by creating the Open Data Portal (data.gov.my) for government data sharing. The portal currently offers several open datasets related to education; however, the number of datasets remains quite limited.

In addition, education databases are held by different agencies with limited collaboration in collecting and sharing data. The quality of open government data also varies widely across agencies.[221] Given the sensitivity of learners' information, related agencies must apply adequate measures to safeguard them. Numerous occurrences have highlighted the risks associated with data management, such as the UiTM data breach in 2019, which resulted in more than a million UiTM students' records being leaked online.[222]

3.3.6. Limited high-performance computing infrastructure to support AI research and innovation

According to the Malaysian AI Roadmap Survey performed in 2021, AI Infrastructure and Data activities are mostly at the initial stage. Malaysia has very limited capacity in terms of compute resources, and there is a significant need for more resources.[223] Currently, Malaysia has several HPC resources, such as the HPC research infrastructure established in Monash University Malaysia to support research. This infrastructure provides powerful computing services that can reduce computing jobs from taking several days to just a few hours.

The government agencies have developed some initiatives to enable access to computing infrastructure for researchers and innovators. For instance, launched in 2024, the MY-AI portal is Malaysia's first national online platform focused on AI resources and issues. Developed and maintained by MIMOS under the MOSTI, the portal aims to support Malaysia's socio-economic growth through technology solutions. It also provides access to HPC resources and links to existing cloud service providers for those in need. A committee of relevant stakeholders evaluates proposals from qualified parties seeking cloud service access.[224]

[221] "Open Government Data in Malaysia: Principles, Benefits, Challenges and The Way Forward," *Khazanah Research Institute website*, https://www.krinstitute.org/assets/contentMS/img/template/editor/KRI%20-%20NetworkedNation%20-%20Chapter%205_latest.pdf.
[222] "Will regulators take action on Malaysian university for admitting data leak?," *TechWire Asia*, https://techwireasia.com/2023/05/will-regulators-take-action-on-malaysian-university-for-admitting-data-leak/, 15 May 2023.
[223] "High Performance Computing (HPC) for Covid-19," *ASEAN Main Portal*, https://asean.org/wp-content/uploads/2023/11/HPC-and-COVID-19-v-25092023-FINAL.pdf, July 2023.
[224] "MOSTI launches MY-AI Portal to propel Malaysia's AI innovation," *MOSTI website*, https://www.mosti.gov.my/wp-content/uploads/2024/07/24052024.1022238388.pdf, 24 May 2024.

4. Cambodia

4.1. Government strategies, regulation and institutional frameworks on AI in education

Currently, Cambodia does not have a national agency for AI governance. Oversight and regulation are distributed among various ministries, with the Ministry of Industry, Science, Technology & Innovation (MISTI) serving as the main coordinator for digital economy initiatives. According to MISTI's AI Landscape Report, a multi-ministerial committee will be established to develop and supervise AI regulations and guidelines, including representatives from MISTI, the Ministry of Education, Youth and Sport (MoEYS), and the Ministry of Posts and Telecommunications (MPTC). This committee will draft new data protection laws, ensure ethical AI development, and monitor AI policy implementation.

MoEYS oversees K-12 and higher education, while the Ministry of Labor and Vocational Training (MLVT) manages technical and vocational education. Under the Cambodia Digital Governance Policy (2022-2035), Strategy 7 focuses on building digital human capital, with MoEYS and MLVT responsible for fostering digital literacy and integration in education. The Cambodia Academy of Digital Technology (CADT), established by MPTC, is the national flagship institution for digital technology research and education, particularly in AI and Data Science.[225] The CADT advises MPTC on the "Digital Skills Development Roadmap for Cambodia."

Cambodia has yet to introduce a National AI Strategy but plans to develop one. A recent guiding paper by MISTI, titled "Artificial Intelligence Landscape in Cambodia: Current Status and Future Trends", is a crucial step toward formulating AI policies. This report emphasizes that the forthcoming National AI Strategy will prioritize building a skilled workforce and applying AI to address key national challenges, including challenges in education. In the education sector, MISTI suggests using AI to enhance the quality and accessibility of education by designing personalized learning experiences that cater to individual student needs. MISTI also highlights the importance of responsible AI research and the creation of trustworthy AI ecosystems.[226]

Currently, Cambodia lacks specific AI-focused policies and regulations. Existing frameworks, such as the Cambodia Digital Government Policy (2022-2035)[227] and the Cambodia Digital Economy and Society Policy Framework (2021-2035),[228] stress the importance of expanding AI applications and establishing a data-driven governance

[225] "Cambodia charts a path to AI integration," *Khmer Times*, https://www.khmertimeskh.com/501597711/cambodia-charts-a-path-to-ai-integration/, 26 November 2024.
[226] "AI Landscape in Cambodia: Current Status and Future Trends," *Policy Pulse website*, https://policypulse.org/publications/articles/ai-landscape-in-cambodia-current-status-and-future-trends/, 29 May 2023.
[227] "Cambodia Digital Government Policy 2022-2035," *Ministry of Post and Telecommunications website*, https://mptc.gov.kh/en/2022/04/cambodia-digital-government-policy-2022-2035/, January 2022.
[228] Cambodia Digital Economy and Society Policy Framework 2021–2035, *Ministry of Post and Telecommunications website*, https://mptc.gov.kh/en/2023/06/cambodia-digital-economy-and-society-policy-framework-2021-2035/, May 2021.

system.[229] However, these policies primarily address the broader context of the fourth industrial revolution and promote AI development within digital government transformation efforts.

The government has released policies to encourage digital integration in education. The Education Strategic Plan (2024-2028)[230] advocates for the use of digital technology in education and outlines methods for adopting technologies such as adaptive learning, learning games, digital experimentation, and simulation. To support this, MoEYS will enhance teacher capacity, equip schools with digital facilities, and collaborate with stakeholders to improve internet access for schools. Additionally, the Policy and Strategy on Information and Communication Technology (ICT) in Education (2018)[231] focuses on modernizing teaching and learning through ICT integration and capacity building.

Cambodia currently lacks specific legislation to govern AI-related risks and has not enacted comprehensive data protection laws. Privacy and data protection are addressed in various existing laws, including the Law on Electronic Commerce (2019), the Constitution, Civil Code, the Laws on Telecommunications, the Press Laws. The government is working on a draft Cybercrime Law to tackle cybercrime, cybersecurity, and data protection issues. Cambodia also aligns with international governance frameworks, such as the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) and the ASEAN Guide on AI Governance and Ethics (2024), which could serve as a foundation for developing its own AI regulations.

4.2. AI applications in education

Cambodia's EdTech ecosystem has evolved significantly, supported by key public and private sector stakeholders and development partners.[232] The EdTech landscape includes various products and services, such as websites, platforms, and mobile applications. Currently, there are about 24 EdTech companies in Cambodia, with notable players including KhemaraSoft, Sala, OneSala, and Feynman Cambodia. Their offerings primarily consist of school management software, online learning management systems, e-learning platforms with multidisciplinary courses, mobile learning applications, multilingual dictionary apps, and educational games for children. However, the availability of AI-integrated products for learners, educators, and administrators remains limited. Outlined below are some local potential applications:

[229] "Discussion Paper on the Responsible Development and Use of Generative AI in ASEAN," *AI Asia Pacific Institute website*, https://aiasiapacific.org/wp-content/uploads/2024/11/Final-Discussion-Paper-To-be-published-5-nov-2024.pdf, May 2024.
[230] "Education Strategic Plan 2024 – 2028," *Ministry of Education, Youth and Sport website*, https://moeys.gov.kh/storage/uploads/documents/67316f9d3a57f.pdf, June 2024.
[231] "Policy and Strategy on Information and Communication Technology in Education," *Open Development Cambodia website*, https://data.opendevelopmentcambodia.net/laws_record/policy-and-strategy-on-information-and-communication-technology-in-education/resource/687a06db-fe5e-4608-9497-e2a2ab6a44e5, May 2018.
[232] "EdTech in Cambodia: A Rapid Scan", *EdTech Hub*, May 2024.

4.2.1. Personalized learning system

- Application name: AKHARA (available for download on popular app stores)
- Target users: Students, teachers, and parents, in which students are the focus
- Suppliers/Developers: Centre of Digital and Distance Education of the Ministry of Education, Youth, and Sport
- Application details:[233]

AKHARA, which stands for Enhancing Knowledge, Capacity Building, and Improving Science and Technology Learning Methods through Diverse Digital Content, is an English study application launched by the Ministry of Education's Centre for Digital Education and Distance Education in February 2024.

This innovative app focuses on developing reading, listening, and writing skills, particularly for students transitioning from primary to higher education. AKHARA compiles Khmer literary texts translated into English from current textbooks, aligning lessons with grade levels and utilizing AI technology to enhance the learning experience.

Designed to tackle the challenges of limited reading proficiency and outdated educational resources-especially in science and technology-AKHARA offers a practical solution in the digital transformation era. The app plays a critical role in promoting equitable, high-quality, and lifelong educational opportunities.

4.2.2. Virtual tutor tool

- Application name: GateMaster.AI (https://gatemaster.ai/)
- Target users: Students
- Suppliers/Developers: Codingate Technology
- Application details:

GateMaster.AI, launched during Codingate Technology's 10th-anniversary celebration on March 28, 2024, is an innovative platform designed to support students in their academic and career development.

By submitting a valid Student ID Card, users gain access to a specialized package that enhances their learning journey. This package includes AI-driven educational tools and resources tailored to individual learning needs, providing personalized study assistance.

GateMaster.AI's advanced personal AI assistant evolves with each interaction, improving its understanding of user preferences and delivering customized recommendations. Additionally, the platform connects students with industry

[233] "Ministry introduces 'AKHARA' app for English study," *Khmer Times*, https://www.khmertimeskh.com/501444004/ministry-introduces-akhara-app-for-english-study/, 22 February 2024.

professionals, bridging the gap between education and career readiness by offering valuable guidance and insights into potential career paths.

4.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

4.3.1. AI applications not yet integrated in public service delivery in the education sector

The MoEYS currently operates several information systems, including the Education Information Management System (EMIS), Human Resource Information Management System (HRMIS), and School Information System (SIS). However, these systems have not yet integrated AI technology in providing public services.

- EMIS: Designed to oversee, update, and share educational data with the public, EMIS includes information on school mapping, school report cards (covering school type, principal, teaching staff, student numbers, student flow rates, infrastructure, and budgets), as well as water, sanitation, hygiene, and national and provincial education statistics.[234]
- HRMIS: This system manages and enhances the efficiency of human resource management within the education sector. The Ministry has been collaborating with UNESCO to upgrade it since 2021.[235]
- SIS: Officially launched in early 2024, SIS aims to improve the monitoring of student learning, facilitate teacher-parent communication, and enhance digital school management for primary, secondary, and high schools.[236]

In the Education Strategic Plan 2024-2028, the Ministry aims to improve and harmonize these systems to ensure data accuracy, facilitate analysis, and inform policy decisions. However, the specific methods for enhancing these systems are not detailed, necessitating further consultation to understand the Ministry's plans, including the potential integration of AI to improve data accuracy and analysis for policymaking. Additionally, it has been noted that MoEYS has not yet provided public services through its main portal.

4.3.2. Low digital literacy among teachers and students, limited teacher training in ICT and digital pedagogy, and lack of formal training in AI usage for students and teachers

Several obstacles hinder the advancement of digital education in Cambodia, including the digital literacy levels of teachers, students, and parents; teachers' capacity for

[234] "Education Information Management System," *EMIS website*, https://emis.moeys.gov.kh/#/dashboard, accessed 5 January 2025.
[235] "MoEYS takes steps to Upgrade Human Resource Management Information System," *UNESCO*, https://www.unesco.org/en/articles/moeys-takes-steps-upgrade-human-resource-management-information-system, 29 January 2021.
[236] "SIS future-proofing schools," *Phnom Penh Post*, https://www.phnompenhpost.com/post-in-depth/sis-future-proofing-schools, 18 March 2024.

effective ICT integration; and the support needed for ongoing professional development.[237] The challenge of low digital literacy in Cambodia has been acknowledged as in the MPTC' statement that "about 30% of Cambodians have a basic level of digital literacy and access to the internet and digital technology, while around 70% do not."[238]

A recent study indicated that nearly 90% of Cambodian students had utilized AI-powered tools like Grammarly, QuillBot, or ChatGPT. However, around 70% of these students reported that they had not received any formal training on how to use AI tools.[239]

Educators in Cambodia have not undergone any training to effectively implement AI in their classrooms. They express a desire for training focused on how to integrate AI tools into their lesson planning and student evaluation processes.[240]

There are several initiatives by the government and other stakeholders that aim to enhance digital skills for students and teachers:

- Education Technology Roadmap (2022):[241] The government plans to address the technology skills gap among students and teachers by (i) integrating digital/technology literacy subjects into the national curriculum at the secondary level during the 2028-2030 period, (ii) conducting digital literacy/technology workshops for students and teachers every three years from 2022 to 2030, and (iii) offering hybrid pedagogy courses every three years to help teachers in incorporate multimedia and ICT technology into their classes. The government intends to collaborate with the international community and the private sector to achieve the last two goals, leveraging private funding.
- Education Strategic Plan 2024-2048: The MoEYS will implement capacity building program on artificial intelligence in education to enhance teaching and learning.
- USAID's Digital Workforce Development Project:[242] A US$15m initiative launched in collaboration with the MoEYS and the University of California, Berkeley, focusing on developing digital literacy in youth education.
- Kampuchea Action to Promote Education (KAPE):[243] As the largest local non-governmental organization (NGO) in Cambodia's education sector, KAPE equips

[237] "Cambodia Digital Education Landscape Scan," *EdTech Hub*, https://docs.edtechhub.org/lib/DNTQUVAC, March 2023.
[238] "Cambodia Lags in Digital Literacy," *Kiripost*, https://kiripost.com/stories/cambodia-lags-in-digital-literacy, 22 March 2022.
[239] "Integrating Artificial Intelligence in Higher Education: A Case Study of Cambodian Universities," *European Journal of Theoretical and Applied Sciences*, 2024.
[240] "Generative AI: Challenges and Opportunities in the Higher Education Sector in Cambodia," *Asia-Pacific Conference on Economics & Finance*, 2023, via Springer.
[241] "Cambodia EduTech Roadmap," *Open Development Cambodia website*, https://data.opendevelopmentcambodia.net/library_record/education-technology-roadmap, 2022.
[242] "USAID and the University of California at Berkeley launch USAID'S Digital Workforce Development Project in Cambodia," *Khmer Times*, https://www.khmertimeskh.com/501030860/usaid-and-the-university-of-california-at-berkeley-launch-usaids-digital-workforce-development-project-in-cambodia/, 24 February 2022.
[243] "Welcome to KAPE - Kampuchea Action to Promote Education (KAPE)," *KAPE website*, https://www.kapekh.org/, accessed 17 December 2024.

schools with digital devices and offers 1-3 hours of digital literacy and ICT classes per week for primary and secondary students. KAPE provides digital literacy training and on-site support, employing mobile learning strategies through its 21st Century Library facilities. The organization recently launched the "Improving Digital Education for All Learners" (IDEAL) program in collaboration with ChildFund Korea and MoEYS, aiming to equip 12 selected schools with computer labs, laptops, tablets, LCD projectors, smart TVs, and renovated libraries.[244]

- Digital Literacy Initiative (DLI):[245] This program, a collaboration between MoEYS, the Ministry of Labor and Vocational Training (MLVT), and the Dariu Foundation, facilitated by Swisscontact, aims to transform the digital education landscape. Its goal is to integrate youth into the digital economy by providing comprehensive digital literacy education and fostering an environment conducive to innovation and entrepreneurship.

4.3.3. Shortage of AI talents and low proportion of women in STEM education and employment

Cambodia faces a shortage of skilled professionals who can enhance AI capabilities, generate innovative ideas, and implement solutions.[246] This issue arises from a lack of qualified instructors, limited AI courses offerings, and broader challenges in Cambodia's ICT education, including a lack of standardized curriculum, language barriers, under-qualified faculty, and high dropout rates. According to the MoEYS, only 53 of Cambodia's 123 higher education institutions offer digital-skills programmes.[247]

It is noteworthy that less than 11% of students enrolled in digital programs in Cambodia are women. The representation of women in STEM fields has been gradually increasing; however, they continue to be underrepresented in engineering disciplines, including ICT. A significant gender gap persists in the STEM tertiary education programs, with women making up 16.68% and men 83.32% of those obtaining STEM degrees as of 2024,[248] and women are also less likely to hold STEM jobs.[249]

Several policies and initiatives have been launched by the government and the private sector to develop AI talent and empower young women to pursue careers in STEM:

[244] "Digital Education Program to be implemented in Phnom Penh and Kandal Province," *Khmer Times*, https://www.khmertimeskh.com/501506339/digital-education-program-to-be-implemented-in-phnom-penh-and-kandal-province/, 14 June 2024.
[245] "Digital Literacy Initiative (DLI)," *Swisscontact website*, https://www.swisscontact.org/en/projects/digital-literacy-initiative-cambodia, accessed 17 February 2024.
[246] "AI Landscape in Cambodia: Current Status and Future Trends," *Policy Pulse website*, https://policypulse.org/publications/articles/ai-landscape-in-cambodia-current-status-and-future-trends/, 29 May 2023.
[247] "Navigating the open road to a new digital economy," *Focus Cambodia*, https://focus-cambodia.com/article/navigating-open-road-digital-economy/, 1 December 2023.
[248] "Global Gender Gap 2024," *World Economic Forum*, 2024.
[249] "A Mixed-Methods Study on Women's Participation in Post-Secondary STEM Education and Careers in Cambodia," *Development Policy Centre*, https://devpolicy.org/2024-Australasian-AID-Conference/AAC2024_5f_You.pdf, 2024.

- "AI Landscape in Cambodia: Current Status and Future Trends" Report: The MISTI emphasizes "Invest in People" as a strategic pillar for an AI-powered Cambodia. Key recommendations include: (i) promoting digital literacy programs focused on AI and STEM education, (ii) designing policies to increase demand for AI and digital talent in both sectors (e.g., tax credits for workforce training), (iii) enhancing student access to practical labs through public-private partnerships for internships, (iv) developing TVET in ICT fields, including AI, and (v) offering scholarships and incentives for Cambodians to study abroad, supported by government, industry funding, international cooperation and co-funding.
- Cambodia's Science, Technology & Innovation Roadmap 2030: MISTI aims to build human capital by enhancing readiness in Science, Technology and Innovation (STI). Specific targets include: (i) raising the proportion of STEM graduates to at least 50% by 2030, (ii) developing Master's and PhD curricula in collaboration with the private sector by 2024, and (iii) ensuring at least 40% of STEM graduates are women by 2030. However, public information on the implementation progress is limited.
- AI readiness initiatives: The government is enhancing AI readiness by fostering open-source AI communities, introducing AI courses at universities, and creating digital platforms for businesses.[250]
- Local institutions: The CADT and the Institute of Technology of Cambodia have begun offering AI-related courses to nurture local talent.
- Centre for AI Innovation (CEAI):[251] Established in 2023 under the Cambodian Economic Development Fund and endorsed by the Prime Minister at the ASEAN Leadership and Partnership Forum 2022, CEAI aims to bridge the gap in AI education, and make AI accessible to professionals, students, and policymakers, even without prior training. It seeks to ensure that 95% of Cambodians have access to AI knowledge and applications. CEAI will provide education and resources, and organize virtual and physical events, including workshops and discussions on current and future challenges in Cambodia.
- STEM4Women:[252] Implemented from 2016 to 2018, this initiative empowers young Cambodian women to pursue STEM education through two-year vocational degrees. It provides access to post-secondary education, career counselling, and support for transitioning into the workforce. Participants benefit from free tuition and accommodation funded by the Thai government, along with significant discounts from local educational institutions.

[250] "AI Landscape in Cambodia: Current Status and Future Trends," *Policy Pulse website*, https://policypulse.org/publications/articles/ai-landscape-in-cambodia-current-status-and-future-trends/, 29 May 2023.
[251] "Centre for AI Innovation Launched in Cambodia," *Centre for AI Innovation (CE.A.I) website*, https://ceaiglobal.com/2023/01/16/ceai-cambodia/, 16 January 2023.
[252] "STEM4Women project," *KAPE website*, https://www.kapekh.org/files/report_file/64-en.pdf, accessed 18 January 2025.

- STEM Sisters:[253] Spearheaded by the STEM Education Organisation for Cambodia (STEMEOC), this initiative empowers young women to pursue STEM careers. It aims to dismantle barriers and create opportunities through workshops, mentorship programs, and interactive activities, equipping participants with the skills and confidence needed to excel in traditionally male-dominated industries.

4.3.4. The gender digital divide

The gender digital divide might limit women's ability to participate in the digital world, including the use of AI applications in education. Cambodia ranks 102nd on the Global Gender Gap Index, highlighting significant gaps in access to the digital economy and participation in the AI sector. The digital divide is clearly illustrated by the significant gender gap in internet usage, which stands at 34%. Rural women exhibit the lowest levels of internet awareness and usage, and there is a 12% disparity in access to internet-enabled phones. In Cambodia, women are 20% less likely to own a mobile phone, with rural women having the lowest rates of mobile phone ownership.[254]

4.3.5. Limited research facilities and R&D capacity in higher education institutions

Specific directions for establishing AI laboratories in universities are not clearly stated in the national policies. Currently, examples of AI laboratories in Cambodia include the AI lab at the CADT and the DCLab at the Institute of Technology of Cambodia. Several challenges that may hinder the establishment of AI labs in Cambodia includes:

- Research facilities and laboratories are not fully functional and are available only in a few public higher education institutions.
- Cambodian universities and public research institutions lack the capacity to conduct high-quality R&D activities.[255]

4.3.6. Difficulties in obtaining high-quality, unbiased datasets for training AI systems and limited infrastructure for data storage and processing

Researchers in the country often struggle to obtain high-quality, unbiased datasets for effectively training AI systems. Additionally, limited infrastructure for data storage, sharing, and processing, combined with the lack of strong data protection and governance frameworks, complicates the ethical collection and use of data. The country also faces high costs for data storage and processing, as well as a shortage of technical expertise in AI, all of which hinder effective data handling and AI model development.[256]

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[253] "STEM Sisters," *STEM Education Organisation for Cambodia website*, https://stemcambodia.ngo/project/stem-sisters/, accessed 18 January 2025.
[254] "After Access: ICT Access and Use and Cambodia and the Global South," *LIRNEasia*, https://lirneasia.net/wp-content/uploads/2018/11/LIRNEasia-AfterAccess-ICT-access-and-use-in-Cambodia.pdf, 7 November 2018.
[255] "Promoting higher education quality in Cambodia: Challenges and recommendations," *Cambodian Journal of Educational Research*, 24 July 2023, via ResearchGate.
[256] "AI Landscape in Cambodia: Current Status and Future Trends," *Policy Pulse website*, https://policypulse.org/publications/articles/ai-landscape-in-cambodia-current-status-and-future-trends/, 29 May 2023.

Another critical issue is the absence of a comprehensive national data centre equipped to store data and provide computing resources.[257]

Some of the policies and initiatives that have been launched to address these challenges include:

- National Data Centre: The MISTI has recommended strategic investment in building a robust data infrastructure to facilitate the development of the AI sector, particularly into developing a national data centre. To implement this, the construction of a US$30m National Data Centre has been initiated by the MPTC, which is set to be completed by 2025. This centre will collect and store national data, including government and corporate information from key sectors.[258]
- Local Language Datasets: While the policies do not explicitly mention developing local language datasets, MISTI recognizes the need to invest in Khmer Natural Language Processing (NLP) to enhance AI applications, such as conversational chatbots in Khmer, and other applications built on NLP requiring the local language.[259] In March 2023, the MPTC announced discussions with OpenAI to create a Khmer-language version of ChatGPT for public use. The government may also explore developing Khmer language datasets for AI training.[260]
- Open Development Cambodia (ODC):[261] Established in 2011 by the East-West Management Institute, ODC is an open-source portal that aggregates and shares data about Cambodia. It collects information from various sources, including government agencies, NGOs, and academic institutions, and publishes it in open formats. The portal currently offers datasets in Khmer and other indigenous languages under the “Access to Education” topic, covering national education policies, public education statistics, and digital educational resources like math learning, Khmer alphabet lessons, children’s story videos, data literacy, and cybersecurity training.

4.3.7. Lack of high-performance computing infrastructure

Cambodia currently lacks significant HPC infrastructure for AI research and development, which presents major challenges for advancing complex AI projects. The

[257] “Cambodia Digital Government Policy 2022-2035,” *Ministry of Post and Telecommunications website*, https://mptc.gov.kh/en/2022/04/cambodia-digital-government-policy-2022-2035/, January 2022.
[258] “Ministry building $30 million National Data Center,” *Khmer Times*, https://www.khmertimeskh.com/501327685/ministry-building-30-million-national-data-center/, 21 July 2023.
[259] “AI Landscape in Cambodia: Current Status and Future Trends,” *Policy Pulse website*, https://policypulse.org/publications/articles/ai-landscape-in-cambodia-current-status-and-future-trends/, 29 May 2023.
[260] “Ministry using ChatGPT AI to ‘ease workload’; Khmer version planned,” *Phnom Penh Post*, https://www.phnompenhpost.com/national/ministry-using-chatgpt-ai-ease-workload-khmer-version-planned, 12 March 2023.
[261] “Open Development Cambodia,” *Open Development Cambodia website*, https://opendevelopmentcambodia.net/, accessed 4 March 2023.

high cost of specialized hardware often makes it prohibitively expensive for organizations.[262]

In 2023, the MISTI launched the BIS Supercomputer to enhance the country's computing capacity.[263] This supercomputer is a vital component of the computing infrastructure managed by the Ministry, dedicated to promoting HPC research and providing advanced services to support the national R&D community. It plays a crucial role in Cambodia's dynamic R&D ecosystem by delivering HPC services to universities, academic institutions, and the private sector. The BIS Supercomputer drives advanced computational research, fosters cloud-based workplaces, and strengthens partnerships while increasing visibility in the field. Its resources include General Purpose Computing, HPC, and Storage and Networking.

The EU supported the development of HPC resources at the Institute of Technology of Cambodia (ITC) through the MONTUS project, an Erasmus+ Capacity Building initiative from 2018–2022. This project aimed to design and implement training programs and resources at the intersection of Cloud Computing, Big Data, AI, and environmental sciences. As a result, ITC established and shared HPC infrastructure and developed the necessary human resources for its operation. This collaboration is intended to extend to other public universities and research institutions in Cambodia, thereby enhancing the country's research capabilities.[264]

4.3.8. Weak collaboration between academia and industry hindering AI innovations

A significant barrier to AI innovation in Cambodia is the weak collaboration between academia and industry. Universities and research institutions are not sufficiently connected to private-sector needs, which limits opportunities for co-designed research, internships, and technology transfer.[265]

To overcome this challenge, the MISTI plans to support incubation facilities at universities for entrepreneurial students and professors. It also aims to make universities and research institutions more accessible to the private sector by establishing University-Industry Linkage Offices in five universities by 2023, and in half of the universities by 2030. These offices will have three key missions:

- Education: Develop curricula that meet the needs of the private sector
- Research: Promote scientific collaboration with industry partners

[262] "AI Landscape in Cambodia: Current Status and Future Trends," *Policy Pulse website*, https://policypulse.org/publications/articles/ai-landscape-in-cambodia-current-status-and-future-trends/, 29 May 2023.
[263] "MISTI High-Performance Computing Platform," *MISTI-HPC website*, https://hpc.misti.gov.kh/%23home, accessed 8 December 2024.
[264] "MONTUS Workshop Phnom Penh," *GIC Department website*, https://gic.itc.edu.kh/site-content/MONTUS%20Workshop%20Phnom%20Penh?utm, accessed 25 November 2024.
[265] "Cambodia's Science, Technology & Innovation Roadmap 2030," *Ministry of Industry, Science, Technology & Innovation website*, https://misti.gov.kh/public/file/20210826162999011 7.pdf, 2021.

- Innovation: Facilitate knowledge transfer and provide access to laboratories

Universities are also proactive in increasing linkages with industry. The AI Forum Research Seminar Series, initiated by CamTech University, aims to cultivate a research culture and practice within Cambodia's higher education institutions. These academic seminars offer a platform for local and international scholars, researchers, academics, faculty, scientists, students, and industry representatives to present their research on AI, Cyber Security, and Digitalization, receiving expert feedback to enhance their work. The series also creates an inclusive, unbiased, and dynamic environment where speakers, participants, and the audience can interact and participate in a shared learning experience. The AI Seminar Series covers essential topics, including the skills needed for the workforce to work effectively with AI, the impact of AI on jobs and industries, the applications and ethical concerns of ChatGPT in education, the responsible use of AI with a focus on policy development and mindful education, and Cambodia's readiness to adopt data analytics tools and technologies.[266]

[266] "AI Seminar Series," *CamTech website*, https://camtech.edu.kh/camtech-seminar-series/, accessed 9 December 2024

5. Vietnam

5.1. Government strategies, regulation and institutional frameworks on AI in education

Vietnam's National Strategy on Research, Development, and Application of Artificial Intelligence to 2030 (National AI Strategy) was issued by the Government under Decision No. 127/QD-TTg, dated January 26, 2021. The strategy aims to foster AI research, development, and practical application across sectors.

Vietnam currently lacks a national agency responsible for AI governance. Both Ministry of Science and Technology (MOST) and Ministry of Education and Training (MOET) and MOST are involved in promoting AI use in education, however, there is currently no coordinated implementation plan or formal mechanism for inter-ministerial collaboration. It remains unclear whether either ministry has made concrete progress in developing or piloting such applications.

MOST is designated as the point of contact for the National AI Strategy and serves as the leading agency for its implementation and monitoring. MOST has also outlined plans to support the development of specific AI applications in education such as smart education and training applications; form a team of "AI teachers"; personalize education and training programs for each student (Adaptive learning); analyse paper/electronic exam questions to automate the exam creation process; detect cheating in exams. Their plan also introduces an inclusive innovation goal: to develop solutions that enable broader public participation in AI development, particularly by encouraging PwDs to engage in tasks such as data labelling or serving as AI application consultants, thereby opening new career paths and employment opportunities in the digital economy.

MOET takes the main responsibility for (i) developing AI talent and skills, (ii) promoting investment by domestic enterprises in AI research labs/institutes at universities, and (iii) accelerating the development of specific AI applications in education.

Vietnam currently does not have a dedicated law specifically governing the research, development, and application of AI. However, the government has introduced the Draft Law on the Digital Technology Industry, which includes a dedicated section on AI (Section 5), signalling an emerging legal framework for AI governance. To provide interim regulatory guidance, the MOST issued Decision No. 1290/2024/QD-BKHCN, which outlines principles for the responsible research and development of AI systems in Vietnam. Vietnam has also adopted national standards relevant to AI, including TCVN 13903:2023, which is aligned with ISO/IEC TR 24028:2020 and provides guidelines on trustworthiness in artificial intelligence, covering reliability, transparency, and robustness of AI systems.

Additionally, the country also adopts international AI governance frameworks, including UNESCO's Recommendation on the Ethics of Artificial Intelligence and the ASEAN

Guide on AI Governance and Ethics, through its membership in these organizations. As for data protection, personal data-related risks associated with AI are expected to be regulated under the Law on Personal Data Protection, which is currently under development. Once finalized, this law will play a critical role in shaping the ethical and legal boundaries of AI deployment in Vietnam.

5.2. AI applications in education

According to the EdTech Vietnam White Paper 2024, the number of online education users is expected to reach 9.7 million by 2029, with the K-12 education segment accounting for the largest market share, approximately 20 million people in 2023. The EdTech market include both domestic and international suppliers, with key domestic players in the market include Edmicro, Topica EdTech Group, Kyna.vn, and Hocmai. The market offers a variety of products that integrate AI to enhance the learning experience and support learners, teachers, and administrators. Several notable locally developed AI applications are outlined below.

5.2.1. Personalized learning system

- Application name: VioEdu online e-learning system (https://vio.edu.vn)
- Target users: Students, teachers, parents and schools, in which students are considered a focus
- Suppliers/Developers: FPT IS
- Application details:

Launched in 2019, VioEdu is Vietnam's first AI-powered smart education assistant. It aims to provide equal access to modern education for students nationwide through connected mobile devices, reducing regional knowledge gaps. VioEdu personalizes learning, saving 30-50% of study time and enhancing efficiency using AI, big data analysis, and knowledge modelling. AI analyses students' learning behaviours and knowledge to identify strengths and gaps, proposing tailored learning pathways.

Lessons are developed by qualified teachers and educational experts, following national textbooks, and presented as engaging visual lectures with game-like rewards. Parents can monitor their children's progress through detailed reports and use VioEdu's materials to support self-learning.

For schools and teachers, VioEdu streamlines teaching and learning management, reducing assignment time by 95% and freeing up time for teachers to focus on individual student needs. School authorities can manage teaching activities, assess teacher and student quality, and connect with parents.

A pilot run with 2,000 primary school students in Hanoi showed that 73.8% made significant progress within 3-6 months, as independently assessed by their teachers.[267]

5.2.2. Virtual tutor tool

- Application name: ELSA Speak
- Target users: English learners worldwide, especially those looking to improve their pronunciation and communication skills
- Suppliers/Developers: ELSA
- Application details:

ELSA Speak, launched in 2015, is Personal AI-powered English-speaking coach that allows users to speak in free-flowing, spontaneous, and engaging real-life conversations on any topic or scenario. It has 13 million of users worldwide[268] and has received numerous awards and accolades for its innovative approach to language learning. The basic features of ELSA Speak include:

- Pronunciation Analysis: The application uses AI technology to analyse and identify pronunciation errors, providing detailed feedback and guidance on how to improve.
- Pronunciation Practice Exercises: It offers thousands of pronunciation practice exercises ranging from basic to advanced levels, helping users practice sounds, words, and sentences effectively.
- Personalized Learning Path: Based on each user's ability and progress, ELSA Speak designs a personalized learning path to help them improve their pronunciation quickly and efficiently.
- Progress Evaluation and Tracking: Users can track their progress through periodic tests and receive detailed evaluations on their pronunciation improvement.
- User-Friendly Interface: The application features an intuitive and easy-to-use interface, suitable for all ages and English proficiency levels.

5.2.3. AI applications in education for people with disabilities

- Application name: AI-assisted Vietnamese Sign Language Bi-directional Translator
- Target users: Deaf students at a special school for deaf children in Hanoi, Vietnam
- Suppliers/Developers: Researchers from the AI4LIFE Institute - Hanoi University of Science and Technology
- Application details:

The research team has developed a smartphone application that helps hearing-impaired people communicate seamlessly with hearing individuals and vice versa. It is a

[267] "FPT launches VioEdu – Vietnam's first AI learning system," *FPT*, https://fpt.com/en/news/fpt-news/fpt-launches-vioedu-%E2%80%93-vietnam%E2%80%99s-first-ai-learning-system, 27 August 2019.
[268] "ELSA named to the 2021 CB Insights AI 100 List of Most Innovative Artificial Intelligence Startups," *ELSA*, https://vn.elsaspeak.com/en/elsa-named-to-the-2021-cb-insights-ai-100-list-of-most-innovative-artificial-intelligence-startups/?srsltid=AfmBOooAaDxBdbuZtEi8wHujG4eNL22ykPxTRrrzeoLJBbzS87K7aAGi, 10 April 2021.

virtual translation application facilitating seamless bi-directional translation between Vietnamese and Sign language. This application acts as a transformative tool, facilitating seamless communication between deaf and hearing individuals. It translates spoken language into sign language and vice versa, empowering deaf users to engage in natural conversations. Furthermore, its automatic sign language translation of spoken language within audio-visual content fosters inclusivity by granting deaf individuals' full access to a broader media spectrum.

Together with the application, the team has built a Vietnamese Multi-view Sign Language dataset comprising 1,000 characters from the Vietnamese Sign Language dictionary. Each character's representation was captured from three different angles and performed by multiple signers. This is the first multi-view sign language dataset in Vietnam.[269]

5.2.4. AI applications in education for people with disabilities

- Application name: Automated Material Translation Solution for the Hearing Impaired
- Target users:
  - Young hearing-impaired children: By providing early access to books and other textual content, this tool helps them develop cognitive abilities and reduces the developmental gap caused by hearing loss.
  - Adult hearing-impaired individuals without literacy skills: This group, which constitutes a significant portion of the hearing-impaired community, gains access to the vast amount of information contained in books and newspapers, reducing the disadvantages associated with hearing impairment.
- Suppliers/Developers: Researchers from the AI4LIFE Institute - Hanoi University of Science and Technology
- Application details:

The solution enables the automatic generation of sign language animations for content in text or audio formats. This tool allows young hearing-impaired children who have not yet started school, as well as adults who have not had the opportunity to learn to read, to convert any Vietnamese text or audio into visual sign language. The solution facilitates the translation of educational materials in text format into sign language animations, enabling the hearing-impaired to access learning resources with greater ease.[270]

[269] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[270] Based on data and information collected from desk research and key informant interviews and consultative meetings.

5.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

5.3.1. AI applications not yet integrated in public service delivery in the education sector

Although the government, through the Decision No. 131/2022/QD-TTg, has set the goal to enhance the use of AI applications (such as virtual assistants, automated responses) in the education management information systems, it is observed from the MOET's portal that AI chatbot/virtual assistants have not been integrated in both the main page and sub-pages dedicated to public services for citizens including:

- Administrative Procedures:[271] Comprising of different procedures for learners, educators, school administrators, businesses, and other organizations. Users can search for suitable procedures by entering keywords and selecting the service provider, related fields, implementor, and service level.
- Feedback and Recommendations:[272] Available to the public (including learners and educators), businesses, organizations, and state agencies. Users are required to provide certain personal details such as full name, address, phone number, email, feedback title, and content (which will be publicly displayed), as well as the receiving unit and any attached documents.
- Evaluation:[273] Users can evaluate the administrative procedure processing units, and public servants handling applications, software, procedures, and documents.
- Statistic Reports:[274] Users can access statistical data on the handling of both online and in-person applications by the Ministry's agencies. Filters are available for management units, fields, document types, and dates to customize the desired reports.

5.3.2. Lack of national guideline and policy on AI applications in education

The MOET has not issued any guidelines or policies at national level on the usage of AI applications in education.[275] Meanwhile, some universities in Vietnam have released guidelines regarding AI usage, such as:

- Artificial Intelligence Guidelines for Students by British University Vietnam (BUV): These guidelines emphasize the ethical and safe use of AI within the university community. They focus on ensuring that AI is utilized in a manner that upholds

[271] "Administrative procedures," *Ministry of Education and Training website*, https://dichvucong.moet.gov.vn/web/guest/thu-tuc-hanh-chinh, accessed 20 December 2024.
[272] "Feedback and suggestions," *Ministry of Education and Training website,* https://dichvucong.gov.vn/p/phananhkiennghi/pakn-gui-pakn.html, accessed 20 December 2024.
[273] "Evaluation of public administrative service quality," *Ministry of Education and Training website*, https://dichvucong.moet.gov.vn/web/guest/danh-gia, accessed 20 December 2024.
[274] "Statistical reporting," *Ministry of Education and Training website*, https://dichvucong.moet.gov.vn/web/guest/bao-cao-thong-ke, accessed 20 December 2024.
[275] Based on data and information collected from desk research and key informant interviews and consultative meetings.

fairness, transparency, accountability, and respect for privacy and intellectual property rights.[276]

- Guidelines on Student Use of Generative Artificial Intelligence by VinUniversity: These guidelines offer detailed principles and regulations for on how students can use GenAI tools while preserving academic integrity. Key principles include alignment with learning objectives, transparency, honest disclosure, critical engagement, consideration of faculty and disciplinary differences, and continuous refinement of practices.[277]
- Regulations on academic integrity by the University of Social Sciences and Humanities (Vietnam National University, Ho Chi Minh City): The University has enacted new regulations on academic integrity including AI usage, effective January 15, 2025. These regulations apply to civil servants, staff, and students involved in training, research, and other organizational activities, both within and outside the university. The policy establishes standards for integrity in AI usage across learning, teaching, and assessment, as well as in scientific and technological activities.[278]

5.3.3. Lack of AI talents for development of AI applications and gender gaps in STEM education and employment

There is a significant shortage of AI specialists and educators proficient in AI technologies.[279] According to the World Intellectual Property Organization,[280] Vietnam currently has about 700 people working in-depth in the field of AI, of which only 300 are experts - a limited number compared to the growing demand of Vietnamese businesses. This scarcity, partly due to limited access to high-quality AI training programs, creates a gap between market demand and available talent.[281] Hence, there is a clear need to develop specialized AI courses and to integrate AI-related content across existing teaching curricula.

Additionally, technical assistance from foreign universities is crucial to support domestic institutions in strengthening and modernizing their training programs in AI, semiconductors, and other emerging technology fields. Although official statistics on the proportion of female students enrolled in AI-related programs and women working in AI development in Vietnam are unavailable, existing data shows that gender inequality in

[276] "Artificial Intelligence Guidelines: Students," *British University Vietnam website*, https://library.buv.edu.vn/wp-content/uploads/2023/11/BUVAIGuidelinesforStudents.pdf, accessed 27 November 2024.
[277] "Guidelines on Student Use of Generative Artificial Intelligence," *VinUniversity website*, https://policy.vinuni.edu.vn/all-policies/guidelines-on-student-use-of-generative-artificial-intelligence/, accessed 17 December 2024.
[278] "Member schools of Ho Chi Minh City National University regulate academic integrity when using AI," *Vietnam.vn*, https://www.vietnam.vn/truong-thanh-vien-dh-quoc-gia-tp-hcm-quy-dinh-liem-chinh-hoc-thuat-khi-dung-ai, 19 January 2025.
[279] "Artificial intelligence in Vietnamese higher education challenges and opportunities," *Tap Chi Cong Thuong*, https://tapchicongthuong.vn/artificial-intelligence-in-vietnamese-higher-education-challenges-and-opportunities-124436.htm, 1 August 2024.
[280] "Taking practice as the driving force for developing AI resources in Vietnam," *Vietnam.vn*, https://www.vietnam.vn/en/lay-thuc-tien-lam-dong-luc-phat-trien-nguon-luc-ai-tai-viet-nam-2, 16 December 2025.
[281] "NIC, Google launch 'Build for the AI Future' initiative to propel AI development in Việt Nam," *Viet Nam News*, https://vietnamnews.vn/economy/1659103/nic-google-launch-build-for-the-ai-future-initiative-to-propel-ai-development-in-viet-nam.html, 11 July 2024.

STEM education and employment persists in the country. In Vietnam, 36.51% of female graduates have completed tertiary education in STEM fields overall,[282] while 26.4% have completed tertiary education specifically in the ICT field.[283] Female workers account for about 37% of the workforce in STEM fields, according to the International Labor Organization.[284]

A range of initiatives are currently underway to address both the shortage of AI talent and the need for greater inclusivity in AI-related education and workforce development. These efforts include:

- Cooperation in training on AI using the "Train-the-trainer" model and transferring training programs between Duy Tan University and the Carnegie Mellon University, USA: Duy Tan University (DTU) and Carnegie Mellon University (CMU) are collaborating to transfer IT training programs using a "Train-the-Trainer" model. As part of this initiative, 18 DTU lecturers attended in-depth courses at CMU, covering topics like Data Structure Engineering, Data Analysis with Python, and Machine Learning. This cooperation aims to enhance the quality of lecturers and training programs at DTU.[285]
- Several initiatives are supporting Vietnamese female students in STEM fields: The Asia Foundation STEM Scholarship, in collaboration with Hanoi University of Civil Engineering and Hanoi University of Science and Technology, provides scholarships for 25 female students in STEM majors.[287] The STEMherVN project promotes educational and career equality for women and girls in STEM, offering "I love STEM" scholarships, especially for disadvantaged students in Vietnam's highlands.[288] Additionally, the ASEAN-UK SAGE Scholarship and British Council Women in STEM Scholarship support women in STEM across ASEAN and other regions.[289]
- Skills4Girls:[290] The UNICEF Skills for Girls initiative adopts a girl-centred approach to skill development in STEM, digital technologies, and social entrepreneurship. In Vietnam, the program collaborates with the MOET and civil society organizations to enhance digital literacy among ethnic minority girls. One of the initiatives has introduced augmented and virtual reality headsets in rural and remote classrooms, while also providing training for teachers to effectively utilize these innovative

[282] "Global Gender Gap 2024," *World Economic Forum*, 2024.
[283] "To be smart, the digital revolution will need to be inclusive: excerpt from the UNESCO science report," *UNESCO*, 2021.
[284] "Vietnamese women are increasingly well prepared for decision-making roles in businesses," *International Labour Organization*, https://www.ilo.org/resource/news/vietnamese-women-are-increasingly-well-prepared-decision-making-roles, 17 November 2020.
[285] "18 Duy Tan University lecturers attend Artificial Intelligence training course at Carnegie Mellon University (CMU, USA)," *Tien Phong*, https://tienphong.vn/18-giang-vien-dh-duy-tan-tham-gia-khoa-tap-huan-ve-tri-tue-nhan-tao-tai-dh-carnegie-mellon-cmu-my-post1571109.tpo, 22 September 2023.
[287] "Support for women pursuing STEM careers," *VOV2.VN*, https://vov2.vov.vn/giao-duc-dao-tao/ho-tro-cho-nu-gioi-theo-duoi-su-nghiep-stem-49178.vov2, 10 July 2024.
[288] "STEMherVN," *MSD Vietnam website*, https://msdvietnam.org/tre-em-va-thanh-nien/stemhervn/, accessed 17 November 2024.
[289] "Empowering Women in STEM: ASEAN-UK SAGE Women in STEM Scholarships," *British Council*, https://www.britishcouncil.id/en/programmes/education/asean-uk-sage/women-in-stem-scholarships, accessed 13 December 2024.
[290] "Gender barriers to basic digital skills for employment in the ASEAN region: A review of promising practices," *Australian Council for Educational Research*, 2024.

technologies. Furthermore, more than 400 teachers (67% female and 24% from ethnic minority backgrounds) have been trained to deliver the curriculum in adaptive and collaborative ways using technology.

5.3.4. Lack of digital skills of teachers and students to adopt AI applications

Lack of digital skills among teachers and students remains a significant barrier to the effective adoption of AI applications in Vietnam's education sector. Many teachers have not received adequate training in either basic ICT skills or the integration of digital tools into pedagogy-let alone in the use of emerging AI technologies. This skills gap is especially pronounced in schools serving students with disabilities, ethnic minorities, and those from low-income backgrounds, where teachers often lack access to professional development on assistive and adaptive technologies. On the student side, only 39% of young people aged 15 to 24 have ICT skills. Among them, 54% of those with higher education, including vocational and university students, demonstrate ICT proficiency. However, there are significant disparities across ethnic groups, with 44% of Kinh and Hoa individuals possessing ICT skills, compared to just 1% among the Mong population. There are several initiatives for developing AI-related skills for teachers, students and people with disabilities to use AI applications:

- Development of AI competency framework for students in Vietnam:[291] The MOET's Vietnam Institute of Educational Sciences (VNIES) is collaborating with UNICEF to develop an AI Competency Framework for high school students in Vietnam, based on UNESCO's framework.
- The AI Summer Camp*,* initiated by STEAM for Vietnam, is one of the first nationwide AI courses for teachers, aiming to pioneer AI application in education by helping teachers integrate AI into lesson planning, lectures, and grading. The initiative will continue to support teachers with workshops and activities through 2025.[292]
- The Inclusive Digital Literacy Project, led by RMIT University, aims to equip PwDs with essential digital literacy and AI-related skills. The initiative includes Training-of-Trainers sessions for 27 PwDs, who then train others in their communities, enhancing their ability to navigate the digital world and protect their online privacy.
- Training AI skills for people with disabilities: The "Will to Live" Centre,[293] a women-owned social enterprise, trains people with disabilities in AI-related skills, including Data Labelling, Microsoft Office, and Photo editing, to help them find suitable jobs and integrate into society.

[291] "AI competency framework for students," *UNESCO*, 2024
[292] "Enhancing AI skills for Vietnamese teachers," *Dang Cong San Viet Nam*, https://dangcongsan.nhandan.vn/giao-duc/nang-cao-ky-nang-su-dung-ai-cho-giao-vien-viet-nam-675507.html, 20 August 2024.
[293] "About us," *Will To Live Center website*, https://en.nghilucsong.net/about-will-to-live-center/, accessed 17 December 2024.

5.3.5. Insufficient State funding for research infrastructures and technology

Although the Government has promoting policy such as Decision No. 569/QD-TTg on allocating adequate budget for investment in research infrastructures and technology, State budget constraint remains an issue. In practice, the Government has allocated only 0.33% of GDP to tertiary education (including higher education). Additionally, universities received merely 13% of the total research funding, which is equivalent to 0.05% of GDP for research programs, even though 50% of Vietnam's total Research and Development workforce is based in universities.[294]

5.3.6. Lack of labelled data sources in Vietnamese to support AI application development

Vietnam's data infrastructure remains underdeveloped, posing a major challenge for AI research and application. High-quality datasets are limited, and existing data is often fragmented, poorly integrated, and difficult to access.[295] Vietnamese datasets currently account for 1.5% of the open datasets available on the Hugging Face platform[296] – the largest AI community online for open-source data for AI experts and enthusiasts as of 2022. However, there is limited public information on the quality, safety, and inclusiveness of these open datasets. There are also no official statistics or reports on the quantity and quality of datasets in other ethnic minority languages of Vietnam.

5.3.7. Limited high-performance computing infrastructure to support AI research and innovation in universities

A major challenge to democratizing access to computing infrastructure for AI research in Vietnam is the concentration of resources within large private enterprises. Companies such as Viettel, and FPT Corporation currently dominate ownership of HPC infrastructure, which is essential for developing and deploying large language models and other advanced AI systems. As a result, only large enterprises have sufficient computational capacity to support such efforts.

While some public universities, such as Hanoi University of Science and Technology, Viet Nam National University, and Ho Chi Minh City University of Technology, possess limited-scale computing facilities, these are often inadequate for conducting cutting-edge AI research at scale. Importantly, Vietnam lacks a national HPC infrastructure that is publicly funded, centrally coordinated, and openly accessible to researchers across institutions. This lack of shared resources significantly constrains the ability of

[294] "Technology in education: a case study on Vietnam," *UNESCO*, 2023.
[295] "Vietnam boosts investment in Artificial Intelligence," *Ministry of Industry of Trade website*, https://moit.gov.vn/tin-tuc/phat-trien-cong-nghiep/viet-nam-day-manh-dau-tu-vao-tri-tue-nhan-tao.html, 13 October 2021.
[296] Visualizations powered by JSI using data from Hugging Face, *OECD.AI*, accessed 6 December 2024.

independent researchers, small institutions, and startups to contribute to AI innovation on an equal footing.[297]

Most universities and research institutes in Vietnam that aim to train next-generation AI models are currently dependent on foreign computing systems. Due to limited domestic infrastructure, they often outsource processing tasks to international platforms by sending data abroad for computation. Some institutions rely on shared cloud computing infrastructure and supercomputing resources provided by partner universities overseas or take advantage of open-access systems offered by major global technology companies. At the same time, AI research equipment and computing infrastructure available within public research institutions remain underutilized, often due to lack of coordination, limited capacity, or insufficient technical support.[298]

[297] "High Performance Computing (HPC) for Covid-19," *ASEAN Main Portal*, https://asean.org/wp-content/uploads/2023/11/HPC-and-COVID-19-v-25092023-FINAL.pdf, July 2023.
[298] "Developing high-performance computing infrastructure," *Nhan Dan*, https://en.nhandan.vn/developing-high-performance-computing-infrastructure-post139700.html, 25 September 2024.

6. Thailand

6.1. Government strategies, regulation and institutional frameworks on AI in education

Thailand has established several national government agencies to oversee the implementation of its national AI strategy, including:

- The National AI Committee: Appointed by the Prime Minister in 2022, this high-level body oversaw the implementation of the AI strategy. It was later dissolved with the change of government, and the Ministry of Digital Economy and Society (MDES) is now planning to form a new committee for the strategy's second phase.[302]
- The Subcommittee AI Workforce Development: Established in 2023 by the Chairman of the National Strategic Committee for the Development of Thailand's Intellectual Operation Plan, this subcommittee supports enhancing personnel potential and promoting intellectual property education.
- The Working Committee for National AI Action Plan: Established in 2023 by the Director of the National Science and Technology Development Agency (NSTDA), this committee assists in coordinating units to implement the national AI action plan.

In 2022, the Thai Cabinet approved Thailand's National AI strategy and action plan (2022–2027) to build an effective AI ecosystem that boosts the economy and improves quality of life by 2027.[303] The strategy is based on five key pillars and targets 10 key industries, with the education sector being a focus in the second phase (2024–2027) to develop smart education and broaden educational opportunities.

Under the National AI Strategy, the Ministry of Higher Education, Science, Research, and Innovation (MHESI) and the Ministry of Education (MOE) are responsible for policies and initiatives related to AI talent and skills development and AI applications in education sector.

Thailand is developing formulating laws to regulate AI. In 2022, the Office of the National Digital Economy and Society Commission (ONDE) proposed a Draft Royal Decree on Business Operations that Use Artificial Intelligence Systems (Draft Royal Decree) to mitigate possible risks posed by AI systems. The draft uses a risk-based approach, which is similar to the EU AI Act, to classify AI systems as Prohibited, High-Risk, or Limited-Risk based on their potential impact.[304] Meanwhile, the Electronic Transactions Development Agency (ETDA) issued the Draft Act on Thailand Artificial Intelligence Promotion and Support (AI Promotion Act) that seeks to promote and

[302] "Digital Economy Ministry to set up national AI committee," *Bangkok Post*, https://www.bangkokpost.com/life/tech/2784234/digital-economy-ministry-to-set-up-national-ai-committee, 30 April 2024.
[303] "Thailand national AI strategy and action plan (2022 – 2027)," *AI Thailand website*, https://ai.in.th/en/about-ai-thailand/, accessed 18 November 2024.
[304] "Current Stage of Thailand's Regulatory Approach to AI," *Lexology*, https://www.lexology.com/library/detail.aspx?g=4e09c320-e675-456e-b0eb-2f2264d79c18, 19 July 2024.

support the application of AI in Thailand. Both ETDA and ONDE are agencies under the MDES.

While Thailand lacks national laws specific to AI in education, some academic institutions enforce their own policies to maintain academic integrity. For example, Chulalongkorn University introduced its "Principles and Guidelines for the Use of AI Tools" in 2023, which provides detailed guidance for instructors and students on using AI in teaching, assessment, and data privacy.[305]

Thailand follows governance frameworks such as the ASEAN Guide on AI Governance and Ethics and UNESCO's Recommendation on the Ethics of Artificial Intelligence. Since 2022, agencies like the MDES and the NSTDA have also released AI ethical guidelines to raise awareness among AI service providers and users.[306]

6.2. AI applications in education

The Thailand EdTech market has grown significantly in recent years due to rapid changes in education and increasing digitalization. The market offers solutions such as e-learning platforms, digital textbooks, virtual classrooms, and educational apps. Key players, including SkillLane, Topica Edtech Group, provide a range of educational technology solutions, from online courses to professional development programs.[307] The market also features AI-powered solutions to enhance learning experiences and support students, teachers, and school administrators. Below is an example of possible application on personalized learning system.

6.2.1. Personalized learning system

- Application name: Aom-ai
- Target users: Students, teachers, and employees
- Suppliers/Developers: NetDragon Websoft Holdings (China) and IT company EDA (Thailand)
- Application details:[308]

Launched in 2024, the lifelong learning platform Aom-ai is a collaborative initiative developed by NetDragon Websoft Holdings (China) and EDA IT (Thailand), with support from the MHESI.

Aom-ai leverages AI technology to deliver personalized learning experiences, enabling users to acquire knowledge more efficiently and effectively. The platform's AI-driven teacher facilitates lessons and provides tailored educational journeys, allowing users to

[305] "Chulalongkorn University Principles and Guidelines for using AI Tools," *Chulalongkorn University*, https://www.chula.ac.th/en/news/125190/, 17 July 2023.
[306] "DNA ASEAN Guide to: How the Use of Artificial Intelligence is Regulated in Southeast Asia," *Drew Network Asia*, 16 July 2024.
[307] Thailand Education Technology Market (2025-2031) Outlook, 6Wresearch, https://www.6wresearch.com/industry-report/thailand-education-technology-market-outlook, accessed 19 December 2024.
[308] "AI-powered education platform will power up Thai economy: NetDragon," *The Nation*, https://www.nationthailand.com/business/tech/40039998, 25 July 2024.

engage in interactive learning and design their courses based on individual interests and needs.

Beyond language skills, Aom-ai offers diverse courses aligned with the evolving demands of Thai learners, such as financial literacy, digital skills, and emerging technologies like electric vehicles and semiconductors.

NetDragon also plans to collaborate with Thai universities to enhance AI education, empowering young learners with the knowledge and skills needed to capitalize on career opportunities both locally and globally.

Currently exclusive to the Chulalongkorn community, ChulaGENIE is set to expand access within 2–3 months, ensuring user authentication and data security. By 2025, the university envisions offering ChulaGENIE as a public service.[310]

6.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

6.3.1. AI not yet integrated in public service delivery in education

Thailand has implemented management information systems to efficiently handle education system data, including the OBEC EMIS used to collect, manage, and analyse education data specifically for schools and students under Office of Basic Education Commission (OBEC) jurisdiction, which includes most public schools in Thailand. Additionally, the Thai EMIS gathers and stores data on schools, teachers, enrolment, and other key statistics. Through the Thai EMIS, education authorities can access detailed data on pupils, including gender, age, disability status, economic background, home-to-school distance, religion, and dropout status. However, the OBEC EMIS data covers only 78.6% of the academic institutions in Thailand.[311]

6.3.2. Limited accessibility of digital devices and gender digital divide

Regional disparities in access to devices and the internet remain significant. In 2021 and 2022, the percentage of households with access to computers, internet connection and mobile phones was the highest in Bangkok and the Central region. Meanwhile, the Northeastern region has the lowest percentage of households with mobile phone access.[312]

The limited availability and affordability of hardware and software necessary for AI in education reduce opportunities for teachers and students to benefit from AI-enhanced learning experiences. In 2019, only 48% of Thai teachers reported had access to

[310] "New Thai AI Platform ChulaGENIE Debuts at Chulalongkorn University," *Khaosod English*, https://www.khaosodenglish.com/net/2025/01/13/new-thai-ai-platform-chulagenie-debuts-at-chulalongkorn-university/#google_vignette, 13 January 2025.
[311] "Technology in education: a case study on Thailand," *UNESCO*, 2023.
[312] Ibid.

computers or tablets for teaching, and just 32% had access to digital learning resources or platforms utilizing AI or adaptive learning technologies.[313]

6.3.3. Lack of digital skills among teachers and students and the gender digital divide

Thailand faces a shortage of qualified teachers capable of effectively utilizing AI in education. In 2019, only 39% of Thai teachers had training in using digital technologies for teaching, and just 16% had training in AI or adaptive learning technologies.[314]

Additionally, digital skills receive limited instructional time in Thailand's curriculum. Technology learning covers 40 hours annually from grades 1 to 6, 80 hours in grades 7 to 9, and 120 hours in upper secondary school. In contrast, Thai language, Mathematics, Science, and Social Studies receive consistent hours across grades 1 to 9. Even Health, Physical Education, and Art are prioritized over Occupations and Technology, indicating a lower emphasis for digital education.[315]

Statista reports a gender gap in mobile and internet usage of approximately 0.7%[316] and 2%,[317] respectively. This minimal disparity indicates relatively equal access to mobile and internet services is relatively equitable across genders.

The Thai government has introduced initiatives to develop digital literacy. The Basic Education Core Curriculum 2008 (revised 2017) outlines five goals for basic education. They include developing essential skills-communication, critical thinking, problem-solving, technological proficiency, and life skills-supported by competencies such as the Capacity for Technological Application. This competency promotes ethical and effective technology use for personal and societal development.[318]

A targeted training program for children and youth enhances digital literacy through modules on digital comprehension, effective tech use, cybersecurity, creative technology application, and computational thinking. Available both online and on-site, this inclusive program aims to bridge the digital divide.[319]

Additionally, the Ministry of Education partners with universities and tech companies to provide professional development programs that integrate digital literacy and technology

[313] "A comparative study of artificial intelligence in education psychology: the cases of Indonesia and Thailand," *Bulletin of Social Informatics Theory and Application*,
[314] Ibid.
[315] "Technology in education: a case study on Thailand," *UNESCO*, 2023.
[316] "Breakdown of mobile phone users in Thailand in 3rd quarter 2023, by gender," *Statista*, https://www.statista.com/statistics/1366000/thailand-share-of-mobile-users-by-gender/, 2024.
[317] "Thailand: breakdown of internet users by gender 2023," *Statista*, https://www.statista.com/statistics/1366034/thailand-breakdown-of-internet-users-among-genders/, 2024.
[318] "Technology in education: a case study on Thailand," *UNESCO*, 2023.
[319] "Thailand: Enhancing Digital Literacy for the Future," *OpenGov Asia,* https://opengovasia.com/2024/06/14/thailand-enhancing-digital-literacy-for-the-future/, 14 June 2024.

into teaching, addressing regional challenges to support effective classroom integration.[320]

6.3.4. Shortage of skilled AI workforce

A major challenge for AI development in Thailand is the scarcity of skilled workers[321] The country experiences a significant shortfall of AI professionals, with an estimated requirement of 100,000 experts, but only about 21,000 are currently available.[322]

Thailand is experiencing a significant demand for skilled AI professionals, particularly in advanced roles such as AI researchers and data scientists. However, the supply remains limited, creating a notable talent gap. For instance, a survey indicates that 94% of Thai employers prioritize AI-skilled talents. Despite this, 64% report difficulties in finding candidates with the necessary AI expertise.[323]

According to the World Economic Forum's Global Gender Gap Report 2024, Thailand ranks 65th globally, with a notable disparity in tertiary STEM education-women represent only 30.14% of STEM graduates compared to 69.86% of men.[324] Thai women have noted that the higher costs of STEM courses, particularly in rural areas, are a significant barrier.[325] Meanwhile, a UNESCO study highlights that only South Korea, Malaysia, and Thailand have achieved gender parity or higher female representation in the STEM workforce, with Thailand leading at 53% female participation.[326]

To strengthen its AI talent pool, Thailand has launched several key initiatives as follows.

- Thailand National AI Strategy and Action plan: The Strategy aims to train over 30,000 AI professionals in six years under Strategy 03.
- AI Engineering Institute (AIEI): Founded in 2022 through a collaboration of six Thai universities, led by CMKL University and King Mongkut's Institute of Technology Ladkrabang. It oversees the AI Sandbox Curriculum: Thailand's first joint AI program designed to develop AI professionals and enhance national competitiveness.[327] The curriculum allows students to earn a bachelor's degree in three years and engage in industry projects from the first year.[328]

[320] "The Future of Connectivist Learning with the Potential of Emerging Technologies and AI in Thailand: Trends, Applications, and Challenges in Shaping Education," 2023.
[321] "Thailand intensifies AI policy to transform economy," *VietnamPlus*, https://en.vietnamplus.vn/thailand-intensifies-ai-policy-to-transform-economy-post287793.vnp, 30 May 2024.
[322] "Thailand prepares AI experts' visas to support the AI industry," *Lexology*, https://www.lexology.com/library/detail.aspx?g=d9800870-9f4b-4188-8782-ee68a08466bc.
[323] "AI skills could boost Thailand workers' salaries by more than 41%," *The Nation*, https://www.nationthailand.com/business/tech/40036530, 19 March 2024.
[324] "Global Gender Gap 2024," *World Economic Forum*, 2024.
[325] "Women in Science, Technology, Engineering, and Mathematics (STEM) in the Asia Pacific," *UNDP*, January 2024.
[326] "Pathways: How Thai Culture And Gender Stereotypes Affect Female Career Experiences In STEM Occupations," *Thammasat University*, 2019.
[327] "Vision and Mission," *AI Engineering Institute website*, https://www.cmkl.ac.th/aiei/vision-and-mission, accessed 18 January 2025.
[328] "Thailand national AI strategy and action plan (2022 – 2027)," *AI Thailand website*, https://ai.in.th/en/about-ai-thailand/, accessed 18 November 2024.

- Super AI Engineer: Led by the AI Association of Thailand, this nationwide initiative provides free AI training for individuals at all skill levels, offering hands-on courses to develop AI beginners and engineers.
- Department of Skill Development's training courses: Online and accessible training programs designed to improve AI and digital skills, increase employability, and boost income. Participants receive certificates upon completion.[329]
- Microsoft's initiatives: Microsoft plans to train one million Thais in AI skills under its AI National Skill Initiative, with 80% of courses available in Thai. It also aims to build AI infrastructure and support local developers. In addition, Microsoft Thailand also announced "AI for All Thais" vision, which will be driven by three core strategies: Skills, Scale, and Secure, further solidifying Microsoft's mission to accelerate Thailand's digital economy, fostering inclusive growth and enriching the lives of all Thai people.[330]
- KPTG's master program: KASIKORN Business-Technology Group (KBTG) has partnered with King Mongkut's Institute of Technology Ladkraban, Mahidol University, and Thammasat University to launch AI-focused master's programs that bridge industry and academia.
- Other government's initiatives: These initiatives include includes the Digital Scholarship Fund,[331] tax incentives, and the Global Digital Talent Visa, which aims to attract 600 top AI experts globally. Thailand is also partnering with Huawei to establish AI and cloud talent development centres to train thousands of professionals over the next five years.[332]

6.3.5. Insufficient funding hindering the establishment of AI research labs in universities

Several universities in Thailand have established dedicated AI centres, and labs to spearhead research, development, and education in AI. However, they face challenges regarding funding constraints. Securing sustainable financial resources is a significant hurdle as many AI research centres depend on external funding, which is often inconsistent and competitive. This reliance affects their ability to maintain and expand research activities.[333]

[329] "Govt launches 5 free online AI and digital courses to upskill Thais," *The Nation*, https://www.nationthailand.com/blogs/news/general/40038839, 15 June 2024.
[330] "Microsoft Unveils "AI for All Thais" Vision, Empowering Thais with AI through Skill, Scale, and Secure," *Microsoft*, https://news.microsoft.com/th-th/2024/08/29/microsoft-unveils-ai-for-all-thais-vision-empowering-thais-with-ai-through-skills-scale-and-secure/, 29 August 2024.
[331] "Thailand's AI Strategy: Cultivating Talent and Supporting Start-ups," *OpenGov Asia*, https://opengovasia.com/2024/09/03/thailands-ai-strategy-cultivating-talent-and-supporting-start-ups/?, 3 September 2024.
[332] "DE Minister Finalizes Deal with Huawei for AI & Cloud Workforce Development, Expected to Generate 60 Billion Baht in 5 Years," *Thailand.go.th*, https://thailand.go.th/issue-focus-detail/-de--huawei--ai--cloud--60000--5-, 5 September 2024.
[333] "Thai Uni Health Breakthroughs: Innovations & Challenges Ahead," *Sukhumvit Today*, https://sukhumvit.today/thai-university-research-breakthroughs-in-health-and-medicine/?, 14 April 2024.

6.3.6. Obstacles in establishing open data systems

Despite established data standards, many agencies struggle with data format and quality, reflecting a lack of readiness and understanding. Additionally, the open government data portal suffers from limitations in data quantity, quality, and variety. Many datasets are infrequently updated, leading to outdated information, while others, though publicly accessible, lack usable formats, hindering effective utilization. While Thai government agencies already collect and publish data across key areas and sectors (e.g., company registrations, current land use, political finance, public consultation), data availability remains limited in several sectors (e.g. beneficial ownership, land tenure, asset declarations).[334]

6.3.7. Insufficient expertise for the development and advancement of high-performance computing infrastructure

Few universities in Thailand offer dedicated courses in HPC, such as parallel and distributed computing or big data. Instead, HPC-related topics are often integrated into broader subjects like computer organization, operating systems, and cloud computing.[335]

While foundational training materials for HPC are available, there is a significant need for advanced instruction, particularly for AI applications. Limited internal capacity restricts comprehensive training, prompting HPC users to participate in international HPC programs and EU-ASEAN HPC School.[336]

The demand for HPC administrative professionals is relatively low compared to the broader IT workforce, leading to limited career prospects. As the IT sector expands, many researchers opt for higher-paying industry positions, while senior computer science faculty in universities are often reluctant to adopt HPC, further hindering workforce development.

[334] "Empowering Thailand's Digital Government with Open Data," *Open Data Institute*, https://theodi.cdn.ngo/media/documents/Empowering_Thailands_Digital_Government_with_Open_Data.pdf, 2024.
[335] "A Survey of High Performance Computing (HPC) Infrastructure in Thailand", *ECTI-CIT Transactions*, June 2023.
[336] "High Performance Computing (HPC) for Covid-19," *ASEAN Main Portal*, https://asean.org/wp-content/uploads/2023/11/HPC-and-COVID-19-v-25092023-FINAL.pdf, July 2023.

7. Lao PDR

7.1. Government strategies, regulation and institutional frameworks on AI in education

Currently, there has not been an assigned ministry or agency for AI in Lao PDR. The Ministry of Technology and Communications (MTC) is the main coordinator for digital economy initiatives. It oversees crucial areas such as connectivity, telecommunications, cybersecurity, digital government, and innovation. Meanwhile, the Ministry of Education and Sports (MoES) is responsible for promoting digital technology deployment into education sector in Lao PDR. The MoES, in coordination with the MTC, oversees the implementing of projects and activities related to digital human resource development, including project on human resource development focusing on new digital skills (AI, Data Science, Cyber Security), development of ICT and digital curriculum in foundation education level.

Lao PDR has yet to establish any national plan, policy or strategy specifically devoted to AI. Lao PDR is just beginning to develop its AI ecosystems, focusing on establishing essential components: ensuring reliable and widespread connectivity, fostering the growth of local AI talent through skills development, boosting funding and investment in R&D, and creating supportive policies and regulatory frameworks tailored to AI.[337] MTC has been developing drafts regarding national AI strategies, however specific details are currently unavailable.[338]

Currently, Lao PDR embraces digital transformation through deploying digital technologies across various industries and sectors. The 5-Year National Digital Economy Development Plan (2021-2025) emphasizes that AI should be a priority in higher education, with the curriculum being strengthened by incorporating more AI technologies. It also expresses ambitions to attract foreign private investment in AI and enhance R&D in this field. However, specific details regarding funding or other measures to support these initiatives are not currently available.[339]

In October 2024, MoES, in collaboration with UNICEF and the European Union, launched an ambitious 10-year ICT in Education Strategy, which aims to integrate technology throughout teaching and learning environments across the country. Therefore, AI can potentially be integrated in education. The initiative also seeks to equip students and educators with digital tools and skills, thereby improving learning outcomes and essential skills for both professional and personal development.[340] The

[337] "Responsible AI in Southeast Asia: Tracking Progress and Benchmarking Impact," *Access Partnership*, https://accesspartnership.com/ai-in-sea/, 2024
[338] "Open Government Data in Lao PDR," *United Nations*, https://publicadministration.desa.un.org/sites/default/files/list-of-files/2024/Laos_Phommilath.pdf, 19 October 2024.
[339] "Responsible AI in Southeast Asia: Tracking Progress and Benchmarking Impact," *Access Partnership*, https://accesspartnership.com/ai-in-sea/, 2024
[340] "Pave the Way for a Digital Future in Lao PDR's Education Sector," *UNICEF*, https://www.unicef.org/laos/stories/pave-way-digital-future-lao-pdrs-education-sector, 29 October 2024.

strategy also aims to reach the most marginalized and underserved populations, particularly in remote and rural areas where educational resources have been scarce. However, public information on this strategy is currently limited.

Currently, there have not been any policies or regulations that directly deals with or regulates AI or specific set of AI guidelines of general application released in Lao PDR. Some existing laws may apply to the use of AI, for instance Law on Prevention and Combating Cyber Crime, Law on the Protection of Electronic Data.[341]

Laos adopts the UNESCO's Recommendation on the Ethics of Artificial Intelligence and ASEAN Guide on AI Governance and Ethics through its membership with these international/multilateral organizations. For the education sector, the MoES has not issued any guidelines for using AI in education. However, they adopt the UNESCO AI competency frameworks for teachers and students.[342]

7.2. AI applications in education

There are currently no locally developed AI applications in education in Lao PDR. Popular applications used in education are popular international GenAI tools like ChatGPT. As most of the AI applications being used are from international providers, Lao students and teachers face challenges such as language barrier, Information and data related to Laos's context or in the Lao language may either be unsearchable using AI apps or result in incorrect answers.[343]

The EdTech landscape in Laos includes a range of initiatives created through partnerships d with public agencies, private stakeholders, and international development partners in various roles. The MoES's collaboration with public, private, NGOs and international development agencies, has resulted in the development of multiple EdTech initiatives with the focus in enhancing learning outcomes and capacity-building. Notably, smaller-scale EdTech initiatives led by NGOs have more significant impact on learning outcomes compared to government-led efforts.[344]

Regarding public services delivery for education, Lao PDR has progressively integrated and utilized digital technology in governance and public services. For example, through the EU-supported Partnership for Strengthening the Education System (PSES) program backed by the EU, UNICEF supports MoES in creating Lao Education and Sports Management Information System (LESMIS), a GIS-powered data platform to improve data visualization, accessibility, and utilization for monitoring and planning in Laos's education system. There is no information of how AI embedded into this system, but it is clearly the opportunity for AI development beyond this system.

[341] "Positioning the Lao PDR for a Digital Future," *World Bank*, 2022.
[342] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[343] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[344] "EdTech in Lao People's Democratic Republic: A Rapid Scan," *EdTech Hub*, 2024.

There are several EdTech applications in Lao PDR, including digital learning platform and application for PwDs.

7.2.1. Digital learning platform

- Application name: Khang Panya Lao (https://laos.learningpassport.unicef.org/)
- Target users: Students and teachers from Grades 1 – 12 and pre-primary children
- Suppliers/Developers: MoES with support from the European Union and UNICEF
- Application details:

Khang Panya Lao (Lao Wisdom Warehouse) is a digital learning platform developed to maintain educational continuity during the COVID-19 pandemic. It was launched by the MoES with support from the European Union and UNICEF. Accessible online and as an Android app, it offers access to content without internet connection.

The platform serves as a centralized hub for teaching resources, aiding teachers in professional development while also providing students with textbooks, interactive quizzes, videos, and other learning materials. It is accessible via computer and can also be downloaded as an app on phones, tablets, and other mobile devices.

To ensure inclusivity, particularly for children with disabilities, the platform features a dedicated section for inclusive education resources tailored for both students and teachers. This section includes Lao sign language courses and inclusive education manuals. Additionally, some materials come with subtitles, audio content, and Read Aloud Storybooks to enhance accessibility.

By September 2022, Khang Panya Lao had gained 100,000 users across Lao PDR and trained 200 teachers on effectively utilizing the platform both in the classroom and at home. However, it has not yet integrated AI into its platform.[345]

7.2.2. EdTech application for people with disabilities

- Application name: Lao Autism Talks
- Target users: People with autism, down syndrome, hearing impaired communication difficulties, recovering from strokes, and with acquired brain injury
- Suppliers/Developers: Association for Autism (AfA) with support from the World Education
- Application details:

Lao Autism Talks, the first Lao-language Augmentative and Alternative Communication (AAC) app, is a picture-based communication technology designed to help children with autism express themselves more effectively, developed by the Association for Autism (AfA) with support from the World Education.

[345] "Khang Panya Lao platform reaches 100,000 users in Laos," *EU website*, https://www.eeas.europa.eu/delegations/lao-pdr/khang-panya-lao-platform-reaches-100000-users-laos_en, 28 September 2022.

The app features a customizable dictionary with a library of 1,500 words across 12 categories, such as “About Me”, “Actions”, “Family”, and “Leisure”. Users can build sentences by selecting images, placing them in sentence slots, and activating a speech function to hear the words. It comes preloaded with a starter dictionary of 175 words to facilitate early communication.

Designed to support language development, the app helps children with autism express their thoughts, needs, and emotions while expanding their vocabulary. It is also a useful tool for individuals looking to improve their Lao language skills or use the app in real-life scenarios like shopping or dining.

Lao Autism Talks has received multiple awards, including first place at the Lao ICT Awards, which promotes innovation among Lao ICT companies, and a silver medal at the ASEAN ICT Awards in Cambodia in November 2017, recognizing outstanding ICT achievements in the region.[346] However, available information indicates that the app has not yet integrated AI.

7.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

7.3.1. AI applications not yet integrated in public service delivery in education

The MoES has not yet implemented AI in public education services. Currently, they are exploring potential development of AI in educational management. One potential consideration by the Ministry is the development of an information management system and statistical tools, which may incorporate AI technologies-such as data analytics and student assessment features-to enhance decision-making and overall system efficiency.[347]

7.3.2. Gender digital divide, and limited training in digital literacy for students and teachers

The lack of access to digital devices has been identified as a major barrier for students to engage with technology for learning and develop digital literacy. Affordable internet connectivity and educational devices are especially scarce in remote areas. During the COVID-19 pandemic, 78% of urban children and 87.5% of rural children in Lao PDR were unable to access schooling due to the absence of digital resources to support remote learning. These figures highlight concerns that widespread technology adoption could exacerbate the digital divide in Lao PDR’s education system, which already struggles with issues of access and quality.[348]

[346] “Lao Autism Talks Wins1st Lao ICT Award,” *Lao News Agency*, https://kpl.gov.la/En/detail.aspx?id=26189, 14 July 2017.
[347] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[348] “Technology in education: a case study on Lao People's Democratic Republic,” *UNESCO*, 2023.

The gender digital divide poses a significant challenge in Lao PDR, as evidenced by mobile phone ownership data. A 2023 UNICEF report reveals that in households with at least one adolescent boy or young man (aged 15-24) and one adolescent girl or young woman (aged 15-24), the latter is 8.5% less likely to own a mobile phone, hindering their participation in the digital world. Furthermore, the gender parity ratio for basic digital skills (SDG 4.4.1) stands at 0.77, meaning there are 77 female youth with digital skills for every 100 male youth. Research also shows that girls from ethnic minority groups in Lao PDR have lower digital skills than their non-ethnic minority peers and face numerous challenges even before starting school. In Lao PDR, only a small group of students receive digital skills education. Additionally, 78% of in-service and pre-service teachers have never undergone ICT training. Most teachers do not acknowledge the importance of training and development for improving their technology skills.[349]

The MoES has been working with partners to develop ICT skills in general for students and teachers, but there is little support from donors for improving their AI-related skills. Support is needed to upgrade AI literacy for teachers and students.[350] To overcome the challenges in digital literacy and digital skills, Lao PDR has launched some initiatives including:

- In 2023, the MoES launched the first ever 'Digital Literacy Camp' for students in Lao PDR. In this camp, students were introduced to tablets, the national e-learning platform, Khang Panya Lao, and important topics like online safety. The specific learning needs and priorities of students, particularly girls, were a focus of the camps.[351]
- The Digital Literacy Initiative (DLI) project, funded by Bread for the World and the Dariu Foundation, in collaboration with the MoES, aims to equip youth with essential digital skills for the digital economy. Targeting upper secondary and technical and vocational college (TVET students), the project aims to enhance digital literacy through activities like coding, basic programming, digital entrepreneurship courses, and code clubs. Running from 2024 to 2026, it focuses on improving ICT skills, creative thinking, and teamwork.[352]

7.3.3. Lack of ICT workforce development programs and gender gaps in STEM education

The inclusion of technological skills and STEM education at the university level, where ICT-related degrees represent only a minor segment of the total degrees offered.[353]

[349] "Bridging the Gender Digital Divide," *UNICEF*, 2023.
[350] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[351] "In Lao PDR, a digital transformation of education has begun," *UNICEF*, https://www.unicef.org/laos/stories/lao-pdr-digital-transformation-education-has-begun, 9 January 2023.
[352] "Digital Literacy Initiative Laos," *Swisscontact website*, https://www.swisscontact.org/en/projects/digital-literacy-initiative-laos, accessed 19 February 2024.
[353] "Technology in education: a case study on Lao People's Democratic Republic," *UNESCO*, 2023.

Regarding the development of AI talents, although Lao PDR does not yet have specialized courses or degrees in AI, there have been effort by universities to update ICT curriculum to integrate AI-related subjects.[354] In the Education and Sports Sector Development Plan (ESSDP) 2021-2025, the MoES plans to work with the National University of Laos (NUOL) to increase the number of enrolments and graduates through several initiatives, including establishing a new Institute of Technology with an AI Centre at NUOL.[355] However, this AI Centre has not been set up and the MoES and NUOL needs support to set this up.[356]

In February 2023, the Research Institute for Smart Technology in Laos and the Chongqing College of Electronic Engineering in China signed an MoU to advance AI and Big Data. The agreement aims to provide technical training and educational programs to develop smart technology-related human resources in Lao PDR and enhance research institutions' capacity. This initiative will establish a foundation for AI and Big Data research and provide facilities like testing and vocational training rooms.[357]

The country also focuses on building foundational digital skills and integrating technology into education through initiatives like the 10-year ICT in Education Strategy, Outcome 1 - Education and Sports Sector Development Plan (ESSDP) 2021 – 2025. However, public information on the results is quite limited.

A gender gap persists in the STEM tertiary education programs, with women making up 28.95% and men 71.05% of those obtaining STEM degrees as of 2024.[358] 'Khaiy Panya STEM' is an initiative to enhance STEM knowledge and skills among Lao adolescents, especially girls. The bootcamp in Luang Prabang, organized by the MoES, UNICEF Lao PDR, and XMT with Wemade's support, engaged students in science experiments and STEM discussions. Participants also learned about digital literacy, focusing on safe and responsible online engagement and identifying accurate information.[359]

7.3.4. Limited high-quality datasets for development of AI applications in education

The MoES is operating the Education Management Information System (EMIS) and the Lao Education and Sports Management Information System (LESMIS) platforms. The EMIS collects detailed information regarding institutional profiles, infrastructure, student demographics, school facilities, and human resources for preschool, primary, and

[354] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[355] "Education and Sports Sector Development Plan 2021-2025," *Planipolis*, https://planipolis.iiep.unesco.org/sites/default/files/ressources/lao_pdr_education_and_sports_sector_development_plan_2021-2025.pdf, 2020.
[356] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[357] "Laos And China Sign MoU to Research Development of Artificial Intelligence," *Laotian Times*, https://laotiantimes.com/2023/03/01/laos-and-china-sign-mou-to-research-development-of-artificial-intelligence/, 1 March 2023
[358] "Global Gender Gap 2024," *World Economic Forum*, 2024.
[359] Siliphot Sihaphom, "Igniting the Spark," *UNICEF*, https://www.unicef.org/laos/stories/igniting-spark, 9 October 2024.

secondary schools in Lao PDR.[360] Some information available on the LESMIS includes school names, student numbers, teacher counts, education materials and others.[361]

Additionally, there is an ongoing effort to digitize educational materials, with most of education materials (e.g., textbooks, teacher guides) have been converted to PDF format and made available on the Khang Panya Lao website managed by the MoES. These materials are publicly accessible, and there are plans to convert them into more interactive formats that can be utilized by education applications.[362] A key challenge for users of the systems is the lack of internet access in rural schools and the poor internet access quality. This complicates the data collection and data entry processes that takes place once a year in October.

7.3.5. Lack of high-performance computing resources

The country does not possess the necessary capacity or expertise to efficiently operate and utilize such HPC resources. Consequently, researchers rely on external resources, particularly supercomputing facilities in Thailand. Some research is conducted through collaborations with Europe.[363] Most research in universities is utilizing small to medium-sized computing resources and support on enhancing access to HPC for researchers and developers is needed.[364]

There are several data centres in Lao PDR. The MTC manages its data centres and cloud infrastructure through the Lao National Internet Centre (LANIC). However, the demand for these services surpasses MTC's capacity to deliver, as limited financial resources hinder the expansion of supply. Various line ministries also invest in their own data centres and servers.[365]

7.3.6. Limited resources for innovation and scaling

Data indicates that in Lao PDR, research receives fewer resources compared to administration. In addition, collaborations between universities, R&D centres, and the business sector are generally absent. Additionally, there are no suitable policy instruments to encourage robust interaction between the supply and demand sides of science, technology, and innovation.[366]

Lao PDR has taken steps to collaborate with foreign universities to enhance talent development and research opportunities in AI. For example, The Lao-Korean College is associated with the Institute of Advanced Technology Education & Research (iATER),

[360] "EMIS form," *NIPN*, https://nipn.lsb.gov.la/emis-form/, 2 August 2024.
[361] "Lao Education and Sports Management Information System (LESMIS)," *UNICEF*, https://www.unicef.org/laos/lao-education-and-sports-management-information-system-lesmis, accessed 18 December 2024.
[362] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[363] "High Performance Computing (HPC) for Covid-19," *ASEAN Main Portal*, https://asean.org/wp-content/uploads/2023/11/HPC-and-COVID-19-v-25092023-FINAL.pdf, July 2023.
[364] Based on data and information collected from desk research and key informant interviews and consultative meetings.
[365] "Positioning the Lao PDR for a Digital Future," *World Bank*, 2022.
[366] "Mapping research and innovation in Lao People's Democratic Republic," *UNESCO*, 2018.

which has been partnering with Korean universities on joint research initiatives, such as Lab AI, since late 2020.[367]

[367] "AI Governance in Southeast Asia," *US-ASEAN Business Council*, 2023.

8. Timor-Leste

8.1. Government strategies, regulation and institutional frameworks on AI in education

Currently, there is no dedicated AI management agency in Timor-Leste. The Ministry of Transport & Communications (MTC) serves as the primary coordinator for digital economy initiatives. The Ministry of Education (MoE) oversees the education sector, including K-12 education, recurrent education, technical-vocational secondary education. Meanwhile, the Ministry of Higher Education, Science and Culture (MESCC) is responsible for higher education institutions and scientific research.

Timor-Leste has not issued any policies specifically for the governance of AI, however, as a member of UNESCO, they adhere to UNESCO's Recommendation on the Ethics of Artificial Intelligence. The government has also developed several national plans to promote the development and use of digital and ICT in education. On June 2, 2023, the Government of Timor-Leste launched the National Strategic Plan for Digital and ICT Development 2022-2032[368] (Timor Digital 2032) to advance the nation's digital and technological development, particularly in areas such as e-government, inclusive economy, health, education, and agriculture.

Regarding the education sector, the strategic plan aims to enhance the quality and accessibility of educational services by leveraging the opportunities provided by digital technologies and ICTs. Accordingly, a focused strategic plan and roadmap for integrating digital technologies and ICTs into the education sector will be developed. This plan shall include connecting all educational institutions to the government ICT network and to the internet, establishing ICT labs, developing digital and online libraries and knowledge repositories, and implementing student records and academic management systems using Unique IDs (a unique ID will be registered for each citizen to serve as the authentication mechanism for accessing government services) across the entire sector. However, it is not clear when this strategic plan will be developed and whether it will include the plan to adopt AI in education.

The "Timor Digital 2032" also sets strategic goals related to developing digital and ICT skills, updating educational curriculum, improving the quality and cost of Internet connectivity, upgrading ICT infrastructure and data centres, extending the government ICT network to connecting all government administration and schools, and attracting digital and ICT investment, among others.

[368] "Timor Digital 2032 – English Version," *Flipsnack*, https://www.flipsnack.com/8AABB9DD75E/timor-digital-2032.html, accessed 25 November 2024.

8.2. AI applications in education

Timor-Leste's EdTech ecosystem is steadily evolving, driven by contributions from the public sector, development partners, and private stakeholders. These EdTech products and services are primarily delivered through mobile applications and websites. It is observed from a recent report on Timor-Leste's Edtech ecosystem that most EdTech initiatives in Timor-Leste have yet to integrate AI.[369] Meanwhile, some AI tools developed by international suppliers are available for the Timor-Leste market. Below are several notable examples.

8.2.1. Personalized learning system

- Application name: Dawn of Civilization – Play and Learn English! (https://dawnofcivilization.net/)[370]
- Target users: Students and teachers
- Suppliers/Developers: Solve Education!
- Application details:

Dawn of Civilization, developed by the international philanthropic organization Solve Education!, is a multi-subject educational game app accessible both online and offline via smartphones. To enhance content delivery, the platform collaborates with educators, enabling them to digitize and gamify their materials. Through the Content Plus development platform, teachers can access game design templates and adapt them to their own curriculum. Additionally, they can track and assess students' learning progress and engagement using Learnalytics, which provides insights into program effectiveness.

The app helps students develop key language skills, including vocabulary, grammar, pronunciation, listening, and reading. Its built-in AI identifies missed or forgotten lessons, allowing learners to reinforce essential concepts more efficiently and accelerate skill mastery.[371]

Solve Education! has learners from over 45 countries and collaborates with a diverse range of partners across the public, private, and nonprofit sectors worldwide.

8.2.2. AI applications for people with disabilities

- Application name: Cboard (https://www.cboard.io/en/)
- Target users: People with speech and language impairments
- Suppliers/Developers: Cboard in collaboration with UNICEF Timor-Leste and Microsoft.
- Application details:

[369] "EdTech in Timor-Leste: A Rapid Scan," *EdTech Hub*, 2024.
[370] "Reimagine Education: ICT & Innovation in Timor-Leste," *UNICEF*, 2020.
[371] "Dawn of Civilization's English Learning Content in Comparison to the Singapore Primary Level English Language Syllabus," *Solve Education!*, https://solveeducation.org/research/dawn-of-civilizations-english-learning-content-in-comparison-to-the-singapore-primary-level-english-language-syllabus/, 4 October 2021.

Cboard, an AI-integrated product and a free open-source web application designed for children and adults with speech and language impairments, facilitating communication through symbols and text-to-speech functionality. This application could be utilized in different settings, including education, to aid people with special communication needs.

Cboard is not a local innovation, however, it was piloted in Timor-Leste's schools from September to December 2023 in collaboration with UNICEF Timor-Leste and Microsoft. The primary goal of this pilot was to evaluate the practical use of the Cboard app within the country's educational settings. In addition to the app provided for students, devices were also provided and donated by UNICEF and PicSeePal, a collaborative partner to the piloted schools who face infrastructural challenges, including limited access to computers and tablets, as well as connectivity issues. This pilot represents a significant effort to democratize communication access for individuals with diverse communication needs.[372]

In 2017, Cboard received an investment from the UNICEF Innovation Fund to improve the app and make it more accessible. In 2022, Cboard received a grant from Microsoft AI for Accessibility to improve the app with AI features. In the last two years, Cboard has been updated with new AI features to improve the user experience.[373]

8.2.3. Automation of admin tasks

- Application name: Matenek[374]
- Target users: Teachers
- Suppliers/Developers: Ministry of Education, Australian Aid, and Catalpa
- Application details:

The Matenek program is a pioneering initiative aimed at assisting teachers who have low digital literacy and limited access to reliable internet. The project focuses on enhancing teachers' skills, motivation, and resource access to ultimately boost student learning. It features a mobile-first platform that supports educators by offering lesson plans, professional development resources, and reminders for classroom preparation. This user-friendly platform is tailored specifically for teachers facing challenges with digital literacy and internet connectivity.

The project benefited 14 teachers, 14 school leaders, 11 school coordinators, over 500 students, and 12 Ministry staffs. Key successes included teachers more than doubling their lesson preparation time compared to before the pilot and utilizing the platform for an average of 45 minutes daily, despite most having no prior smartphone experience. This led to improved teacher readiness, positively influencing student readiness to learn

[372] "Cboard pilot in Timor Leste," *Cboard*, https://www.cboard.io/en/blog/2023-09-03-cboard-pilot-in-timor-leste, 2023
[373] "History," *Cboard AAC*, https://www.cboard.io/en/history/, accessed 18 December 2024.
[374] "Equipping teachers with confidence in the classroom," *Catalpa International*, https://catalpa.io/projects/matenek-improving-teaching/, accessed 18 December 2024.

and the time dedicated to preparing teaching materials. Lessons using Matenek resources were delivered more effectively and at a better pace than those without, and program teachers adopted more practices and strategies to engage students. Additionally, Ministry staff noted a reduction in barriers to using technology for achieving educational outcomes.[375]

From public sources, it is unclear if the app has integrated any AI features.

8.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

8.3.1. AI applications not yet integrated in public service delivery in the education sector

In the MoE's National Education Strategic Plan 2011‑2023,[376] the Ministry acknowledges the significance of utilizing data for effective education management. As such, the MoE maintains the national Education Management Information System (EMIS) and shares the data publicly to ensure data-based decision-making and administration by all stakeholders. As of the time of writing, the public interface of EMIS[377] does not integrate any AI-powered features such as chatbots.

Another effort is the plan to use the Unique ID to implement student records management systems and academic management systems for the whole education sector, as set out in the "Timor Digital 2032." AI can be integrated into these education management systems to significantly enhance the delivery of public services within the education sector.

8.3.2. Insufficient digital skills among teachers and students to adopt AI and gender digital divide

Digital literacy among young Timorese is limited, as well as their ability to use online resources in a responsible and productive manner.[378] Both male and female students generally lack digital skills This may partly stem from the curriculum in secondary and vocational schools focusing primarily on basic multimedia skills, such as how to use a computer, rather than on more advanced digital competencies. Teachers' digital awareness remains low, and they lack sufficient training in ICT and digital skills, making them unable to effectively support students' digital education.[379]

[375] "Technology in education in Papua New Guinea and the Pacific," *UNESCO,* 2024.
[376] "National Education Strategic Plan 2011-2030," *Timor Leste Ministry of Education*, https://www.globalpartnership.org/node/document/download?file=document/file/2011-08-Ministry-of-Education-Timor-Leste-Education-Plan_processed.pdf, 2011.
[377] "Statistical Data," *Timor Leste Ministry of Education*, https://www.moe.gov.tl/emis/dados-estatistico, accessed 19 December 2024.
[378] "Reimagine Education: ICT & Innovation in Timor-Leste," *UNICEF*, 2020.
[379] "EdTech in Timor-Leste: A Rapid Scan," *EdTech Hub*, 2024.

Additionally, the use of Tetum in ICT is minimal,[380] leading to a shortage of localized content,[381] and higher education struggles with inadequate devices and inaccessible platforms for inclusive learning.[382]

The gender digital divide is a significant challenge in Timor. Young girls aged 15-24 years use the Internet 4% less than their male counterparts aged 15-25 years. Adolescent girls in Timor-Leste are also 4.8% less likely to own a mobile phone compared to their male peers within the same household.[383]

There are several initiatives to enhance digital literacy for teachers and students in Timor-Leste as follows.

- "Timor Digital 2032": A national strategy to develop ICT skills, assess digital competencies, and update curricula from preschool onward.
- Eskola Ba Uma (School Goes Home):[384] A digital platform supporting home learning through mobile apps, television, radio, and accessible resources for marginalized and disabled learners.
- ICT Skills and Knowledge for Youth in Timor-Leste (iSKY-TL):[385] A UNDP - government partnership (2021 - 2023) that provided computer labs and basic skills training in Oecusse, a region with a high rate of multidimensional poverty.
- ALMA (Apoiu Lideransa liuhosi Mentoria 34 no Aprendizajen / Leadership Mentorship and Learning Support):[386] A ten-year project (July 2016 - May 2026) improving teacher training and school leadership through peer mentoring and digital tools for classroom observations.
- Matenek:[387] Matenek is a mobile technology project designed to assist teachers by providing lesson plans, professional development content, and reminders for classroom preparation. The project is implemented under the collaboration among MoE, Australian Aid and Catalpa - an NGO rooted in the use of design thinking to impact international development.
- "Leveraging ICT to Improve Education and Skills in Timor-Leste" Project:[388] An initiative from 2019-2021 that enhanced education quality by providing ICT

[380] "Reimagine Education: ICT & Innovation in Timor-Leste," *UNICEF*, 2020.
[381] "EdTech in Timor-Leste: A Rapid Scan," *EdTech Hub*, 2024.
[382] "Technology in education: a case study on Timor-Leste," *UNESCO*, 2023.
[383] "Bridging the Gender Digital Divide: Challenges and an Urgent Call for Action for Equitable Digital Skills Development", *UNICEF*, https://www.unicef.org/press-releases/90-cent-adolescent-girls-and-young-women-low-income-countries-are-offline-unicef, 27 April 2023.
[384] "Eskola Ba Uma' initiative helps children continue learning in Timor-Leste," *UNICEF*, https:// www.unicef.org/timorleste/stories/eskola-ba-uma-initiative-helps-children-continue-learning-timor-leste, 01 June 2020.
[385] "ICT Skills and Knowledge for Youth in Timor-Leste (iSKY-TL)," *UNDP*, https://www.undp.org/timor-leste/projects/ict-skills-and-knowledge-youth-timor-leste-isky-tl, accessed 19 December 2024.
[386] "Education Analytics Service (EAS) Teacher Development Multi-Year Study Series: Timor Leste Interim Report 2," *Australian Government Department of Foreign Affairs and Trade*, https://www.dfat.gov.au/publications/development/education-analytics-service-eas-teacher-development-multi-year-study-series-timor-leste-interim-report-2, accessed 19 December 2024.
[387] "Equipping teachers with confidence in the classroom," *Catalpa International*, https://catalpa.io/projects/matenek-improving-teaching/, accessed 18 December 2024.
[388] "ICT Infrastructure Improves Education for Timorese Youth," *UNDP*, https:// www.undp.org/timor-leste/news/ict-infrastructure-improves-education-timorese-youth", 3 October 2021

infrastructure, teaching computer skills and programming, and training teachers with multilingual ICT manuals.

8.3.3. Lack of AI talents for developing AI applications

Timor-Leste is among Southeast Asian countries that are in the nascent stages of developing their AI ecosystems and faces a common challenge of a shortage of AI talent and skills. The rapid advancement of AI technology has outpaced the availability of skilled professionals in the field. This gap is primarily due to limited access to specialized AI education and training programs.

Efforts are being made to address this issue through the development of local educational initiatives. For example, the establishment of the Spatial AI Centre by EON Reality aims to enhance AI skills and knowledge among Timorese students and professionals.[389] Additionally, universities such as the Dili Institute of Technology (DIT) are beginning to incorporate AI into their curricula to better prepare students for the demands of the tech industry. DIT also has done several research on AI-related topics, however, there is very limited information on their research facilities.

8.3.4. Lack of datasets in local languages to train AI model

As of the time of writing, there are less than 50 datasets in the Tetum language and around 1,000 datasets in the Portuguese language that can be found on Hugging Face,[390] the largest AI community online for open-source data for AI experts and enthusiasts worldwide. These figures are significantly smaller compared to the approximately 19,000 English datasets available on the same website. There is also very limited public information on the quality, safety, and inclusiveness of these open datasets.

The reliability and affordability of Internet connectivity in the country are one of the barriers to the potential for generating valuable data that could be utilized by AI models.[391]

At present, there appear to be few initiatives aimed at supporting the development of datasets in local languages that are both locally relevant and inclusive. Current efforts are primarily concentrated on enhancing the basic ICT infrastructure.

[389] "EON Reality Advances Educational Frontiers in Timor-Leste with New Spatial AI Center and Tailored Learning Programs," *EON Reality,* https:// eonreality.com/eon-reality-advances-educational-frontiers-in-timor-leste-with-new-spatial-ai-center-and-tailored-learning-programs/, 10 June 2024.
[390] "Hugging Face," *Hugging Face*, https://huggingface.co/datasets?language=language:tet&sort=trending, accessed 18 December 2024.
[391] "Responsible AI in Southeast Asia: Tracking Progress and Benchmarking Impact," *Access Partnership*, https://accesspartnership.com/ai-in-sea/, 2024.

8.3.5. Lack of collaboration between academia, industry, and government to develop AI applications in education

The absence of strong collaborations between academia, industry, government, and civil society can obstruct the ongoing progress of innovation and development initiatives. Additionally, the current lack of public-private partnerships in Timor-Leste poses a potential barrier to implementing the Science, Technology, and Innovation agenda, especially within the Quadruple Helix Innovation Framework.[392]

[392] "The Panorama of Science, Technology and Innovation (STI) in Timor Leste: Revealing challenges and resolutions," *Revista de Ciencia e Technologia de Timor-Leste,* https://rct.inct.gov.tl/index.php/rct/article/view/18, 2024.

9. Myanmar

9.1. Government strategies, regulation and institutional frameworks on AI in education

Currently, Myanmar does not have a national government agency who is responsible for AI development and implementation. However, the following key government agencies are expected to play roles in developing strategies, roadmaps, and policies for AI in education:

- Ministry of Transport & Communications (MOTC): MOTC is the main coordinator for digital economy initiatives, with support from the Digital Economy Development Committee (DEDC).
- Ministry of Education (MOE): According to the Myanmar Digital Economy Roadmap (2018-2025), MOE is assigned to be in charge of improving digital literacy and technology skills for students by providing digital infrastructure to educational institutions.
- Ministry of Science and Technology (MOST): Focuses on advancing scientific research and technological innovation, which likely includes AI applications.

Myanmar has not yet developed a national AI strategy or set specific regulations for AI usage. This is primarily due to limited technical expertise and an understanding of the policy and regulatory needs for utilizing AI to drive economic growth.[393]

Myanmar also currently lacks a robust legal framework to govern and mitigate risks and limitations associated with AI. Regional frameworks, like the ASEAN Guide on AI Governance and Ethics, guide Myanmar's AI approach by emphasizing responsible development, ethical considerations, and inclusivity.

9.2. AI applications in education

Regarding Myanmar's EdTech financing landscape, by 2024, the country secured US$1.31m in funding. EdTech adoption in Myanmar is hindered by limited funding and low purchasing power, making scaling difficult. Startups targeting high-end customers further shrink the market, while investors often misjudge Myanmar's growth by comparing it to more developed countries. Additionally, a bias toward English-speaking founders adds to the funding challenges.[394]

Few AI-powered education platforms catering to local language needs exist in Myanmar, most of which are developed by international providers.

[393] "Responsible AI in Southeast Asia: Tracking Progress and Benchmarking Impact," *Access Partnership*, https://accesspartnership.com/ai-in-sea/, 2024.
[394] "Edtech startups want to reform education in Myanmar, but systemic challenges hinder mass adoption," *KrASIA*, https://kr-asia.com/edtech-startups-want-to-reform-education-in-myanmar-but-systemic-challenges-hinder-mass-adoption, 6 Jan 2021.

Regarding AI-integrated products to support PwDs, existing applications for people with visual and hearing impairments mainly support English speakers, with limited offerings in the Burmese language.[395]

An example of local EdTech applications that can incorporate AI as a virtual tutor tool is MyanLearn with specific information as follows:

- Application name: MyanLearn
- Target users: Students between 15 to 30 years old
- Suppliers/Developers: MyanLearn
- Application details:

MyanLearn was founded in 2017 by three young people who graduated from Singapore. The application supports students learn and practicing English conversation skills online using interactive methods, finding both online and physical classes from all categories, and connecting with tutors. Available in both Android and iOS, nearly 6,000 students are using the application to search classes on a monthly basis, and the number of users grows each month.[396] MyanLearn incorporates interactive English-speaking practice with a Computer Bot. However, specific details about the AI technologies employed are not extensively documented in the available sources.

9.3. Key challenges, gaps and notable initiatives (where applicable) regarding the six enabling pillars

9.3.1. AI applications not yet integrated in public service delivery in the education sector

The Ministry of Education's primary portal does not incorporate public service functions nor leverage AI integration. On the website of the Myanmar Department of Higher Education, a suggestion service is available that allows users to provide feedback by submitting personal information (name and email), along with the subject and details of their suggestions. Nevertheless, the platform does not utilize AI to enhance user engagement and streamline the feedback process. Thus, these gaps highlight a key area for AI development to optimize governance in the education sector.

9.3.2. Digital skills deficiency among teachers and learners hindering AI adoption and gender digital divide

Significant gaps in digital literacy persist in Myanmar, as 75% of youth aged 10 to 24 had not received formal digital skills education as of 2021. Although Myanmar's

[395] "Pragmatic first steps in ensuring accessible ICTs," LIRNEasia, https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Flirneasia.net%2Fwp-content%2Fuploads%2F2018%2F03%2FS6_Pragmatic-first-steps-in-ensuring-accessible-ICTs_Nepal.pptx&wdOrigin=BROWSELINK, 2018.
[396] "Leveraging youths' experience across Myanmar's education," *The Nations Online*, https://news.smu.edu.sg/sites/news.smu.edu.sg/files/wwwsmu/news_room/smu_in_the_news/2019/Apr2019/Apr26/20190422-THENATION-Thailand-Leveraging.pdf, 22 April 2019.

education sector is undergoing a digital transformation, with concentrated efforts to enhance the digital skills of both teachers and learners, challenges such as limited infrastructure, political instability, and socio-economic disparities continue to hinder the effective integration of digital literacy into education. Teachers also face challenges, often lacking adequate training and resources to effectively utilize digital technology in classrooms.

While urban schools and students benefit from certain EdTech initiatives, rural areas struggle due to infrastructure limitations. Regionally, 62% of primary schools and 78% of secondary schools have computers for pedagogical purposes, but Myanmar still lags behind these averages. Connectivity in schools is challenging, with only 6% of secondary schools having internet access. Urban-rural disparities are stark, with students from the wealthiest households being eight times more likely to have internet at home compared to their poorest counterparts.[397]

Regarding the gender digital divide, women are 28% less likely than men to own a mobile phone, the primary means of internet access in the country, and women also face related disparities in digital skills.[398]

The following initiatives demonstrate the government's efforts to bridge the digital skills gap among educators and learners:

- Myanmar Digital Economy Roadmap (2018–2025): The Roadmap outlines the short-term plan to improve digital literacy and skills by providing training to students, establishing digital centres, offering vocational training, fostering international collaborations, and conducting public awareness campaigns. The long-term focus is on enhancing digital education through developing local digital content, providing online learning opportunities, and training teachers in digital skills.
- Media and Information Literacy (MIL) Competency Framework:[399] This framework aims to strengthen key competencies, including digital, information, and computer literacy, with a particular emphasis on higher education.
- Connect to Learn:[400] This collaboration between Myanmar's MOE, Ericsson, UNESCO, and other partners aims to enhance educational opportunities in rural areas by integrating ICT into the learning environment. The project's initiatives include integrating ICT, distributing devices, training educators, and enriching student learning experiences.

[397] "2023 Southeast Asia Report – Technology in Education," *UNESCO*, https://www.unesco.org/gem-report/en/2023-southeast-asia, 2023.
[398] "Ending the Gender Digital Divide in Myanmar: A Problem-Driven Political Economy Assessment," *IREX*, 2017.
[399] "Towards a Media and Information Literacy Competency Framework," *UNESCO*, 2020
[400] "Connect to Learn: Aiming to Improve Learning Outcomes of Underprivileged Students in Myanmar," *Qualcomm*, https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/casestudy_myanmar_2021update.pdf, 6 April 2021

- Empowering Women and Girls through Mobile Technology in Myanmar Project:[401] This initiative, part of the Connect to Learn project, aimed to enhance access to modern education and empower women and girls through technology. The project provides ICT tools, teacher training, English and life skills programs, and training for education officials, school leaders, and teachers on ICT integration, while strengthening the Department of Basic Education's project management capabilities.

9.3.3. Lack of AI talents and research labs on responsible AI in Myanmar universities and gender disparities in STEM-related fields

Myanmar currently has three universities that offer AI courses for students to enrol.[402] However, developing AI talent in Myanmar faces several challenges. There is a shortage of skilled professionals to drive change and a lack of adequate ICT experts.[403] Creating and scaling up AI labs in Myanmar universities faces obstacles, including insufficient funding for investing in advanced technology and infrastructure,[404] a shortage of a skilled workforce, and unequal access to technology and internet connectivity.[405]

While comprehensive data on women's specialization in AI within Myanmar is scarce, available evidence provides insights into gender disparities within the STEM field. As of 2023, women comprised 60.76% and men 39.24% of those obtaining STEM degrees in tertiary education programs.[406] Regarding STEM sub-sectors, women represented 42.3% of graduates in Engineering and 67.4% in ICT.[407]

Efforts to develop AI talent and skills in Myanmar are limited, with most initiatives stemming from collaborations between the government and the private sector partners. One notable example is the National Cloud & AI Contest, co-organized in 2019 by the Rectors Committee, the Research & Development Institute of the MOE, and the Myanmar Computer Federation, with support from Huawei. This contest aimed to promote innovation in AI and cloud computing, engage universities specializing in technology across Myanmar and encourage practical applications in various sectors.[408]

[401] "Empowering Women and Girls through Mobile Technology in Myanmar Activity Profile," *Mohinga*, https://mohinga.info/en/profiles/activity/MM-FERD-ID4642/, accessed 19 December 2024.
[402] "3 Best universities for Artificial Intelligence (AI) in Myanmar", *EduRank*, https://edurank.org/cs/ai/mm/, 2 March 2025.
[403] "Responsible AI in Southeast Asia: Tracking Progress and Benchmarking Impact," *Access Partnership*, https://accesspartnership.com/ai-in-sea/, 2024.
[404] "Integration of Technology in Higher Education in Myanmar: A Review of University Teachers' Perceptions of Barriers and Supports," *Technium Social Sciences Journal*, January 2021.
[405] "Myanmar's new digital strategy improves ICT development and network readiness," *Oxford Business Group*, https://oxfordbusinessgroup.com/reports/myanmar/2020-report/economy/connection-roadmap-new-digital-strategy-for-government-trade-and-investment-to-improve-sector-development-and-network-readiness, 2020.
[406] "Global Gender Gap 2023," *World Economic Forum*, 2023.
[407] "To be smart, the digital revolution will need to be inclusive: excerpt from the UNESCO science report," *UNESCO*, 2021.
[408] "Myanmar National Cloud & AI Contest to Hold For the First Time," *Huawei*, https://www.huawei.com/mm/news/mm/2019/myanmar-national-cloud-ai-contest-to-hold-for-the-first-time-eng, 2019.

9.3.4. Data privacy concerns in AI application development

Challenges in developing datasets for AI applications in Myanmar are compounded by the absence of a comprehensive data protection law,[409] which hinders data sharing and utilization and discourages entities from contributing data. Additionally, the lack of a dedicated data protection agency, coupled with issues such as online fraud, cyber-attacks, and broader cybersecurity challenges, further complicates the development process.[410]

There are some initiatives implemented by the Myanmar government to overcome these challenges:

- Myanmar Digital Economy Roadmap (2018–2025): The Roadmap outlines strategies to advance digital transformation and trade by developing regulatory frameworks focused on critical areas such as open data, data sharing, and data privacy.
- Education Management Information System (EMIS):[411] Initiated by the MOE, EMIS is a comprehensive web-based platform that collects, stores, and manages data across basic, higher, technical, vocational, and non-formal education sectors. Developed with UNESCO's technical assistance in 2015, it supports policy formulation, planning, decision-making, research, and monitoring by gathering detailed information on schools, teachers, students, and finances. Regarding the development of the EMIS, ensuring data accuracy and timeliness remains a critical challenge that requires ongoing training and capacity building for data management personnel.[412]

9.3.5. Insufficient high-performance computing infrastructure to facilitate AI research and innovation

Myanmar's IT infrastructure remains underdeveloped, with limited access to reliable electricity and internet connectivity-particularly in remote and rural areas-which further hinders the widespread adoption of ICT solutions.[413]

However, some universities have made significant strides in developing advanced computing infrastructure, which may support AI development. Specifically:

[409] "Responsible AI in Southeast Asia: Tracking Progress and Benchmarking Impact," *Access Partnership*, https://accesspartnership.com/ai-in-sea/, 2024.
[410] "Myanmar's new digital strategy improves ICT development and network readiness," *Oxford Business Group*, https://oxfordbusinessgroup.com/reports/myanmar/2020-report/economy/connection-roadmap-new-digital-strategy-for-government-trade-and-investment-to-improve-sector-development-and-network-readiness, 2020.
[411] "Better data for better decisions in Myanmar's education sector," *UNESCO*, https://www.unesco.org/en/articles/better-data-better-decisions-myanmars-education-sector, 11 March 2020.
[412] "Strengthening EMIS Capacity towards EFA Monitoring in Myanmar", *Slideplayer*, https://slideplayer.com/slide/13658724.
[413] "Myanmar's new digital strategy improves ICT development and network readiness," *Oxford Business Group*, https://oxfordbusinessgroup.com/reports/myanmar/2020-report/economy/connection-roadmap-new-digital-strategy-for-government-trade-and-investment-to-improve-sector-development-and-network-readiness, 2020.

- High-Performance Computing Lab (HPC Lab) at the University of Information Technology (UIT):[414] UIT's HPC Lab focuses on advancing knowledge and application in scientific computing. This lab aims to establish foundational expertise for developing HPC systems. Its research focuses on parallel and distributed systems, parallel and distributed computing, mobile and ubiquitous computing, computer network and management, and distributed system and distributed programming.
- Cloud Computing System Lab at the University of Information Technology (UIT):[415] The Cloud Computing System Lab aims to manage transformative research on the Cloud ecosystem, improve innovative technologies and equip UIT students with knowledge about various features of cloud computing and software platforms, addressing Big Data and Big Compute problems. Its research topics include mobile cloud computing, encryption, data security, big data analytics, big data clustering, virtual computing, and infrastructure management for services.
- Microsoft Windows Compute Cluster Server (CCS) system at Yangon University (YU):[416] In 2008, Yangon University, supported by the Ministry of Education and the Asia Research Centre-YO, implemented the Microsoft Windows Compute Cluster Server (CCS) system as part of its HPC infrastructure. This initiative aims to expand access to central HPC resources and integrate them into mainstream research workflows at in line with YU's strategy.

[414] "High Performance Computing Lab," *University of Information Technology*, https://www.uit.edu.mm/research-labs/high-performance-computing-lab/, accessed 20 December 2024.
[415] "Cloud Computing System Lab," *University of Information Technology*, https://www.uit.edu.mm/research-labs/cloud-computing-system-lab/, accessed 20 December 2024.
[416] "High Performance Computing on the Compute Cluster at Yangon University," *MERAL portal*, https://meral.edu.mm/records/2499?community=uy, accessed 20 December 2024.

Appendix 2: AI applications in global education

I. Overview of global AI application in the EdTech market

The global EdTech market has witnessed substantial growth, valued at approximately US$254.8b in 2021 and projected to exceed US$600b by 2027.[417] Both mature markets, such as the US and Canada, and emerging economies like China and India have been pivotal in propelling the growth of online learning. The Asia-Pacific region has emerged as the largest and fastest-growing market for EdTech, with the K-12 segment leading in both institutional and direct-to-consumer applications.[418]

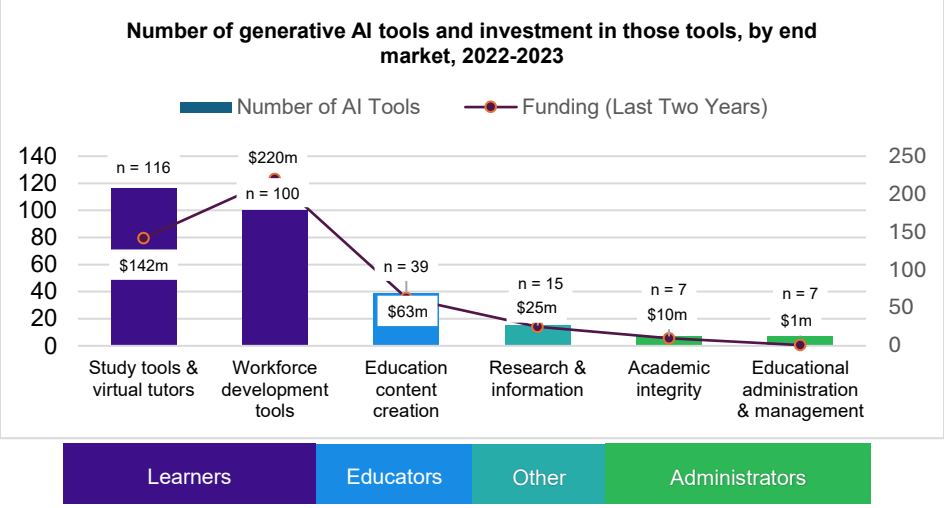
In the era of new edge technologies, the integration of advanced technologies, including AI and AR/VR, is anticipated to significantly influence the EdTech market, particularly by enhancing educational experiences through game-based learning.[419] Specifically, the global AI in the EdTech market is projected to grow substantially, with an estimated value of US$92.09b by 2033, rising from US$3.65b in 2023, at a compound annual growth rate (CAGR) of 38.1% (2024–2033).[420] Interest in extended reality (XR)-a term encompassing technologies such as AR and VR-has also surged, as reflected in a 200% increase in global internet searches over the past five years.[421]

II. AI application in global education

The integration of AI technology into education offers numerous benefits that enhance the learning experience for students, improve teaching efficiency for educators, and streamline administrative processes for educational institutions. AI applications in education can be categorized by end-users, which encompass tools for learners (e.g., study tools and virtual tutors), educators (e.g., content creation), administrators (e.g., academic integrity and educational administration), and others (e.g., research and information). Among these, according to an EY report from 2022-2023, study tools and virtual tutors accounted for approximately 40% of AI-enabled education tool development and were the most prominent applications from 2022 to 2023, as described in Figure below.

[417] "Education Technology Market Size, Share, & Growth Analysis Report By EdTech Business Models, Type, Sector, End-User, Geography–Industry Analysis Report, Regional Outlook, Growth Potential, Competitive Market Share and Forecast 2029," *Arizton Advisory & Intelligence*, https://www.arizton.com/market-reports/edtech-market, October 2024.
[418] "Education: a sector in transition – Nine trends re-shaping the global K-12 and higher education sectors," *Global Markets*, 2023.
[419] Ibid.
[420] "AI in Edtech Market," *Market.Us*, October 2024.
[421] "The 9 Most Interesting EdTech Trends of 2024," *Expoding Topics*, https:// explodingtopics.com/blog/edtech-trends, 4 October 2024.

Figure 1: Number of generative AI tools and investment in those tools by end market 2022-2023



AI Applications for Learners[422]

- **Study tools** facilitate student learning at all achievement levels by quickly offering customized review/study materials to learners with key providers, including Chegg, and Anthology. These tools also include language learning tools that enhance language acquisition including conversational AI, writing assistants, and interactive lessons, helping students learn more effectively by providing real-time feedback.
- **Virtual tutors** or AI tutors provide personalized academic guidance to enhance student learning, exemplified by platforms such as Khan Academy and Varsity Tutors.
- **Workforce development tools** are personalized upskilling and productivity tools that customize the employees' learning experience, and scale development programs to meet the needs of many employees, offered by companies such as Workera, Skillsoft, and Eightfold.ai. These tools rank as the second most popular AI application, attracting US$200m in investments between 2022 and 2023.

AI Applications for Educators

- **Teacher assistants and copilots** automate administrative tasks such as grading, lesson planning, and progress monitoring, aiding the effective support of students across different achievement levels. These tools are mainly offered by providers like Byju's, Class Technology Inc., and Gradescope.[423] According to Forbes, about 60% of teachers use AI in daily teaching.[424]

[422] "Generative AI in education: Summary of EdTech landscape," *EY Parthenon*, 2024.
[423] Ibid.
[424] "Artificial Intelligence In Education: Teachers' Opinions On AI In The Classroom," *Forbes*, https://www.forbes.com/advisor/education/it-and-tech/artificial-intelligence-in-school/, 6 Jun 2024.

- **Educational content creation** tools streamline the creation of content and courses, reducing the burden of lesson planning and grading and allowing teachers to focus more time/energy on delivery. Between 2022 and 2023, these tools secured approximately US$63m in funding from L2Y investments.[425]

AI Applications for Administrators

- **Education admin & management** tools that simplify administrative tasks and provide real-time analytics can reduce workforce requirements in education, offered by companies like PowerSchool and Doowii.[426] Regarding administration in the public sector, government spending on AI for digital government services is expected to reach US$41.8 b by 2027.[427] The government can use AI solutions to modernize operations and secure data,[428] which may be applied in the educational sector. However, education administration and management tools ranked among the AI tools receiving the least investment during the 2022-2023 period, with only US$1m in funding.[429]
- **Academic integrity** tools recognize AI-generated text to ensure academic integrity and originality, provided by GPTZero, Turnitin, and Copyleaks. These tools also received a relatively low level of investment between 2022 and 2023, amounting to approximately US$10m, with a similar number of tools as education admin tools.[430]

Other AI Applications

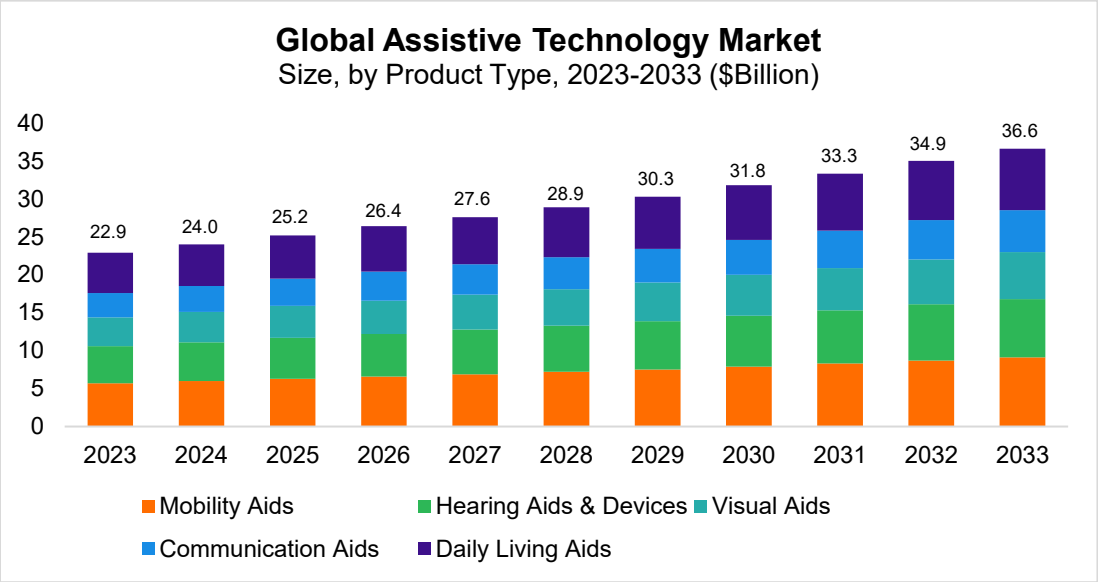
- **Research and information** include tools that can summarize and extract key information from research papers, providing insights and takeaways, and saving researchers time such as Consensus. According to the survey of Quizlet (2023), 44% of teachers and students have used AI for research.[431]

AI Application for PwDs

Regarding AI applications for PwDs, Market.us reports that the global assistive technology market (including tools for mobility, hearing, visual, communication, and daily living aides) is anticipated to grow from US$22.9b in 2023 to approximately US$36.6b by 2033, with a CAGR of 4.8% during the 2024-2033 forecast period as illustrated below.[432]

[425] "Generative AI in education: Summary of EdTech landscape," *EY Parthenon*, 2024.
[426] Ibid.
[427] "Compare AI Software Spending in the Government Industry, 2023-2027," *Gartner*, https://www.gartner.com/en/documents/5318363, 27 March 2024.
[428] "4 foundational ways that AI is transforming government," *Microsoft*, https://www.microsoft.com/en-us/industry/blog/government/2024/10/08/4-foundational-ways-that-ai-is-transforming-government/, 8 October 2024.
[429] "Generative AI in education: Summary of EdTech landscape," *EY Parthenon*, 2024.
[430] Ibid.
[431] Ibid.
[432] "Assistive Technology Market," *Market.Us*, https://market.us/report/assistive-technology-market/, April 2024.

Figure 2: Global Assistive Technology Market



Assistive and accessible technologies are designed to support learning for PwDs, enabling them to engage in learning and related tasks and access to mainstream services of content that may otherwise be unavailable to them.[433] Examples include phonetic spelling software (Praat Vocal Toolkit), text-to-speech apps (PlayHT), picture-based communication (Proloquo2Go), speech-to-text (Otter), and video creation (Fliki).

III. Key players in the markets

- LinkedIn Learning offers online courses to develop business, technology, and creative skills. In 2023, it introduced AI-enabled tools like AI-enabled job descriptions, collaborative articles, and an AI-enabled chatbot for job applications. LinkedIn Learning also launched the AI Skill Initiative with Microsoft, offering free courses on generative AI. In 2022, LinkedIn Learning's revenue was about US$14b, with a CAGR of 100% from 2019 to 2022.
- Pearson is a major player in educational publishing and assessment services. In 2023, it integrated generative AI across its products, including large language models for Workforce Skills, AI tools for Mastering and MyLab, and a GenAI tool for Pearson+. Pearson's revenue in 2023 was about US$5b, with a growth rate of 8.6% from 2022 to 2023.
- Houghton Mifflin Harcourt (HMH) provides pre-K-12 education content and technology solutions. In August 2023, HMH introduced OpenAI-enabled integrations within Writable, enhancing assignment creation and personalized writing coaching. HMH's revenue in 2021 was about US$1b, with a growth rate of 25% from 2020 to 2021.

[433] "Using education technology to support learners with special educational needs and disabilities in low- and middle-income countries," *EdTech Hub*, March 2020.

- Chegg, Inc. is known for its AI-enhanced learning service, CheggMate, which uses OpenAI's GPT-4 for personalized learning. In 2023, Chegg's revenue was about US$733m, with a growth rate of 4.6% from 2022 to 2023.
- Udemy launched an AI tool in May 2023 to assist course creators in developing coding exercises. Udemy's revenue in 2023 was approximately US$705m, reflecting a growth rate of 17.6% from 2022 to 2023.
- PowerSchool provides K-12 education technology solutions. In 2023, it introduced AI-integrated products like Performance Matters and LearningNav and launched PowerBuddy™, an AI-enabled assistant. PowerSchool's revenue in 2023 was about US$676m, with a 13% growth from 2021 to 2022.
- Coursera offers a wide range of courses and degrees. In 2023, it introduced Coursera Coach, an AI-enabled virtual coach, and AI-assisted course building. Coursera's revenue in 2023 was US$609m, with a growth rate of 22.7% from 2022 to 2023.
- Skillsoft provides corporate training solutions. In August 2023, it launched CAISY™ Conversation AI Simulator. Skillsoft's revenue in 2023 was about US$555.1m, with a growth rate of 5.2% from 2022 to 2023.
- Instructure is known for its Canvas Learning Management System. In 2023, it partnered with Khan Academy and OpenAI to integrate AI into classrooms. Instructure's revenue in 2023 was about US$520m, with a 13% growth rate from 2022 to 2023.
- Curriculum Associates supports personalized learning. It acquired SoapBox Labs to enhance voice AI in classrooms. The company's revenue in 2023 was US$520m, with a significant growth rate of 85% from 2018 to 2021.
- Khan Academy offers free educational resources. In 2023, it introduced Khanmigo, an AI-enabled virtual tutor. Khan Academy's revenue in 2023 was approximately US$507m, with a growth rate of 6.7% from 2022 to 2023.
- Duolingo leverages AI for language learning. Its premium offering, Duolingo Max, includes features powered by OpenAI's generative AI. Duolingo's revenue in 2023 was around US$484m, marking a 43% increase compared to 2022.
- Turnitin specializes in AI-enabled tools for academic integrity and grading.

IV. Risks associated with AI applications in education

While AI applications in education offer many benefits, there are also several risks and challenges associated with their use that require careful management, including but not limited to:[434]

- **Trust and accuracy**: Teachers and learners using AI tools may face significant challenges if the input data is incorrect or biased; for instance, flawed datasets can

[434] "Generative AI: Master Deck," *EY*, 2024.

result in inaccurate grading and misleading lesson content. The inability to explain how AI generates certain outputs can further erode trust in its application within educational settings.

- **Fairness and bias**: AI models may exhibit biases towards specific groups such as women, people with disabilities, or other marginalized groups[435] due to the nature of the training data. For example, an AI grading system might unfairly penalize specific writing styles, leading to unequal evaluation. Teachers also need to monitor AI-generated suggestions for lesson plans to ensure they do not perpetuate stereotypes or discriminatory content.
- **Privacy, surveillance, and security**: Teachers and learners may unknowingly share sensitive personal data when using AI tools. For example, platforms collecting information on students' performance might lack transparency about how this data is stored or used, posing risks of breaches or unethical surveillance. Teachers could also face cybersecurity concerns when integrating AI into digital classrooms.
- **Legal issues**: Teachers relying on AI-generated educational materials may unintentionally violate copyright or intellectual property laws if the sources of these materials are not properly attributed. Similarly, learners using AI tools for assignments may inadvertently breach academic integrity rules or face consequences under data protection laws like the General Data Protection Regulation (GDPR).
- **AI-giarism**: Learners might misuse AI tools to generate essays or assignments without proper attribution, undermining their learning process and academic honesty. Teachers might also face ethical issues if they use AI-generated teaching materials or assessments without ensuring the originality of the AI's role in their creation.[436]

To mitigate these risks, it is crucial to adopt a responsible and ethical approach to AI implementation in education.

[435] "What Is AI Bias?," *IBM*, https://www.ibm.com/think/topics/ai-bias, accessed 29 November 2024.
[436] "Is AI Changing the Rules of Academic Misconduct? An In-depth Look at Students' Perceptions of 'AI-giarism'," *The University of Hong Kong*, June 2023, via ResearchGate.

Appendix 3: Prioritization themes of the UK/FCDO and the Southeast Asian countries

The information provided in the Table below outlines a compilation of prioritization targets for the UK/FCDO and the Southeast Asian countries. This compilation has been derived from various sources; however, the list is not exhaustive. These prioritization targets are subject to change and should be interpreted in the context of ongoing developments and policy changes.

Table 6: Prioritization themes of the UK/FCDO and the Southeast Asian countries

Stakeholders	Themes	Priorities	References
UK/FCDO	Talent and skills	Research partnerships with the UK that connect with the UK's science and innovation targets	FCDO's internal document
		Education access for girls and marginalized communities	
		STEM learning	
		Technical and Vocational Education and Training (TVET)	
		English Language Teaching (ELT)	
		Professional qualifications, upskilling and reskilling of the workforce, and industry engagement	
		Teacher training	
		Curriculum development	
		Digitalization of education and inclusive education, including the use of AI education technology	

Stakeholders	Themes	Priorities	References
		Policies and programs that tackle gender barriers to digital skills and employment	UK-ASEAN Supporting Advancement of Girls' Education (SAGE)
		Bridging the educational gaps and ensuring inclusive and equitable access to quality education	
		The engagement of EdTech and educational supplies sector with buyers both in the UK and overseas	The UK's first international education strategy was launched under the Conservative government in 2019.[437] International Education Strategy (IES): 2023 Progress Update is the third annual progress update to the original 2019 IES. It summarizes progress against the two IES ambitions and all outstanding actions and sets out future priorities.[438]
		Inclusive AI design and testing practices by fostering ASEAN	

[437] "International Education Strategy: global potential, global growth," *GOV.UK*, https://www.gov.uk/government/publications/international-education-strategy-global-potential-global-growth, accessed 16 November 2024.
[438] "International Education Strategy: 2023 progress update," *GOV.UK*, https://www.gov.uk/government/publications/international-education-strategy-2023-update/international-education-strategy-2023-progress-update, accessed 16 November 2024.

Stakeholders	Themes	Priorities	References
Southeast Asian countries	AI applications	collaboration and engaging diverse stakeholders	ASEAN Responsible AI Roadmap (2025-2030)
		Universal design, usability, and accessibility in AI development	
	Responsible governance	Digital transformation of education aligns with national and ASEAN-wide vision statements and/or plans for digitalization that link learning and new competencies needed for school, work, and life, especially those that prioritize marginalized groups, and increase policy linkage between education and other relevant sectors	ASEAN declares on the digital transformation on education systems in ASEAN
		Respect for the intellectual property of all learning resources and their variations	
		AI standards and guidelines for safe and effective educational use	14th International Summit on the Teaching Profession (ISTP) by SEAMEO
		Fiscal and non-fiscal support for innovative R&D	ASEAN Economic Community (AEC) Blueprint 2025
		Policy frameworks for Intellectual Property Rights (IPR) protection, collaboration, and technology transfer	ASEAN Plan of action on science, technology, and innovation (APASTI) 2016-2025

Stakeholders	Themes	Priorities	References
		Ethical principles for AI design, development, and utilization emphasizing fairness, accountability, transparency, and privacy, aligning with ASEAN Guide on AI Governance and Ethics	ASEAN Responsible AI Roadmap (2025-2030)
	Talent and skills	Curriculum development, enhancing digital and innovation literacy	Priority Areas of Cooperation of ASEAN
		Workforce reskilling and upskilling in STEM and ICT	ASEAN declaration on innovation
		TVET aligned with labour market needs	ASEAN Work Plan on Education 2021-2025
		Effective and equitable pre-service and in-service teacher training with relevant digital literacy skills	ASEAN declares on the digital transformation on education systems in ASEAN
		A shared repository of learning resources among ASEAN Member States including materials and content delivery platforms	
		Training children how to navigate safely online	
		Partnerships between governments, private sectors, and academia to design AI skill programs aligned with ASEAN labour market demands and	ASEAN Responsible AI Roadmap (2025-2030)

Stakeholders	Themes	Priorities	References
		leverage industry expertise and resources	
		Collaboration with educational institutions to integrate AI-related topics and projects into the curriculum at various levels of education	
		Collaboration with industry to identify evolving AI skill needs and develop joint training, apprenticeships, and mentorship programs for workforce growth	
		Partnership with the private sector for AI internships and curricula alignment with industry trends	
		Scholarships for AI education and training at undergraduate, graduate, and postgraduate levels	
	Data	Open education data and transparent statistics advocacy	ASEAN declares on the digital transformation on education systems in ASEAN
		Data privacy and protection policies	
		R&D technology transfer and information network/database for exchange and dissemination within and outside ASEAN	ASEAN Plan of action on science, technology, and innovation (APASTI) 2016-2025

Stakeholders	Themes	Priorities	References
		Trusted ASEAN data-sharing platforms with robust governance mechanisms	ASEAN Responsible AI Roadmap (2025-2030)
		Data protection regulation updates with clear guidelines to address AI-specific challenges	
	Computing	ASEAN network of PPP agencies and stakeholders to share experiences and collaborate on joint projects (e.g., infrastructure project)	ASEAN Economic Community (AEC) Blueprint 2025
		Cloud computing adoption for scalable, cost-effective AI development and deployment	ASEAN Responsible AI Roadmap (2025-2030)
		Data centres development and upgrade	
		HPC infrastructure establishment and expansion to support AI innovation with advanced computing capabilities	
	Innovation/ Scaling	Establishment of regional networks of joint research, capacity-building and innovation initiatives focusing on ASEAN-related topics	ASEAN Economic Community (AEC) Blueprint 2025
		Development of research and technology parks, joint corporate, government, and/or university research laboratories, R&D centres, and similar science and	

Stakeholders	Themes	Priorities	References
		technology institutions and centres.	
		Use of the Intellectual Property Rights system facilitating research collaboration, technology commercialization, and an innovation culture	ASEAN declaration on innovation
		Science, Technology, and Innovation (STI) collaboration with global partners	ASEAN-United Kingdom Dialogue Partnership (2022-2026)
		Innovative funding mechanisms within member states that support national investments in ICT and education	ASEAN declares on the digital transformation on education systems in ASEAN
		Long-term funding strategies for digital education transformation	
		Machine learning (ML)-based software for teaching, research, and industry	SEAMEO Strategic Plan 2021-20230
		Incubation and accelerator programs for AI startups with training, funding access, mentorship, and guidance on business and regulatory landscapes, tailored to industry-specific needs and challenges	ASEAN declaration on innovation
		Funding and resources for ground-breaking research projects at AI centres of excellence and research institutes; incentives for faculty	ASEAN Responsible AI Roadmap (2025-2030)

Stakeholders	Themes	Priorities	References
		and students to drive responsible AI exploration and innovation	
		Offer for startups and MSMEs with access to cloud service and AI tools	
		Grants/Subsidies for AI projects, and support networking events to connect startups and MSMEs with investors and collaborators	
		AI testbed or sandbox to provide a controlled environment for industry players to test AI regulations, policies, and applications	

Appendix 4: Stakeholders consulted for the study

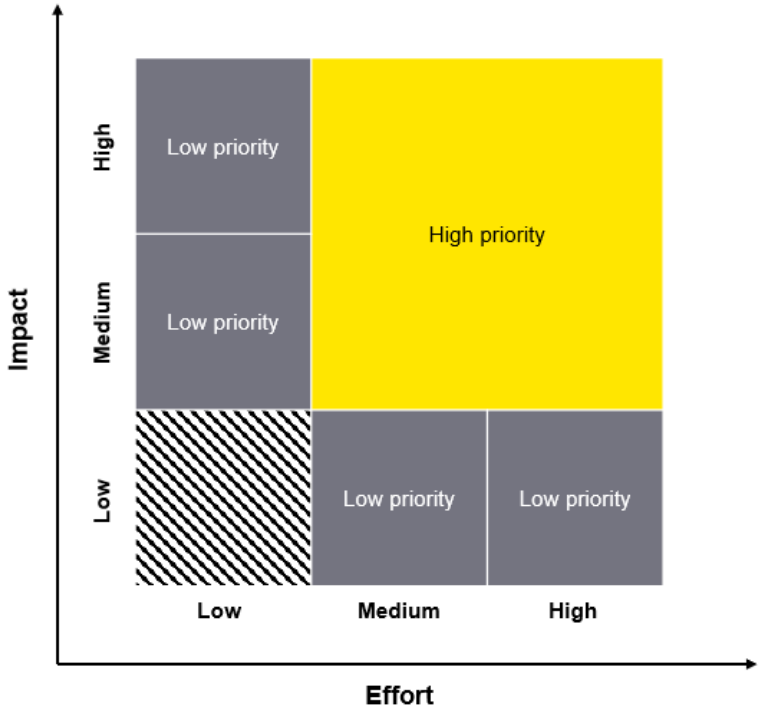
1. Access Partnership
2. AI4LIFE - Hanoi University of Science and Technology
3. An expert from the Ministry of Education and Training of Vietnam
4. Cambodia Academy of Digital Technology
5. CMKL University
6. Digital Asia Hub
7. EdTech Hub
8. Google
9. Ministry of Education and Sports of Lao PDR
10. Ministry of Industry, Science, Technology and Innovation of Cambodia
11. Ministry of Primary and Secondary Education of Indonesia
12. Ministry of Science, Technology and Innovation of Malaysia
13. Ministry of Technology and Communications of Lao PDR
14. National University of Laos
15. TIC Timor
16. Tokopedia-UI AI Centre of Excellence - Universitas Indonesia
17. Vietnam National Innovation Centre

Appendix 5: Prioritization matrix

The potential UK interventions are assessed using two main dimensions of the prioritization matrix, which include:

- Impact: rated on a scale of "high – medium – low"
  - Coverage: Does this cover multiple end-users in education and/or education levels?
  - GESI potential: Will this create openings to integrate GESI considerations, specifically in relation to women and PwDs?
  - Alignment: Does this align with the UK/FCDO's regional education priorities and Southeast Asian countries' national strategies/priorities/action plans? The list of priorities is prescribed in Appendix 3.
- Effort: rated on a scale of "high – medium – low"
  - Resource requirements: Does this require significant time and resources to for deployment?
  - Complexity: Does this involve many stakeholders, or are there any potential regulatory or compliance issues that may arise?

Figure 3: Prioritization matrix



Appendix 6: Government AI readiness index framework

According to Oxford Insights, the three essential pillars for promoting AI readiness in a country are Government, Technology Sector, and Data & Infrastructure:

- **Government:** A government should have a strategic vision for how it develops and governs AI, supported by appropriate regulation and attention to ethical risks (governance and ethics). Moreover, it needs to have strong internal digital capacity, including the skills and practices that support its adaptability in the face of new technologies.
- **Technology Sector:** Public bodies depend on a good supply of AI tools from the country's technology sector, which needs to be mature enough to supply the government. The sector should have high innovation capacity, underpinned by a business environment that supports entrepreneurship and a good flow of R&D spending. Equally important are good levels of human capital, which drive the development of advanced AI solutions and ensure the sector can respond to the evolving needs of governments.
- **Data & Infrastructure:** AI tools need lots of high-quality data (data availability) which, to avoid bias and error, should also be representative of the citizens in a given country (data representativeness). Finally, this data's potential cannot be realised without the infrastructure necessary to power AI tools and deliver them to citizens.

Table 7: Government AI Readiness Index of nine Southeast Asian countries (2024)[439]

Country	Ranking	Total	Government	Technology Sector	Data & Infrastructure
Malaysia	24	71.40	82.47	54.17	77.56
Thailand	35	66.17	75.78	44.83	77.90
Indonesia	38	65.85	79.86	48.06	69.64
Vietnam	51	61.42	75.02	43.36	65.86
Philippines	56	58.51	74.49	38.58	62.45
Cambodia	133	36.63	29.18	29.31	51.40
Lao PDR	137	36.08	28.10	28.79	51.36
Myanmar	143	34.26	24.24	33.85	44.69
Timor-Leste	146	33.68	27.03	26.70	47.30

[439] "Government AI Readiness Index 2024," *Oxford Insight*, https://oxfordinsights.com/ai-readiness/ai-readiness-index/, accessed 3 March 2025.

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