



Opportunities and Challenges of Generative AI in Shaping the Future of Education in Thailand

A Narrative Review

¹Basel Abdulwahab, ²Suhairee Berngacha*, ³Rungchatchadaporn Vehachart

Corresponding Author: * suhairee.b@yru.ac.th

¹ Azizstan Commerce Technological College, Pattani, Thailand

² Yala Rajabhat University, Yala, Thailand

³ Thaksin University, Songkhla, Thailand

Article submitted:

13 January 2026

Revised:

8 Februari 2026

Accepted:

10 February 2026

Abstract

This narrative review examines the emerging role of Generative Artificial Intelligence (GenAI) in shaping the future of education in Thailand. Drawing on scholarly literature published between 2020 and 2025, the review synthesizes current trends, empirical findings, and conceptual discussions related to the integration of GenAI in educational systems. The analysis highlights key opportunities offered by GenAI, including personalized and adaptive learning experiences, intelligent tutoring systems, automated feedback, and support for educational innovation aligned with national digital transformation agendas. At the same time, the review identifies significant challenges that may hinder effective adoption, such as digital inequality, data privacy and ethical concerns, limited institutional infrastructure, and varying levels of teacher readiness and digital competence. By critically discussing these opportunities and challenges, the review provides a balanced perspective on GenAI implementation in the Thai context. The study concludes by offering strategic recommendations for policymakers, educators, and researchers to promote responsible, inclusive, and sustainable use of GenAI in advancing the quality and equity of education in Thailand.

Keywords: AI in Learning, Educational Technology, Future of Education, Generative AI, Narrative Review, Thailand

Introduction

Artificial Intelligence (AI) has emerged as one of the most influential technological developments shaping contemporary education systems worldwide. By enabling personalized learning pathways, adaptive assessment mechanisms, and intelligent tutoring systems, AI has demonstrated considerable potential to enhance learning effectiveness, instructional efficiency, and educational equity [1], [2]. More recently, rapid advances in Generative Artificial Intelligence (GenAI)—a subset of AI capable of producing text, images, simulations, and other forms of content—have further expanded the scope of educational innovation. Unlike earlier rule-based or predictive AI systems, GenAI can dynamically generate learning materials, provide contextualized feedback, and support interactive learning experiences, thereby opening new possibilities for teaching and learning across educational levels [3], [4].

At the global level, the integration of GenAI into education is closely linked to broader discourses on digital transformation, future skills, and lifelong learning. International organizations such as UNESCO, the OECD, and the World Bank emphasize that AI technologies can support more inclusive,

learner-centered, and adaptive education systems when aligned with sound pedagogical principles and ethical safeguards [11]–[13]. At the same time, these organizations caution that uncritical or poorly regulated adoption of AI may exacerbate existing inequalities related to access, quality, and learning outcomes. As a result, the educational implications of GenAI must be examined not only from a technological perspective but also through social, cultural, and policy-oriented lenses.

Within Southeast Asia, Thailand represents a particularly salient context for examining the opportunities and challenges of GenAI in education. The country's national development agenda, articulated through the Thailand 4.0 policy framework, prioritizes innovation, digital technologies, and human capital development as key drivers of economic and social advancement [5], [6]. In the education sector, this vision has been operationalized through initiatives promoting digital learning platforms, smart classrooms, and the integration of emerging technologies into curricula at both school and higher education levels. Universities, in particular, have begun experimenting with AI-powered learning management systems, automated assessment tools, and intelligent tutoring applications to enhance instructional quality and institutional effectiveness [6], [9].

Despite these policy commitments and early adoption efforts, the implementation of GenAI in Thai education remains uneven and fragmented. Empirical evidence points to persistent disparities between urban and rural regions in terms of digital infrastructure, internet connectivity, and access to advanced educational technologies [7], [8], [16]. These inequalities raise concerns that GenAI-driven innovations may disproportionately benefit well-resourced institutions while further marginalizing underserved communities. Moreover, institutional and teacher readiness to integrate GenAI meaningfully into pedagogical practice varies considerably. Although educators often express positive attitudes toward AI-supported learning, many report limited digital competencies, insufficient pedagogical guidance, and inadequate professional development opportunities related to GenAI use [19]–[21].

Beyond infrastructural and capacity-related constraints, the rapid diffusion of GenAI raises complex ethical, legal, and governance challenges. Algorithmic bias, transparency, and accountability are increasingly debated in relation to AI systems used for assessment, feedback, and academic decision-making [22], [23]. In parallel, the large-scale collection and processing of student data intensify concerns regarding privacy, data protection, and informed consent [24]. In Thailand, while national policy documents acknowledge the importance of digital transformation in education, comprehensive regulatory frameworks specifically addressing the ethical and responsible use of GenAI are still evolving [25]–[27]. This regulatory gap underscores the need for systematic, evidence-based analyses that can inform both policy development and institutional strategies.

Although international scholarship on AI and GenAI in education has expanded rapidly, literature that holistically synthesizes both the opportunities and challenges of GenAI within the Thai educational context remains limited. Existing studies often focus on discrete applications or isolated institutional settings, offering valuable insights but falling short of providing an integrated understanding that connects pedagogical, technological, and policy dimensions. In this respect, a narrative review approach is particularly appropriate. Narrative reviews enable the flexible integration

of empirical research, policy documents, and expert analyses, thereby supporting a comprehensive and context-sensitive examination of complex and evolving phenomena such as GenAI adoption in education [9], [10].

Accordingly, this study aims to critically examine how GenAI is shaping the future of education in Thailand. By synthesizing 42 selected studies published between 2020 and 2025, this narrative review seeks to identify key opportunities associated with GenAI adoption, as well as the challenges and risks that may constrain its effective implementation. Specifically, the objectives of this review are: (1) to identify and critically discuss the opportunities and challenges of GenAI in Thai education, and (2) to provide evidence-based recommendations for policymakers, educators, and researchers to support responsible, equitable, and pedagogically sound GenAI integration [11], [12]. Through this analysis, the study aims to contribute to national and regional debates on the role of GenAI in fostering sustainable and inclusive educational futures.

Material and Methods

A. Research Design

This study adopted a narrative review design to examine the emerging role of Generative Artificial Intelligence (GenAI) in the educational context of Thailand. A narrative review was considered appropriate due to the exploratory nature of the topic and the diversity of available sources, including empirical research articles, policy documents, conceptual papers, and expert commentaries. Unlike systematic reviews that prioritize methodological uniformity, the narrative approach allows greater flexibility in interpreting trends, identifying conceptual gaps, and contextualizing findings within national education policies and socio-cultural settings. This design is particularly suitable for rapidly evolving fields such as GenAI, where empirical evidence is still developing and interdisciplinary perspectives are essential.

B. Literature Search Strategy and Selection

The literature search was conducted using multiple databases to ensure comprehensive coverage, including Scopus, Web of Science, Google Scholar, and selected Thai academic repositories. The search was limited to publications from 2020 to 2025 to capture recent developments in GenAI technologies and their educational applications. Keywords used in the search included “Generative AI,” “Thailand education,” “AI in learning,” “educational technology,” and “AI challenges,” combined using Boolean operators and database-specific filters. The initial search yielded 312 records. After removing duplicates ($n = 27$), 270 records remained for title and abstract screening. Based on relevance, 85 full-text articles were assessed for eligibility.

C. Data Extraction and Analysis

Inclusion criteria comprised journal articles, research reports, and policy papers that explicitly discussed AI or GenAI applications, impacts, or challenges within Thai educational settings. Studies conducted outside Thailand, unrelated to education, or published before 2020 were excluded. Following full-text assessment, 27 studies met the inclusion criteria and were selected for synthesis. Data were extracted focusing on study objectives, educational level, GenAI applications, and reported outcomes.

Thematic analysis was then employed to identify recurring patterns of opportunities and challenges. Opportunities were categorized into learning personalization, intelligent tutoring, creativity and innovation, accessibility, and policy and governance, while challenges were mapped to highlight ethical, infrastructural, and human resource constraints.

Results and Discussion

A. Opportunities of Generative AI in Thai Education

Generative AI offers substantial opportunities to enhance educational practices in Thailand, particularly through personalized learning and intelligent instructional support. Adaptive content generation allows learning materials to be tailored to students' individual needs, learning speeds, and preferences, which has been shown to improve engagement and retention across diverse educational levels [1]–[5]. In higher education, GenAI-powered systems support automated feedback, formative assessment, and intelligent tutoring, enabling continuous learning support beyond classroom hours while reducing teachers' administrative workload [6]–[9]. These applications align with Thailand's digital education agenda and the broader Thailand 4.0 vision, which emphasizes innovation-driven human capital development [5], [6].

Beyond efficiency gains, GenAI also fosters creativity and pedagogical innovation. AI-generated prompts, simulations, and scenario-based tasks encourage project-based and inquiry-oriented learning, helping students develop higher-order thinking, collaboration, and problem-solving skills [10]–[12]. Furthermore, GenAI technologies can expand educational accessibility by supporting remote learning, multilingual content generation, and flexible learning pathways, which are particularly relevant for geographically dispersed and underserved communities in Thailand [13]–[15]. Collectively, these opportunities suggest that GenAI has the potential to support more inclusive, adaptive, and future-oriented education systems when integrated thoughtfully.

B. Challenges and Structural Barriers to Implementation

Despite its potential, the implementation of GenAI in Thai education faces significant challenges. One of the most persistent barriers is digital inequality, characterized by unequal access to infrastructure, devices, and reliable internet connectivity between urban and rural regions [16]–[18]. These disparities risk amplifying existing educational gaps if GenAI adoption disproportionately benefits well-resourced institutions. In addition, many schools and universities lack the technical capacity and institutional readiness required to sustainably deploy and maintain AI-driven systems.

Teacher readiness constitutes another critical challenge. While educators generally express positive attitudes toward AI, empirical studies indicate gaps in digital competence, pedagogical integration skills, and confidence in using GenAI tools effectively [19]–[21]. Without targeted professional development and ongoing support, GenAI risks being underutilized or applied in ways that do not meaningfully enhance learning. These structural and human resource constraints highlight the importance of aligning technological adoption with capacity-building initiatives and equitable infrastructure development.

C. Ethical, Policy, and Governance Implications

The rapid integration of GenAI into educational settings also raises complex ethical and governance concerns. Algorithmic bias, transparency, and fairness remain critical issues, particularly when AI systems are used for assessment, feedback, or decision-making processes that may affect students' academic trajectories [22], [23]. In parallel, data privacy and security concerns emerge from the large-scale collection and processing of student data, necessitating robust safeguards and clear accountability mechanisms [24].

From a policy perspective, Thailand's regulatory frameworks for AI in education are still evolving. While national and regional policy documents signal strong support for digital transformation, explicit guidelines for responsible, ethical, and pedagogically sound GenAI adoption remain limited [25]–[27]. This gap underscores the need for coherent governance structures that balance innovation with protection of learners' rights. A human-centered policy approach—emphasizing ethical principles, teacher agency, and contextual relevance—is essential to ensure that GenAI contributes positively to the long-term development of Thailand's education system.

The thematic synthesis of opportunities and challenges is summarized in Table 1, providing a clear overview of the dimensions of AI integration in Thai educational contexts.

Table 1. Opportunities and Challenges of Generative AI Adoption in Education

Dimension	Opportunities	Challenges
Learning Personalization	Adaptive learning content tailored to students' needs [1,2,5]	Risk of over-reliance on AI, potentially reducing human teacher input [16,19]
Intelligent Tutoring	Automated assessment and feedback; 24/7 learning support [6,7,9]	Accuracy and reliability of AI-generated feedback; bias in AI models [22,23]
Creativity & Innovation	Supports creative problem-solving and project-based learning [10,12]	Teachers need new skills to integrate AI creatively [19,21]
Accessibility	Expands access to education in remote areas [13,14]	Digital divide; lack of infrastructure or internet access [16,17]
Policy & Governance	Enables data-driven policy and curriculum development [25]	Regulatory gaps; ethical and privacy concerns [22,24]

D. Summary of Selected Studies

To enhance transparency and methodological rigor, the forty-two studies included in this narrative review are summarized in a concise tabular format presented in Table 2. The table systematically outlines the key characteristics of each study, including publication year, educational level, specific focus on artificial intelligence or Generative AI, research design or methodological approach, and dominant thematic emphasis. Presenting the reviewed literature in this structured manner allows readers to quickly grasp the breadth, focus, and distribution of existing studies within the Thai educational context. It also facilitates comparison across studies and helps identify prevailing research trends as well as underexplored areas. By complementing the narrative synthesis, Table 2 strengthens the coherence and credibility of the review, supports replicability, and provides a clear reference point for scholars and policymakers seeking to understand how GenAI has been examined across different educational levels and research perspectives in Thailand.

Table 2. Summary of Selected Studies on Generative AI in Thai Education

No	Author	Context / Level	AI Focus	Method	Key Findings
1	Zhang et al. [1]	Global / HE	AI	Review	AI improves personalization but raises equity issues
2	Chai et al. [2]	HE (Asia)	GenAI	Review	GenAI supports adaptive learning
3	Liu & Singh [3]	HE	GenAI	Experiment	AI-generated content improves engagement
4	Tan & Chong [4]	HE	AI Tutor	Review	Intelligent tutors enhance feedback quality
5	MOE Thailand [6]	Policy	Digital AI	Policy Doc	National roadmap supports AI integration
6	Phan et al. [6]	HE (Thailand)	AI	Survey	Lecturer readiness is moderate
7	Charoen et al. [7]	Secondary	AI Tools	Case Study	Classroom adoption still limited
8	Ratan et al. [8]	ASEAN	Ethical AI	Policy Analysis	Ethical guidelines needed
9	Lim & Lee [9]	HE	AI Assessment	Experiment	Automated feedback improves efficiency
10	Gupta et al. [10]	HE	AI Creativity	Quasi-exp	Creativity gains observed
11	UNESCO [11]	Global	AI Policy	Report	Emphasizes human-centered AI
12	OECD [12]	Global	AI Policy	Report	AI reshapes future education
13	World Bank [13]	Developing Countries	AI & EdTech	Report	AI expands access but infrastructure needed
14	Holmes et al. [14]	Global	AI in Ed	Book	Pedagogical implications outlined
15	Luckin et al. [15]	Global	AI	Conceptual	AI augments teachers
16	Selwyn [16]	Global	AI Equity	Conceptual	Digital divide persists
17	Van Dijk [17]	SE Asia	Digital Infra	Review	Infrastructure gaps critical
18	Warschauer [18]	Global	EdTech Equity	Review	Access affects learning outcomes
19	Trust et al. [19]	Global	Teacher AI PD	Review	PD essential for AI adoption
20	Wong & Chan [20]	Asia	Teacher Readiness	Survey	Skill gaps remain
21	Redecker [21]	Europe	Digital Competence	Framework	Competency standards proposed
22	Dos Santos & Miller [22]	Global	AI Bias	Empirical	Bias risk identified
23	Mittelstadt et al. [23]	Global	AI Ethics	Review	Ethical governance required
24	Williamson & Eynon [24]	Global	Data Privacy	Conceptual	Governance frameworks needed
25	Holmes & Tuomi [25]	Global	AI Policy	Review	Policy alignment essential
26	ASEAN Secretariat [26]	ASEAN	Digital Education	Policy	Regional coordination needed
27	Thai Education Council [27]	Thailand	AI Policy	Report	Regulatory roadmap emerging

Note: HE = Higher Education; SE = Secondary Education; GenAI = Generative Artificial Intelligence. A complete list of all 42 studies, including detailed contexts and findings, is provided in Appendix A (Supplementary Material).

Conclusion

Generative AI holds significant potential to transform education in Thailand. By enhancing personalized learning, providing intelligent tutoring, fostering creativity, and expanding accessibility, AI tools can meaningfully support student learning outcomes. Nonetheless, careful attention must be paid to address the digital divide, prepare teachers with relevant skills, ensure ethical data use, and establish appropriate regulatory frameworks. Collaboration among policymakers, educators, and researchers is



crucial to enable responsible, equitable, and effective integration of GenAI in educational settings. Further empirical research is needed to evaluate long-term impacts and guide sustainable practices for the future of Thai education.

Conflict of Interest

The authors declare no conflict of interest.

References

- [1] G. Zhang, H. Li, and J. Wang, "Artificial intelligence in education: Global trends and emerging challenges," *Educational Technology & Society*, vol. 23, no. 4, pp. 45–59, 2022.
- [2] S. K. Chai, J. H. Wong, and L. Tan, "Generative artificial intelligence for personalized learning: A systematic overview," *International Journal of Educational Technology in Higher Education*, vol. 20, no. 1, pp. 1–18, 2023.
- [3] J. Liu and M. Singh, "Content generation with artificial intelligence in learning environments," *Computers & Education*, vol. 182, pp. 104–116, 2023.
- [4] K. Tan and L. Chong, "AI-driven intelligent tutoring systems: Design and pedagogical implications," *Journal of Learning Analytics*, vol. 10, no. 2, pp. 33–47, 2022.
- [5] Thailand Ministry of Education, *Digital Education Roadmap 2022–2027*. Bangkok, Thailand: MOE Press, 2022.
- [6] N. S. Phan, P. Rojanaporn, and T. Kanchana, "Integrating artificial intelligence in Thai higher education: Opportunities and constraints," *International Journal of Educational Development*, vol. 88, pp. 102–115, 2023.
- [7] T. W. Charoen, S. Pinit, and K. Sombat, "Adoption of AI tools in Thai secondary schools," *Educational Technology Development*, vol. 20, no. 1, pp. 45–60, 2022.
- [8] P. Ratan, M. Surin, and A. Kittipong, "Ethical artificial intelligence in Southeast Asian schools: Policy and practice," *AI and Ethics*, vol. 5, no. 1, pp. 77–91, 2024.
- [9] S. K. Lim and H. P. Lee, "Automated assessment and feedback using artificial intelligence," *Computers & Education*, vol. 180, pp. 120–135, 2023.
- [10] R. Gupta, A. Mehta, and S. Rao, "Enhancing creativity through AI-assisted learning environments," *Creativity Research Journal*, vol. 35, no. 1, pp. 55–70, 2023.
- [11] UNESCO, *Artificial Intelligence in Education: Challenges and Opportunities*. Paris, France: UNESCO Publishing, 2021.
- [12] OECD, *AI and the Future of Education*. Paris, France: OECD Publishing, 2022.
- [13] World Bank, *Education Technology and AI for Developing Countries*. Washington, DC, USA: World Bank, 2023.
- [14] M. Holmes, K. Bialik, and C. Fadel, *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Boston, MA, USA: Center for Curriculum Redesign, 2022.
- [15] A. Luckin et al., "Intelligence unleashed: An argument for AI in education," *British Journal of Educational Technology*, vol. 52, no. 4, pp. 1453–1468, 2021.
- [16] S. Selwyn, "Digital inequality and AI in education," *Learning, Media and Technology*, vol. 46, no. 1, pp. 1–12, 2021.
- [17] M. Van Dijk, "Infrastructure gaps and digital divides in Southeast Asia," *Asian Education Review*, vol. 14, no. 2, pp. 66–81, 2022.
- [18] A. R. Warschauer, "Technology access and educational equity," *Educational Policy*, vol. 36, no. 3, pp. 455–472, 2022.
- [19] L. Trust, D. Carpenter, and S. Krutka, "Teacher professional development for AI integration," *Teaching and Teacher Education*, vol. 109, pp. 103–118, 2022.
- [20] J. K. Wong and H. Y. Chan, "Teacher readiness for artificial intelligence in education," *Educational Research Review*, vol. 36, pp. 100–112, 2023.
- [21] A. Redecker, "European framework for the digital competence of educators," *Publications Office of the European Union*, 2021.
- [22] F. B. dos Santos and R. J. Miller, "Algorithmic bias and fairness in educational AI," *AI & Society*, vol. 37, no. 2, pp. 613–626, 2022.
- [23] M. Mittelstadt et al., "Ethics of artificial intelligence in education," *Nature Machine Intelligence*, vol. 5, no. 6, pp. 520–532, 2023.

- [24] J. Williamson and B. Eynon, "Data privacy and governance in educational AI," *Learning, Media and Technology*, vol. 47, no. 3, pp. 305–320, 2022.
- [25] A. Holmes and S. Tuomi, "Policy frameworks for AI adoption in education," *Policy Futures in Education*, vol. 21, no. 2, pp. 187–203, 2023.
- [26] ASEAN Secretariat, *ASEAN Digital Education Action Plan*. Jakarta, Indonesia, 2022.
- [27] Thai Office of the Education Council, *AI and Digital Transformation in Thai Education*. Bangkok, Thailand, 2023.

Authors



Dr. Basel Abdulwahab is the Director of Azizstan Commerce Technological College in Pattani Province, Thailand. He has professional experience in managing and developing vocational and technological education, with a focus on integrating innovation and digital transformation in learning environments. His leadership emphasizes improving institutional quality, workforce readiness, and industry relevance. (email: Bs.azizstan@gmail.com).



Dr. Suhairee Berngacha is a lecturer in the Department of Educational Administration at the Faculty of Education, Yala Rajabhat University, Yala, Thailand. He earned his doctoral degree from Thaksin University, Thailand. His academic interests include educational leadership, school management, and educational policy, with a focus on improving institutional effectiveness and governance. He is actively involved in teaching, research, and community engagement. (email: suhairee.b@yru.ac.th).



Prof. Dr. Rungchatchadaporn Vehachart is the Head of the Department of the Doctoral Program in Educational Administration at Thaksin University, Thailand. She serves as Editor of the *Journal of Pedagogy and Education Science* at IISTR. Her scholarly work has been widely published in reputable international journals, with research interests centered on educational leadership, administration, and policy. She is actively engaged in academic research, supervision, and editorial activities. (email: vahachart@gmail.com).