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A Systematic Review of the Risk and Concern of Generative AI Integration in Education

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Abstract

With the rapid advancement of generative AI, it is concerning that institutions and educators continue to neglect clarifying the risks involved when digital tools are rapidly integrated into education systems without adequate planning and consideration. This systematic literature review seeks to identify and compile these risks, with the aim of providing a comprehensive overview of the challenges faced by students, educators, and institutions when generative AI is adopted within educational contexts. The risks can be categorized into four constructs: ethical integrity, academic integrity, cognitive risk, and technical risk. Each construct requires distinct sets of solutions to effectively mitigate the associated challenges. Consequently, new educational policies must be introduced. Such policies should remain flexible to accommodate cultural variations, differing levels of acceptance, and varying expectations, while simultaneously fostering a fair and inclusive educational environment for all stakeholders involved.

1. Introduction

Generative artificial intelligence (GenAI) presents numerous possibilities for upgrading and enhancing education systems across diverse fields of study, revolutionizing traditional learning experiences (Wang et al., 2024). With the integration of GenAI, the learning process has become more intelligent, enabling students to engage in personalized learning tailored to their individual needs (Wang & Li, 2024).

The advancement of GenAI has also facilitated real-time feedback (Mosly, I., 2024), reducing concerns about encroaching on educators' personal time, while allowing students to adopt learning methods customized to their unique styles (Wang et al., 2024). The potential of GenAI to serve as a transformative force in education must therefore be acknowledged (Mosly, 2024)

GenAI offers extensive opportunities for both students and educators to adapt their learning and teaching approaches (Wang et al., 2024). However, it is important to recognize that its integration also introduces multiple risks and challenges that may undermine educational efforts (Chan & Hu, 2024). Its deployment raises unprecedented issues involving ethical, practical, and pedagogical risks (Yusuf et al., 2024), which must be systematically studied, addressed, and managed to ensure that GenAI enhances learning rather than harming those involved.

The nature of GenAI is inherently driven by dataset training to improve its capabilities (Zhao et al., 2024). Despite significant advancements in AI's ability to generate diverse outcomes, current GenAI tools continue to exhibit bias in their outputs (Mosly, 2024) If left unchecked, such biases may result in discriminatory outcomes (Qu et al., 2024), disproportionately affecting students with lower levels of digital literacy. The digital

divide remains a pressing global issue (Mosly, I., 2024), one that can only be mitigated through substantial investment in infrastructure, facilities, and most critically, secure, stable, and reliable internet access. This divide has created disparities not only among students with varying levels of access but also across institutions, differentiating their capacity to implement AI-enhanced education (Wijaya et al., 2024).

This systematic literature review aims to comprehensively explore the risks and concerns arising from GenAI integration in educational institutions. By drawing on empirical evidence and insights, the study seeks to promote ethical and responsible use of GenAI among all stakeholders. Specifically, the objectives are twofold: first, to identify the risks and concerns associated with GenAI integration in educational institutions; and second, to categorize these risks into distinct constructs.

1.1 Research Objectives

The research objectives of the study are listed below:

1. To identify what are the risk involve in generative AI integration in an educational institution.
2. To investigate the negative impact of the risk affects towards students and educators
3. To identify the strategies to mitigate the risk and concern within Generative AI integration in an educational institution

1.2 Research Question

Below are the research questions of the study:

1. What is the risk of generative AI integration in an educational institution?
2. How the recognized risk affects students and educators in negative manners?
4. What strategies can be implemented to mitigate the risk and concern in generative AI integration in an educational institution?

2. Literature Review

2.1 Defining Generative AI

Generative AI (GenAI) refers to artificial intelligence systems that are highly capable of producing new content such as text, images, music, videos, and other modalities based on patterns learned from large datasets, leveraging deep learning techniques commonly referred to as neural networks (Saúde et al., 2024).

For instance, ChatGPT is a GenAI model that produces natural language responses depending on user input. Models such as GPT, or Generative Pre-trained Transformer, employ large-scale language processing techniques to predict and generate coherent text sequences (French et al., 2023).

These models are trained on vast datasets and fine-tuned through reinforcement learning, including human feedback, to improve output quality (Chan & Hu, 2024). Other AI platforms generate outputs beyond text. For example, MidJourney is a platform capable of creating artistic images based on user input or prompts (Zhao et al., 2024). Due to their popularity and public acceptance, GenAI systems are increasingly applied across multiple sectors, including education, art, and workplace settings, where they are incorporated into scenarios requiring innovation and improvement (Mosly, 2024)

2.2 GenAI Type and Capabilities

Due to their diverse capabilities in producing various types of responses, numerous GenAI tools are widely available for public use (Țală et al., 2024). The most common, as discussed earlier, are text-based GenAI systems such as ChatGPT and DeepSeek (Yusuf et al., 2024). AI in this category is designed to generate human-like text applicable to a wide range of tasks, including essay writing, word synthesis, and even creative endeavors such as poetry composition (Gasaymeh et al., 2024). Text-based GenAI tools are intended to engage users with realistic responses and conversations, simplifying tasks such as writing emails and letters, brainstorming, or initiating ideas (Yusuf et al., 2024).

Beyond text-based systems, image-based GenAI platforms such as MidJourney, Stable Diffusion, and others have gained significant popularity. These tools can create artworks that are often indistinguishable from human-produced pieces, yet generated instantaneously (Kazanidis & Pellas, 2024). They are capable of differentiating visual styles and producing both realistic and abstract art suitable for digital applications (Chan & Hu, 2024). Some outcomes are considered sufficiently high-quality to be used in marketing visuals, production footage, and concept design development (Gasaymeh et al., 2024). However, studies indicate that humans tend to value human-created art more highly than AI-generated art, particularly when the status of the artwork as AI-generated is disclosed (French et al., 2023).

Audio-based GenAI systems are capable of producing sound outputs such as voiceovers, music, scores, and instrumental compositions based on user prompts, scripts, and feedback (Yusuf et al., 2024). Tools such as Jukebox and Suno are popular among both music enthusiasts and students, as they can mimic human vocals and

multiple instruments to create compositions without requiring users to record with a microphone (Yusuf et al., 2024).

Similarly, video-based GenAI tools can generate videos from text prompts or create motion sequences based on provided images (Kazanidis & Pellas, 2024). Platforms such as Synthesia and Runway allow users to incorporate AI-generated video outputs into their projects or combine multiple generated clips to produce complete footage (Yusuf et al., 2024).

The development of code-based GenAI has further simplified programming processes by enabling the generation and debugging of code across multiple programming languages (Zviel-Girshin, 2024). Certain tools can even produce source files in user-specified formats, ready for compilation (Somia, 2024). Code GenAI has been widely recognized for its potential to improve efficiency in programming workflows (Zviel-Girshin, 2024)

2.3 GenAI Type and Capabilities

With the diverse applications of GenAI across text, image, audio, video, and coding generation, it is evident that GenAI is suitable for integration into education systems, as its accessible tools can facilitate learning (Mosly, 2024) GenAI is known for its adaptability, enabling the creation of personalized learning environments tailored to the specific needs of individual students (Wang et al., 2024). The feedback mechanisms of GenAI, particularly text-based systems, provide students with individualized teaching assistance (Zhao et al., 2024), functioning as learning partners when students understand how to interact effectively with the technology.

The integration of GenAI into student education also enhances skill development (Mosly, 2024) AI tutors can deliver instant feedback, accelerating the feedback process that is typically constrained by human instructors, and covering multiple topics across diverse subjects (Wang et al., 2024). Students are further empowered to engage in self-regulated learning through GenAI, as AI tools such as chatbots can interact with learners at their convenience, assisting in reviewing, improving, and even grading their work (Saúde et al., 2024). Customized AI tools can be developed to provide intelligent tutoring systems that engage students through interactive dialogues, thereby facilitating deeper learning (Wang et al., 2024). Importantly, one of the most significant benefits of GenAI integration in education is its potential to support students with impairments, such as visual impairment or dyslexia (Wijaya et al., 2024). Technologies such as speech-to-text and automated text generation serve as assistive tools, helping these students overcome barriers to learning (Gasaymeh et al., 2024).

On the educators' side, GenAI supports task automation, enabling the generation of test questions, provision of feedback during assessments, and automation of grading processes (Wu et al., 2024). Processes that traditionally require significant time and effort can be simplified, shortened, and automated, leading many educational institutions to adopt GenAI as a time-saving tool (Wang et al., 2024). GenAI tools also enhance educators' efficiency and organization in finalizing assessments and evaluations (Yang et al., 2024). Research has documented improvements in teaching and learning processes at both school and university levels following GenAI adoption (Mosly, 2024) AI tools have even been introduced to younger students in K–12 education, supporting the development of foundational skills in computational thinking, AI literacy, and digital literacy (Zhao et al., 2024). Furthermore, high-quality educational resources such as textbooks, quizzes, and interactive study materials can be developed more quickly and at lower cost (Saúde et al., 2024).

Nevertheless, with the increasing integration of GenAI into education systems worldwide, multiple issues have emerged concerning ethical and policy considerations, transparency, plagiarism, and risks affecting learners, students, and educators (Țală et al., 2024). Investigating these challenges is the central aim of this systematic literature review.

3. Methodology

3.1 Protocol Development

Systematic literature review has to involve the development of a review protocol that focused on the methodology and steps taken by the researcher, to address the research question. There are five phases or stages in producing a systematic literature review; framing the questions for the review, identifying relevant work, assessing the quality of the relevant work, summarizing the evidence and summarizing the evidence.

Using the PRISMA 2020 guideline as the protocol for article selection, the researcher starts to compile articles from databases namely Scopus, IEEE Xplor, Nature Research and Pro Quest using the keyword 'generative','AI','effects','risk' and 'education'. From the four main databases mentioned above (Scopus, IEEE Xplor, Nature Research and Pro Quest) the researcher employed three processes: identification, screening and eligibility to obtain the number of literatures required to form the summary of the evidence that can answer the research question, from the bodies of eligible literature. To help guide the selection of the literature, the researcher adapted criteria of Article Quality Assessment (AQA) propose by Ahmed et al. (2018) to set the eligibility criteria for each article.

Table 1 Article Quality Assessment

AQA 1	Does the topic stated in the article relate to the use of GenAI?
AQA 2	Is the literature presented in a clear term of the context of the study conducted?
AQA3	Is the research methodology explained in depth?
AQA 4	Is the data collection process well-described in the article?
AQA 5	Is the data analysis method appropriately evaluated?

The selected journals were required to be written in English, with publications ranging from 2019 to 2025 to ensure that the evidence included remained relevant to the period of study. To strengthen the inclusion and exclusion process, the researcher also adapted the planned review study proposed by Ahmed et al. (2018). This framework provided clear guidance for determining eligibility and ensured that the selection of evidence was consistent with the topics under investigation.

Table 2 Inclusion/Exclusion Criteria

CRITERIA	INCLUSION	EXCLUSION
Focus of study	Generative AI, education	Does not involve generative AI and education
Field of study	Educational institutions	Does not involve educational institution
Language	English	Written using other languages
Type of literature	Scholar Article/Journal	Other type of literature
Year of publications	2019-2025	Published before 2019
Acccess Type	Open or Full Access to PDF version of the literature	Limited or no access

3.2 Protocol Execution

By using the keywords “generative,” “AI,” “effects,” “risk,” and “education” in the selected databases, the search results yielded the number of articles retrieved as shown in the table below. This number represents the body of evidence collected during the identification phase. Duplicate records of the same literature found across different databases were automatically discarded to ensure accuracy and consistency in the dataset.

Table 3 Keyword List

DATABASE	KEYWORD	JOURNAL FOUND
IEEE Xplor	‘generative’ AND ‘AI’ AND ‘effects’ AND ‘risk’ AND ‘education’	8
Scopus	‘generative’ AND ‘AI’ AND ‘effects’ AND ‘risk’ AND ‘education’	30
Nature Research	‘generative’ AND ‘AI’ AND ‘effects’ AND ‘risk’ AND ‘education’	212
Pro Quest	‘generative’ AND ‘artificial intelligence’ AND ‘AI’ AND ‘effects’ AND ‘risk’ AND ‘education’ (limited to 2024 and above)	293*
TOTAL		543

The search conducted using the ProQuest database initially produced 1,902 results. Due to the high volume of articles retrieved and the limitations faced by the researcher, the inclusion criteria for ProQuest were restricted to literature published in 2024 and later. To further refine and filter the evidence during the screening phase, the abstracts of all articles collected from the databases were reviewed to provide an initial impression of their suitability. During this process, the planned review study framework adapted in the protocol was applied to ensure consistency and rigor in the selection of relevant literature.

Table 4 Journal Screened

DATABASE	JOURNAL SCREENED
IEEE Xplor	4
Scopus	3
Nature Research	17
Pro Quest	32
TOTAL	56

A thorough evaluation of the full texts of the collected evidence was conducted to determine the eligibility of the remaining articles. This phase was crucial in ensuring that the data obtained adhered strictly to the established criteria, thereby guaranteeing that the evidence compiled and summarized was comprehensive, relevant, and aligned with the research questions. During this stage, three duplicate records were identified and discarded, while thirty-one articles were excluded based on the eligibility criteria. Ultimately, twenty-two articles were deemed suitable and cohesive, providing sufficient support for the arguments and objectives of the study.

3.3 Selected Evidence

The selected evidence presented below constitutes the body of literature that will be applied to fulfill the research objectives of this study

Table 5 Selected Evidence

No.	Title	Author	Year Published	Research Focused
1	Artificial Intelligence's Opportunities and Challenges in Engineering Curricular Design A Combined Review and Focus Group Study	Ibrahim Mosly	2024	Engineering education
2	Creative Use of OpenAI in Education: Case Studies from Game Development	French, F.; Levi, D.; Maczo, C.; Simonaityte, A.; Triantafyllidis, S.; Varda	2023	Game development education
3	Development of an artificial intelligence curriculum design for children in Taiwan and its impact on learning outcomes	Hong-Guang Zhao, Xin-Zhu Li & Xin Kang	2024	Early childhood education
4	Disciplinary differences in undergraduate students' engagement with generative artificial intelligence	Yao Qu, Michelle Xin Yi Tan and Jue Wang	2024	Undergraduates from various disciplines
5	Do you have AI dependency? The roles of academic self-efficacy, academic stress, and performance expectations on problematic AI usage behavior	Shunan Zhang, Xiangying Zhao, Tong Zhou and Jang Hyun Kim	2024	Undergraduates from various disciplines
6	Effects of ChatGPT use on undergraduate students' creativity: a threat to creative thinking	Radu Bogdan Toma and Iraya Yánez-Pérez	2024	Pre--service undergraduates in kindergarten programme
7	Exploring the impact of artificial	Xibing Wang, Xiaoshu	2024	Undergraduates

	intelligence application in personalized learning environments: thematic analysis of undergraduates' perceptions in China	Xu ,Yunfeng Zhang, Shanshan Hao & Weng Jie		from various disciplines
8	Exploring University Students' Perceptions of Generative Artificial Intelligence In Education	Tală, M.L., Müller, C.N., Albăstroiu Năstase, I., State, O. and Gheorghe, G	2024	Undergraduate and master's students from economic studies course
9	Generative AI and the future of higher education: a threat to academic integrity or reformation? Evidence from multicultural perspectives	Abdullahi Yusuf, Nasrin Pervin and Marcos Román-González	2024	Students and educators from various higher education institutions
10	Harnessing Generative Artificial Intelligence for Digital Literacy Innovation: A Comparative Study between Early Childhood Education and Computer Science Undergraduates	Ioannis Kazanidis and Nikolaos Pellas	2024	Undergraduates from early childhood education and computer science
11	Impacts of Generative Artificial Intelligence in Higher Education: Research Trends and Students' Perceptions	Sandra Saúde, João Paulo Barros and Inês Almeida	2024	Computer science students
12	Latent Profile Analysis of AI Literacy and Trust in Mathematics Teachers and Their Relations with AI Dependency and 21st-Century Skills	Tommy Tanu Wijaya, Qingchun Yu, Yiming Cao, Yahan He and Frederick K. S. Leung	2024	Mathematics teachers
13	Navigating the new frontier: the impact of artificial intelligence on students' entrepreneurial competencies	Tatiana Somia	2023	Undergraduates in entrepreneurship course
14	Perceptions of Artificial Intelligence and Its Impact on Academic Integrity Among University Students in Peru and Chile: An Approach to Sustainable Education	Espinoza Vidaurre, S.M.; Velásquez Rodríguez, N.C.; Gambetta Quelopana, R.L.; Martinez Valdivia, A.N.; Leo Rossi, E.A.; Nolasco-Mamani, M.A.	2024	Students from various level from 13 universities in Chile and Peru
15	Students' voices on generative AI: perceptions, benefits, and challenges in higher education	Cecilia Ka Yuk Chan and Wenjie Hu	2023	Undergraduate and postgraduate students from various disciplines in Hong Kong
16	The Good and Bad of AI Tools in Novice Programming Education	Rina Zviel-Girshin	2024	First semester Engineering students
17	The Impact of AI Usage on University Students' Willingness for Autonomous Learning	Ling Wang and Wenye Li	2024	Undergraduates from various disciplines
18	University Students' Insights of Generative Artificial Intelligence (AI) Writing Tools	Al-Mothana M. Gasaymeh,, MohammadA.Beirat and Asma'a A.AbuQbeita	2024	Undergraduate and graduate students from education course
19	Unlocking Potential: Key Factors	Di Wu,Shuling Zhang,	2024	Undergraduates

	Shaping Undergraduate Self-Directed Learning in AI-Enhanced Educational Environments	Zhiyuan Ma, Xiao-Guang Yue and Rebecca Kechen Dong		from various disciplines
20	Using an Artificial-Intelligence-Generated Program for Positive Efficiency in Filmmaking Education: Insights from Experts and Students	Wei Yang , Hyemin Lee, Ronghui Wu , Ru Zhang and Younghwan Pan	2023	Experts film maker and undergraduate in film production

4. Discussion

4.1 GenAI Risk Category

The integration of GenAI into education introduces interconnected risks that span academic integrity, ethics, cognition, and technical implementation. Academic integrity concerns, such as plagiarism and diminished originality in student submissions, are compounded by ethical challenges including bias, privacy leakage, and lack of transparency in algorithmic decision-making (Espinoza Vidaurre et al., 2024; Wu et al., 2024; Wijaya et al., 2024).

These issues are not isolated; rather, they reinforce one another. For example, the opacity of GenAI systems makes it difficult to detect plagiarism, while systemic bias in training data raises questions of fairness in both assessment and authorship (Toma & Yánez Pérez, 2024; Chan & Hu, 2024). Cognitive risks further exacerbate these challenges. Over-reliance on GenAI undermines students' autonomy, critical thinking, and creativity, while simultaneously shaping language development in ways that may limit higher-order skills (Wang & Li, 2024; Wu et al., 2024). This dependency is closely tied to ethical risks, as students who unquestioningly accept AI outputs are more vulnerable to misinformation and "hallucinations" generated by the system (Yusuf et al., 2024).

Technical and practical risks intersect with both ethical and cognitive dimensions. Limited institutional resources, disparities in educator competencies, and inconsistent national regulations create uneven access to GenAI, amplifying the digital divide and reinforcing inequities in learning outcomes (Wang & Li, 2024; Espinoza Vidaurre et al., 2024). These structural challenges not only hinder effective integration but also magnify the risks of misuse and misinterpretation across educational contexts (Chan & Hu, 2024).

4.2 GenAI Impact on Student Motivation

One of the most significant risks associated with students enhancing their learning through GenAI is the issue of over-reliance (Wu et al., 2024). Studies have demonstrated that such dependency undermines student autonomy, diminishing independent thinking and problem-solving skills (Wang & Li, 2024).

This reliance has been linked to increased passivity and reduced creativity among students (Espinoza Vidaurre et al., 2024). Many students persist in presenting AI-generated outcomes as their own work, thereby increasing the likelihood of spreading misinformation (Wang et al., 2024). In more severe cases, students exhibit frustration when GenAI tools are unavailable, struggling to complete tasks or assignments without assistance (Chan & Hu, 2024). Such dependency can lead to stress and anxiety, as students feel incapable of independent learning, ultimately reducing motivation when GenAI support is absent (Wang & Li, 2024).

Another concern, often overlooked due to the popularity of GenAI, is the presence of students who prefer traditional learning methods and express skepticism toward AI-driven approaches (Wang et al., 2024). Evidence suggests that successful integration of GenAI into education must begin with student acceptance (Espinoza Vidaurre et al., 2024). Human factors and emotions play a critical role in smoothing this process, as not all students willingly embrace AI-driven courses. While some are enthusiastic, others remain hesitant, worried, or simply comply with course requirements without genuine engagement (Chan & Hu, 2024).

Educators must therefore acknowledge that certain students will reject GenAI integration, particularly in courses where AI use is not compulsory (Wang & Li, 2024). These students often prefer hands-on, traditional methods, which they perceive as offering deeper learning experiences (Wu et al., 2024). They also express concerns about over-reliance on GenAI and question the accuracy and reliability of AI-generated feedback (Yusuf et al., 2024). Furthermore, disparities in student engagement with GenAI have been observed across disciplines, with applied fields showing higher motivation to adopt GenAI compared to pure fields. This suggests that the choice of study discipline is an important factor in shaping students' acceptance levels (Espinoza Vidaurre et al., 2024; Wang & Li, 2024).

4.3 GenAI Risk on Educator Integrity

Educators, like students, are significantly impacted by the integration of GenAI in education, facing risks that demand updates to pedagogical methods and strategies. These changes are necessary to ensure educators understand how GenAI reshapes professional ethics and teaching practices (Wijaya et al., 2024). Yet, some educators overestimate GenAI's potential, leading to reduced effort in teaching and learning. This overvaluation results in fewer hours

dedicated to academic engagement, weakening critical development and active participation in academia (Wang et al., 2024; Wijaya et al., 2024).

At present, ethical education involving GenAI remains underdeveloped (Mosly, 2024) Educators must therefore adopt approaches that minimize risks of unfair judgment or decision-making (Yang et al., 2024). Since GenAI is trained on datasets that cannot reliably distinguish fact from fiction, educators must be prepared to identify biases and manage sensitive data responsibly (Țală et al., 2024). Documented cases of gender bias and racial profiling in GenAI outputs highlight the urgency of ethical oversight (French et al., 2023).

Teacher training is another critical concern. Without comprehensive preparation, educators struggle to integrate GenAI effectively into classrooms (Mosly, 2024) Institutions must provide professional development aligned with AI technologies (Wijaya et al., 2024), while preparing educators to transition into facilitator roles equipped with ethical knowledge to govern AI usage (Wu et al., 2024).

Nevertheless, some educators perceive GenAI integration as incurring more risks than benefits (Wijaya et al., 2024). Concerns include self-reliance on GenAI, diminishing problem-solving skills (Saúde et al., 2024), and reduced teacher-student interaction, which may weaken critical thinking capacities on both sides (Wijaya et al., 2024). The erosion of higher-order cognitive skills is considered one of the most pressing risks, as educators fear that essential human thinking abilities could be replaced by automated systems controlled by technological elites (Wang et al., 2024).

Academic integrity risks also extend to educators. GenAI's functionality can inadvertently support academic malpractice, undermining originality in scholarly research (Espinoza Vidaurre et al., 2024). Moreover, GenAI outputs may be factually inaccurate or contextually irrelevant (Kazanidis & Pellas, 2024). Even when outputs appear original and relevant, they often contain inappropriate references and lack individual perspectives, requiring manual review by educators (Yusuf et al., 2024).

Ultimately, the integration of GenAI in education must balance technical capabilities with the humanistic dimensions of pedagogy (Țală et al., 2024). While automation can improve efficiency (Zviel-Girshin, 2024), excessive reliance risks eroding human values, emotions, and interactions essential for students' moral and creative development (Wijaya et al., 2024). Educators must therefore resist treating GenAI as a universal shortcut for task completion (Saúde et al., 2024). Addressing these risks requires collaboration among educators, legislators, curriculum designers, and technology developers to create a progressive education system that values student-centered approaches, ethical considerations, and seamless integration of GenAI into both theory and practice (Mosly, 2024; Saúde et al., 2024).

4.4 Strategies to Mitigate Risk and Concern

Acknowledging the risks and concerns of GenAI integration in educational institutions is crucial for all stakeholders—students, educators, faculties, and policymakers—who must collaborate to develop strategies that minimize these challenges (Mosly, 2024) Strategy development should begin with institutional and stakeholder collaboration to establish guidelines that pilot integration and address ethical, programmatic, policy, and pedagogical concerns (Saúde et al., 2024).

Ethical guidelines and policies governing AI use are essential, as they provide a framework to address risks, concerns, and opportunities from multiple perspectives (Espinoza Vidaurre et al., 2024). These policies must clearly outline principles of AI integration in academic settings, covering data privacy, transparency, and responsible use (Mosly, 2024) To safeguard academic integrity, institutions should require self-declaration of GenAI usage in student and educator submissions (Chan & Hu, 2024), thereby reducing plagiarism and protecting the validity of academic work (Yusuf, A., 2024). Transparency frameworks that encourage openness between educators and students can further build trust, particularly among those initially skeptical of GenAI integration (Saúde et al., 2024).

Training programs are equally critical. Institutions must provide opportunities for both educators and students to develop GenAI skills, ensuring effective integration into teaching and learning practices (Chan & Hu, 2024). Strengthening AI literacy improves understanding of GenAI's advantages and limitations, making the technology more accessible, especially to hesitant groups (Wijaya et al., 2024). Professional development programs should include scenario-based training that simulates decision-making with and without AI assistance, enabling educators to visualize both benefits and limitations (Wijaya et al., 2024; Wang & Li, 2024).

Pedagogical strategies must also be re-evaluated to prioritize the development of students' critical thinking (Saúde et al., 2024). Students should be trained to critically evaluate AI-generated outputs, distinguish reliable from unreliable sources, and make informed decisions (Mosly, 2024) At the same time, institutions must balance AI integration with traditional pedagogical models to foster independent learning (Zhao et al., 2024; Wang et al., 2024). GenAI should be positioned as a supplementary tool rather than a replacement for human interaction, ensuring that active participation between educators and students remains central to the learning process (Wijaya et al., 2024; Mosly, 2024).

At the management level, institutions must prioritize data privacy and user security (Zhao et al., 2024). Enhanced security measures, including upgraded protocols and robust hardware/software safeguards, are necessary to mitigate bias, eliminate prejudice, and protect users (Saúde et al., 2024; Mosly, 2024).

On a broader scale, long-term strategies require policymakers and institutions to rethink curricula and teaching approaches to prepare educators and students for a future where GenAI is commonplace (Mosly, 2024) Curricula should emphasize interdisciplinary learning, critical thinking, creativity, and digital literacy (Yang et al., 2024). Foundational changes will strengthen ethical AI usage in education while promoting open discussions about GenAI's

strengths and weaknesses (Mosly, 2024) To ensure fairness and accessibility, policymakers must provide resources and support to guarantee equitable access to GenAI tools across the education sector (Wang & Li, 2024).

5. Conclusion

The integration of GenAI into educational systems is undeniably transformative, offering revolutionary changes that promise to improve learning processes. At the same time, however, it introduces unprecedented obstacles that institutions must confront with caution and urgency. Risks related to ethics, infrastructure, facilities, and the level of acceptance among stakeholders must be carefully managed, particularly given the rapid pace of GenAI advancements each year.

Among these challenges, ethical and integrity-related issues stand out as the most pressing. Students and educators often lack clarity on what constitutes ethical use of GenAI, leading to unresolved dilemmas and contentious debates if not properly addressed (Mosly, 2024) GenAI's inherent limitations in understanding human context further exacerbate these risks, as biased outputs can result in unfair decisions. If left unchecked, unethical use of GenAI threatens to erode higher-order cognitive skills, undermining creativity, autonomy, and intellectual growth. Over-reliance on GenAI must therefore be recognized as a critical risk, as it hinders the long-term development of both educators' and students' problem-solving abilities (Wang & Li, 2024).

To safeguard responsible usage, comprehensive policies must be established as guiding frameworks across educational institutions. Such policies should be flexible enough to accommodate cultural variations, differing attitudes, and diverse expectations, while simultaneously nurturing fairness and inclusivity (Espinoza Vidaurre et al., 2024). Clear guidelines on ethical practices, transparency, and accountability are essential to ensure that GenAI integration strengthens rather than weakens academic integrity.

Ultimately, all educational institutions must prepare for the inevitable transition brought about by GenAI. Its transformational power is predicted to reshape even the foundations of learning itself. Yet, with this vast potential comes equally vast responsibility. If integration occurs without adequate preparation, institutions risk producing generations of students overly dependent on AI, unable to thrive independently without technological assistance. The challenge, therefore, lies not in resisting GenAI, but in managing its risks responsibly to ensure that its integration enhances education rather than diminishes it.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: study conception and design: Author 1, Author 2; data collection: Author 1; analysis and interpretation of results: Author 1; draft manuscript preparation: Author 1. All authors reviewed the results and approved the final version of the manuscript

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