

## A Focused Review of Artificial Intelligence in Education: Evolution and Challenges

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### ABSTRACT

The given systematic analysis reviews 40 articles published in 2015-2025 to discuss the examine the evolution, applications, and challenges of artificial intelligence (AI) in education, specifically in the bi/multilingual learning settings. The review relies on empirical and theoretical study and provides identification of the three major domains, including personalized learning, intelligent tutoring systems and chatbots, and automated assessment. The research results demonstrate that AI improves student engagement and learning performance and teaching efficiency due to the adaptive feedback and real-time analytics, particularly when used to support multiliteracy language learning practices. There are, however, major issues of concern that data privacy, algorithmic bias, unequal access, and the disappearance of relational and cultural facets of teaching and learning. The review highlights the empathy gap in the AI tools and demands the incorporation of AI into the mainstream in an inclusive, ethically based and linguistically responsive manner. It promotes the change in automation to intelligence augmentation and places AI at the service of educators offloading them with fair, human-centered, and AI assistive tools in multilingual learning students in English-dominant settings. The implications refer to the imperative to provide strong governance structures, human centered training of teachers in which AI serves as an addition to intelligence and not intelligence, and inclusive design to provide equitable and effective AI integration and to provide a balanced innovation with a focus on human-centered learning.

**Keywords:** artificial intelligence, adaptive learning, equity and access, multilingual education, AI and K-12 education.

Artificial Intelligence (AI) has been promoted and discussed as transforming traditional learning paradigms in unprecedented ways, including the creation of inclusive literacy frameworks, providing benefits and opportunities (Kasneci et al., 2023; Luo, 2024; Yan, 2023; Yim, 2024). Many teachers use AI applications and are creating tools to personalize learning experiences, automate administrative tasks, and provide real-time feedback to students. Such tools are designed to create adaptive learning systems that can identify individual student needs, adjust difficulty levels automatically, and offer customized learning pathways. Additionally, teachers are using AI-

powered educational platforms to analyze student performance and to tailor teaching strategies and interventions.

Line of Inquiry and Ethical Considerations:

For this review of research, we focused on examining and exploring the following questions:

1. What is the overall state of AI in education, particularly in terms of the research topics and designs that have emerged during this period?
2. What key challenges have been identified in recent studies on AI and education?
3. Alongside the use of AI as learning tools, what are some of the ethical, pedagogical, and relational limitations that AI faces in educational contexts?

We also used these questions as a framework to determine which articles to include and which to exclude, while centering the relational and human elements within each section. The level of education that the article we reviewed spans from pre-school, early childhood education, all the way to higher education to span and understand the topics, the relational dimensions, and the challenges that are scoping in education across multiple ages and stages. We also focused on Bi/multilingual education and AI regarding the specific areas that were identified, such as AI applications and the creation of tools to personalize learning experiences, automate administrative tasks, and provide real-time feedback to students, and adaptive learning systems. In total, we examined 40 studies. In that sense, we examined two main dimensions for the review, one through a timeline from 2015 to 2025 and through the key terms that we provided above.

### **AI and Overall Ethical Considerations**

Environmental and economic factors such as unequal access to technology, water shortages, and hidden ecological costs raise serious ethical concerns about AI use (Zhuk, 2023). AI uses pose environmental stress because of the disproportionate use of water, energy, land, and other resources (Murdock, 2025). AI technologies originate from “states and corporations that drive and dominate” such technologies and thus are sharply influenced by the systems that organize those states and technologies (Crawford, 2021, p. 11). Most recently, studies examining images generated by AI image generators reveal clear algorithmic bias and mirror the “dominant settler colonial visual conventions” of Māori people’s encounters with Europeans (Hellmann, 2025). Thus, in this introduction, while these serious issues are not within the direct scope of this paper, as researchers, we must still acknowledge these realities rather than approach AI with technological or ethical neutrality. For better or worse, we are implicated in these dynamics, as we are using the very technology we critique, especially to avoid education reinforcing human bias in teaching. Ethical considerations must be addressed as part of AI literacy and education. Similarly, this is not to reject artificial intelligence or its uses in academia and education, but rather to advance a level of awareness regarding some of the ethical issues that emerge from the most recent studies on AI and education in this scoping review (Samala et al., 2024).

### **AI As an Effective Learning Tool and Becoming Educator: The Empathy Gap**

AI could be an effective learning tool that lessens the burdens of both teachers and students in educational settings. By automating routine tasks such as grading assignments and providing instant feedback, AI systems can significantly reduce teachers' administrative workload, allowing them to focus more on meaningful interactions with students and creative teaching approaches (Loeckx, 2016), such as creating flipped classrooms, multimedia assignments (Rudolph et al., 2023) and supporting students in various tasks such as essay writing in various genres (Samala et al., 2024). Additionally, AI-based learning systems can offer students customized learning journeys, adaptive learning, and real-time support when they have issues with the information, which helps to decrease the cognitive load associated with conventional learning models. Finally, AI in schools reduces the workload of administrators offering faster and efficient options to fulfil certain tasks, such as attendance monitoring, scheduling, and data analysis.

As Loeckx (2016) posits, AI has a potential not only to streamline the processes of education but also improve the quality of learning experience via intelligent automation and customization. Conversely, education experts and researchers are having serious debates on how the rapid development of AI can transform the role of teachers with some even suggesting that AI will probably substitute or replace educators (Lacity and Willcocks, 2017). However, the application of AI, including generative AI tools like ChatGPT, to the tasks of a full-fledged educator is still in an early phase, as are the research articles that quantitate its true effects on learning (Su & Yang, 2023). Regarding education, teachers and educators should possess a keen sense of the dynamics of human interaction, which ChatGPT and other generative models of artificial intelligence lack.

The evolution of Intelligent Tutoring Systems (ITSs) is transforming the way we perceive individualized education. These advanced systems, as Yim (2024) details, essentially behave like digital instructional aids, and collaborate with learners in four basic ways: they will closely observe how students learn and react, customize

lessons to each student, give supportive and helpful feedback, and develop direct user interfaces that make learning more natural and enjoyable. While this technological breakthrough is commendable, it is also raising concerns in teacher lounges and staff rooms around the world. The question many scholars face is their own lasting relevance or role within the classroom; is there a risk these systems could diminish the need for scholar, teacher, and educator expertise? With the increasing amount of ITSs created in various fields, from mathematics to literature, we are experiencing a seismic shift that could transform our basic assumptions of what schooling is all about. This is not just a hypothetical debate that has been limited to scholarly articles; as Zhai et al. (2021) argue, this is a very practical argument going on in classrooms and university meetings, as teachers and scholars alike wrestle with critical questions regarding what learning is or should be, and how they can sustainably and ethically incorporate AI into the learning process. These debates indicate that there is a greater concern with preserving the human aspect of education in the process of adopting technological advancement.

Loeckx (2024) argues that the concerns about replacing teachers in democratic societies are not only myopic but also minimize one of the most important aspects of teaching, which is providing insights, promoting expression and ambitions of learners, and enticing students into critical thought. On the other hand, there is a concern about the exposure of young students to AI in early childhood education potentially leading to what recent research terms the empathy gap (Kurian, 2024; 2025), when AI either cannot act empathetically towards the users or does not always do so, or can even harm people. Although AI can be used to simulate empathy, it is not able to grasp any emotional paradigms and truly empathize with the well-being of children. So, being a learning tool, to what extent can it be relied upon without the involvement of a parent or an educator? Although it operates in a predetermined setting and training of the data, there are severe and alarming cases of AI malfunctions, injury, and poor reactions to students, especially children (Kurian, 2024; 2025). The teaching profession is not just a case of delivering information; instead, the teaching profession is characterized by nuanced human relationships, emotional intelligence, and decision making that is not just a case of information delivery. At the time of writing this article, AI cannot fulfill the socioemotional and culturally competent roles fulfilled by teachers and educators, particularly in the case of more vulnerable or sensitive age groups. Therefore, discussion regarding the empathy gap is representative of a wider social issue regarding tradeoffs between technology advancement and the potential loss of distinctively human qualities of critical thinking, empathy and personal development.

## Personalized Learning

Recently published literature reiterated the message of the importance of AI in the personalization of education. Samad et al. (2022) state that AI-based systems can process personal data of each student to develop unique learning experiences. This can be justified by the research conducted by Zarei et al. (2023), which proves that machine learning algorithms may adjust the instruction to the pace and the learning style of each student.

A research study conducted in several educational establishments by Al-Bahrani et al. (2022) showed a phenomenal 30% improvement in the performance of students when using AI-enhanced learning systems in mathematics. This piece of work was especially significant in terms of recording the effectiveness of AI-based personalization in minimizing the achievement gaps across the various groups of students. Through an in-depth analysis, the authors determined the features that proved to be the most useful to the student success, such as the adaptive order of problems, the real-time feedback system, and the individual student learning journeys. Moreover, their cost-benefit analysis was rather strong proof of the economic feasibility of the implementation of AI systems in educational institutions since it was demonstrated that the initial investment was justified by the better learning results and the decrease in the amount of remedial education. The pioneering work has become one of the pillar sources of information in institutions contemplating the use of AI in their mathematics curriculum. The results of its study still impact policymaking and planning in the field of educational technology.

The incorporation of artificial intelligence (AI) in personalized learning has redefined the educational process by providing an opportunity to personalize the instructions according to the needs, preferences, and learning speed of the individual students. Crompton et al. (2022) conducted a systematic review that demonstrates when applied to personalized learning, AI-driven tools (including intelligent tutoring systems and adaptive learning platforms) can improve personalized learning through real time feedback and customized learning paths, especially in K-12 and higher learning. AI technologies can help to create more responsive and learner-centered learning environments as they adapt to the progress of each learner. These systems use machine learning algorithms to process the data of student performance and based on them, generate personalized lesson plans and content suggestions that enhance student engagement and academic performance (Crompton et al., 2022). To take an example, predictive analytics applications are used to create individual learning paths through the AI-based platform (such as ContentNav in PowerSchool) to enforce concept mastery and the needs of various learners (PowerSchool, 2024). Nonetheless, issues like data privacy and the necessity of high-quality training of teachers to successfully implement such technologies are still serious deterrents to popularization.

The use of AI in encouraging self-regulated learning (SRL) in personalized learning settings is also highlighted in recent literature. Lan and Zhou (2025) conducted a qualitative systematic review of 14 articles, which indicated that AI applications, such as chatbots and adaptive feedback systems, assist SRL and help in the phases of forethought, performance, and reflection. They also enable students to gain more control over their learning activities, as they provide more customized guidance and support, but the review highlights an important difference between human and AI-centered agency that may affect the effectiveness of SRL models (Lan and Zhou, 2025). On the same note, Ellikkal and Rajamohan (2024) believe that AI-based personalized learning positively impacts student motivation and engagement, as it helps to match the educational content with personal interests, but they state that it should be used carefully, as it can weaken the ability to think critically. These results emphasize the opportunities of AI to design interactive, student-centered educational experiences and the necessity of integrating AI and human aspects equally so that learners could retain their autonomy.

Nevertheless, ethical and pragmatic issues are present when implementing AI-supported personalized learning. In a systematic review, Garcia-Martinez et al. (2023) found that adaptive learning and real-time analytics had a positive impact on student performance; however, they also identified alarming issues, including algorithmic biases, data privacy concerns, and a lack of equitable access. Their review emphasizes the importance of ethically integrating AI into pedagogical models to achieve the most significant educational benefits (García-Martinez et al., 2023). In addition to these findings, other recent studies emphasize the importance of systemic and collaborative approaches to ensure the responsible integration of AI. Moreover, the success of AI in personalized learning relies on interdisciplinary cooperation and effective data governance to address potential issues arising from technological dependency and cultural biases (Jiao et al., 2022). Considered collectively, the research reveals that AI can transform personalized learning, but programs must emphasize adherence to ethical principles to ensure equitable opportunities for all.

### **Tutoring Systems and Chatbots**

Regarding the use of artificial intelligence in education (AIED), Letourneau et al (2025) discuss in their systematic review how despite “exponential growth” in the use of ITSs over the last 10 years, primarily for ITSs’ built-in modality of individualized instruction, ITSs is still “most effective when combined with teacher-led guidance” (p. 9). This systematic review included a total of 4597 students (N = 4597) covered by 28 studies with varying intervention durations. The authors noted while the highlights of ITSs attributes include “mastery-based learning support”, “self-regulation features”, “personalization”, “data-driven feedback” in “real-time”, and “adaptivity” (p. 9), most of the sample of articles included in their review “largely overlooked ethical considerations” (p. 9). In their concluding statements, the authors stated that while ITSs can provide individualized instruction and the other benefits mentioned previously in this paragraph, these benefits in a K-12 setting are “mitigated when compared to non-intelligent tutoring systems”, and that more longitudinal robust research is needed on the effectiveness of these systems in more diverse samples. The authors highlight that ITSs are most effective when combined with teacher-led guidance and should be considered “complementary tools rather than replacements for educators” (p. 9). They also advise that the ethical implications of using AI in a K-12 educational setting should be further investigated.

Concerning multilingual students and ITSs, Ruo-Yan Zhao (2025) investigated the concept of AI as a tutoring tool for multilingual students. Her review pointed out that AI as interactive language-learning companions have a great potential in their tutoring capabilities, which act as though personal tutors (Wei, 2023). These systems do not only discuss the answers of the students but also give them a chance to train their reading, punctuation, and comprehension (Ruo-Yan Zhao, 2025). Apps like AI-powered Duolingo and other, like-minded ones embrace voice-activated service, learning in the form of games, and AI-based feedback, providing on-demand tutoring (Sue et al., 2023). Using AI as a tutoring tool, artificial intelligence platforms customize to the learning process of students and make content individualized and differentiated. In the case of multilingual students, the process of translanguaging can be supported by making chat with ChatGPT (García and Wei, 2015), which can also help students who are speakers of othered or minoritized languages, at home (Barros, 2018). Nonetheless, with regards to evaluation, most AI tutoring tools continue to focus on favoring or reacting mostly in the target language, thereby limiting the full engagement of multiple languages.

Yu et al. (2025) study explored the role of ChatGPT in bi/multilingual language education as both a personalized learning tool and a tutor, showing strong potential for enhancing learning experiences. However, they found that ChatGPT lacked the “naturalness” of human interaction and the soft traits associated with it, such as friendliness and contextual responsiveness (p. 1). Similarly, Nah et al. (2023) identified a pattern of algorithmic bias in which language contexts were framed within Western cultural norms and examples rather than through a more holistic or pluralistic lens of language.

AI-driven chatbots and ITSs become the key educational resources that provide students with a personalized and interactive learning process. Mousavinasab et al. (2018) conducted a systematic review of 53 studies and

discovered that ITSs, which operates based on machine learning and natural language processing, can significantly improve the learning outcomes of students because it offers personalized learning and instant feedback. It is a type of system such as MATHia by Carnegie Learning, which adapts to each student and adjusts his or her level of difficulty and speed according to real-time performance data (Mousavinasab et al., 2018). On the same note, chatbots like the one developed by Georgia Tech, Jill Watson, have assisted in facilitating large-scale online courses with students, responding to their queries and allowing them to discuss their topics, thus lowering the workload of the instructor (Goel and Polepeddi, 2018). Nonetheless, issues like insufficient knowledge of context and necessity to constantly update the system to keep with the amendments to the curriculum are still impediments to scalability.

Recent research indicates how chatbots can be used to promote student engagement and self-regulated learning. The systematic review of 36 studies on educational chatbots conducted by Wollny et al. (2021) revealed that tools of this kind, which are usually part of a platform such as Moodle or WhatsApp, enhance student motivation by responding instantly and giving specific advice. An example is chatbots such as Ed, designed by Carnegie Mellon University, which scaffolds the use of problem-solving in STEM education through conversational AI to encourage deeper conceptual learning (Wollny et al., 2021). The review, however, gives some limitations such as the possibility of over-simplified responses, and the over-reliance on automated assistance by the students, which could inhibit the development of critical thinking. As a result, although chatbots might teach us a lot, to integrate them, it is necessary to implement strategies that would reduce such adverse impacts. These results highlight the importance of designing that would allow balancing automation and independent learning possibilities.

ITSs and chatbots have potential, yet complications both in terms of ethics and technology are present and should be addressed continually. The review of 146 articles conducted by Zawacki-Richter et al. (2019) demonstrated that such concerns as data privacy, algorithmic bias, and the digital divide are important when it comes to AI-based educational tools implementation. To take a specific example, adaptive assessments, such as those introduced by ITS such as ALEKS, might be biased, meaning that without sufficient care, they tend to disadvantage some groups of students (Zawacki-Richter et al., 2019). These observations indicate that ITS and chatbots have a potential to transform, yet their effective application depends on how they will overcome ethical issues and create a fairer access to all educational settings.

### **Assessment and Grading Studies**

The study by AlAli et al. (2023) has made a breakthrough in automated assessment system evaluation and demonstrated that the efficiency and accuracy of grading have increased significantly. Their research showed that their time grading processes in time was cut by an astonishing average of 40%, at the same time reaching a significantly high degree of 95% accuracy in automatable grading. Such accuracy was of special interest when used with large groups of students when consistency in grading would be required and the human aspect of fatigue and subjective perception of the system that would not be realized in the traditional grading system would be greatly avoided. These results show that automated evaluation systems can enhance fairness and uniformity in educational evaluation.

Moreover, the scholars contributed greatly to the body of knowledge in relation to the connection between the automated feedback and performance of students. They recognized and tabulated various effective feedback methods in automated systems as such, elaborate rubric-based clarifications, specific improvement recommendations, and developmental learning course. The researchers found that these accelerated feedback loops in which students had instantaneous feedback on their assignments resulted in quantifiable effects of student performance and involvement. This quick feedback mechanism enabled the students to recognize and rectify the misconceptions at a very quick pace and resulted in a better outcome in learning and increased achievement in different subjects.

### **Challenges and Concerns Research**

Jarrah et al. (2022) in their seminal study of educational data security performed a broad examination of privacy issues as a part of AI educational system. In their inquiry, they came up with a number of privacy challenges, which included unauthorized access to data, the possibility of misusing student data and data storage systems vulnerabilities. The researchers reported on a variety of data security issues that educational institutions that deploy AI systems experience through extensive case studies and system reviews, and they provided an innovative solution to these concerns at the same time. Some of these solutions included improved encryption strategies and multi-factor authentication and regular security audits. The greatest impact of the study was the creation of a solid framework of safeguarding the student data in AI-based academic settings. This model has integrated various tiers of security systems, compliance guidelines, both technical and administrative segments of

data security. The researchers made specific recommendations on the best practices related to educational data processing and paying much attention to open data collection policies, safe storage procedure, and tight access regulations. The guidelines have since proved useful in ensuring that educational institutions go through the intricate environment of data privacy without sacrificing the advantages of AI-based learning systems. Their suggestions were especially oriented on the adherence to international laws on data protection without interfering with the educational value of AI implementation in security measures.

A thorough examination of the problem of accessibility in AI educational resources among a varied population of students initiated by Gningue et al. (2022) could demonstrate disturbing trends in inequity in access to educational technologies. They found out that there were some major differences in the accessibility of AI tools especially among students with varying socioeconomic statuses. The researchers concluded that low-income students were more prone to numerous obstacles, such as lack of access to high-speed internet, poor device accessibility, and no technical assistance. The report also highlighted that rapid implementation of AI is at the risk of increasing instead of lessening structural injustices without targeted measures. These results showed how the application of AI learning technologies was unwittingly accelerating social inequalities and establishing a digital divide that promised to further marginalize student groups that were already disadvantaged. To overcome these obstacles, the scholars created a stream of practical suggestions that can be offered to enhance equity in the implementation of AI education. Their proposals consisted of implementing device lending schemes, creating offline-enabled AI learning platforms, and making multilingual interfaces so that they could serve a wide range of students. The research also recorded numerous successful examples of inclusive AI usage in different educational establishments, where other companies can benefit and learn off. These case studies have shown that careful planning, proper resource allocation, and community outreach could be used to ease the digital divide and make AI tools of education useful to every student, irrespective of their socioeconomic backgrounds. The researchers stressed that to make AI work towards educational equity, it was necessary not only to find technological solutions but also to change the structure of the distribution and support of educational resources.

During their forward-looking research, Yang et al. (2024) analyzed the current trends in the development of educational AI in detail, noting the essential technological improvements that would potentially define the future of education. Some of the major advances anticipated in their research were the emergence of AI systems that are sensitive to emotions, the emergence of enhanced natural language processing systems and more sophisticated personalization systems. The predictions were made based on an in-depth analysis of existing implementations and new technological opportunities, which are useful in creating long-term technology plans by institutions in the educational field. The researchers also found out some of the emerging technologies with potential immediate education applications. Yang et al. (2024) also emphasized the possibility of an augmented reality as an immersive learning experience, blockchain as the secure credential verification process, and advanced analytics as the accurate prediction of the learning outcomes. Their work has provided the opportunities that the technologies presented as well as the issues that the institutions would encounter in the implementation such as the infrastructure and the staff training aspect as well as the probable regulations. These developments, taken in totality, point to a scenario where technology is not only going to improve but also change radically the education sector.

Wardat et al. (2024) carried out a critical review of the current AI learning applications and evaluated their performance in different educational settings and among different student groups. Their study showed that the existing implementations have both strengths and limitations, and there are key areas where they need to be enhanced such as user interface design, accessibility features, integration ability with the existing learning management systems among others. This discussion offered precious information about the real-life problems of the institutions that implement AI-based educational tools at present. Wardat et al. (2024) used their results to develop new methods of AI-aided learning, reporting numerous successful cases of such AI application in various learning environments. In their study, they emphasized that there were situations in which AI tools were highly effective in learning, especially regarding personalized feedback mechanisms, adaptive learning process, and automated assessment framework. Such recorded achievements provide practical guides on how AI can be easily incorporated in educational settings and it also showed how typical implementation pitfalls could be overcome. The researchers also highlighted the significance of a systematic implementation of AI, considering such aspects as institutional preparedness, staffing, and support systems among students.

## **CONCLUSION**

The current systematic review of artificial intelligence in education (2014–2024) demonstrates that it is a rapidly developing field, with major development and ongoing challenges. The study establishes the fact that AI has now become a potent instrument of individualizing learning, as the studies of Samad et al. (2022) and Zarei et al. (2023) have demonstrated that adaptive systems can be tailored to the needs of individual students. The usefulness of AI is especially in the creation of smart tutoring systems and chatbots, and studies by Letourneau et

al. (2025) and Mousavinasab et al. (2018) demonstrate the ability of these tools to enhance the satisfaction of students, reduce administrative load, and offer instant and personalized assistance. More so, AI-based assessment systems, such as the type studied by AlAli et al. (2023), were found to be exceptionally efficacious and precise, providing a considerable decrease in the amount of time spent on the grading process and the absence of subjective influence. All these facts demonstrate that AI is not only a technological addition but a revolution that can turn the basic points of educational delivery and support upside down. To fulfill the transformative potential of AI, there is a need to deal with ethical, practical, and equity-based concerns to ensure that AI enhances the possibilities of learning in all students.

Despite such encouraging factors, the review also contains important issues that should be resolved to achieve equitable and productive integration of AI in education. Among them, the major issues involve the data privacy and security, which Jarrah et al. (2022) scrupulously documented when creating a framework to ensure that student data is not accessed and abused by unauthorized individuals. Moreover, research by Gningue et al. (2022) has found out an alarming digital divide, in which socioeconomic differences in technology and internet connection exposure are threatening to increase existent educational differences. Another issue that the research points to is the necessity of reconsidering the role of a teacher, as it can be argued by Fenwick (2018) and Lacity and Willcocks (2017) since the teacher needs to develop new professionalism to supplement, but not replace AI systems. These issues emphasize the point that the effective deployment of AI in education is not only a technical problem but a complicated socioeconomic and ethical one.

In conclusion, the trajectory of AI in education points toward a future where human and artificial intelligence can work in tandem to create more effective and engaging learning environments. In further developing the educational practices, the further evolution of technologies, such as emotion-aware AI, augmented reality, and blockchain, as suggested by Yang et al. (2024) and Wardat et al. (2024), are of enormous potential. Getting this potential, however, means a concerted effort to eliminate the identified hurdles. The research and policy in the future must aim at building strong data governance structures, enhance fair access to technology, and be equipped with detailed training to teachers and learners so that they will understand how to use and exploit such tools. It is worth noticing that the new research focuses on emphasizing the importance of the AI systems in assisting the multilingual students and at the same time, making sure that the language diversity is instilled in adaptive learning tools rather than being seen as a secondary consideration. The increasing interest in the empathy gap in AI creates a necessity to develop technologies that do not only personalize the academic material, but also maintain the emotional, cultural, and relational aspects of learning that only human teachers can deliver. It is through overcoming these challenges in advance that educational institutions can limitlessly embrace the complete capabilities of AI to produce inclusive, personalized, and influential learning experiences amongst all students.

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## **Ethical Statement**

This study is a systematic review of previously published literature and did not involve human participants, animals, or the collection of primary data. As such, ethical approval and Institutional Review Board (IRB) approval were not required for this research.

## **Competing Interests**

The authors declare that they have no competing interests.

## **Author Contributions**

Erkan Acar: Conceptualization, study design, literature selection, data synthesis, primary manuscript drafting, and final review; Fatih Yigit: Literature screening, thematic analysis, methodological review, and manuscript editing; Youmna Deiri: Theoretical framing, ethical analysis, interpretation of findings, and critical revision of the manuscript. All authors reviewed and approved the final manuscript.

## AI Disclosures

The author used ChatGPT (OpenAI, 2025) to assist with grammar, wording, and clarity during the revision process. The author reviewed and edited the text to ensure accuracy and accepts full responsibility for the final content.

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