REVISTA INVECOM
ISSN en línea: 2739-0063

The use of artificial intelligence in tutoring and teaching accompaniment: a systematic review in the school context

El uso de inteligencia artificial en la tutoría y acompañamiento docente: revisión sistemática en el contexto escolar

Received: 08/06/2025 - **Accepted:** 06/09/2025

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Abstract
This systematic review examines the use of artificial intelligence (AI) in tutoring and teaching support in the school context, with the aim of identifying emerging trends, approaches, and challenges. The PRISMA protocol was applied, reviewing articles published between January 2023 and June 2025 in the Scopus, Web of Science, and SciELO databases. After applying the inclusion and exclusion criteria, 29 studies were analyzed. The results reveal five predominant themes: intelligent tutoring systems; teacher perceptions and training in AI; applications for personalizing support; ethical and pedagogical implications; and institutional policies and strategies. The findings highlight the potential of AI to personalize teaching-learning processes, optimize teacher management, and generate early warnings about academic difficulties. However, challenges remain related to critical teacher training, the technological divide, algorithmic transparency, and equity in access. Likewise, the effective integration of AI requires a systemic approach that articulates technological innovation and critical pedagogy, avoiding the dehumanization of tutoring. It is concluded that AI can strengthen teacher support if it is implemented with ethical criteria, cultural relevance, and inclusive public policies that guarantee its sustainability.

Keywords: tutoring, educational technology, artificial intelligence.

Resumen
La presente revisión sistemática examina el uso de la inteligencia artificial (IA) en la tutoría y el acompañamiento docente en el contexto escolar, con el propósito de identificar tendencias, enfoques y desafíos emergentes. Se aplicó el protocolo PRISMA, revisando artículos publicados entre enero de 2023 y junio de 2025 en las bases de datos Scopus, Web of Science y SciELO. Tras aplicar los criterios de inclusión y exclusión, se analizaron 29 estudios. Los resultados evidencian cinco ejes temáticos predominantes: sistemas de tutoría inteligente; percepciones y formación docente frente a la IA; aplicaciones para la personalización del acompañamiento; implicaciones éticas y pedagógicas; y políticas y estrategias institucionales. Los hallazgos destacan el potencial de la IA para personalizar procesos de enseñanza-aprendizaje, optimizar la gestión docente y generar alertas tempranas sobre dificultades académicas. No obstante, persisten retos vinculados con la formación crítica del profesorado, la brecha tecnológica, la transparencia algorítmica y la equidad en el acceso. Asimismo, la integración efectiva de la IA requiere un enfoque sistémico que articule innovación tecnológica y pedagogía crítica, evitando la deshumanización de la tutoría. Se concluye que la IA puede fortalecer el acompañamiento docente si se implementa con criterios éticos, pertinencia cultural y políticas públicas inclusivas que garanticen su sostenibilidad.

SciELO Venezuela latindex LatinREV CC BY

Palabras clave: tutoría, tecnología educativa, inteligencia artificial.

Introduction

In recent decades, the educational field has undergone significant transformations due to the progressive incorporation of emerging technologies, among which artificial intelligence (AI) holds a prominent place. These technologies are not only redefining how knowledge is accessed but also how educational stakeholders interact, make decisions, and support formative processes (Zhang, 2024). In this new landscape, the role of educators is being reconfigured: in addition to being content transmitters, they assume key functions as guides, mediators, and tutors of learning. Consequently, tutoring and educational support are becoming increasingly important in the contemporary school context.

Within this framework, the use of artificial intelligence in tutoring and teacher support emerges as a growing trend that is capturing the interest of both researchers and educational institutions. AI, understood as a set of computer systems capable of performing tasks that typically require human intelligence—such as decision-making, pattern recognition, natural language processing, and machine learning—has begun to be applied at various levels of the educational system (Francisco & Silva, 2022). Its potential manifests in multiple dimensions: from the creation of adaptive learning platforms to automated feedback generation, predictive analysis of student performance, and the management of early alerts to prevent school dropout.

However, the implementation of AI in tutoring processes is not a linear phenomenon and is fraught with controversies. As intelligent tutoring systems are developed and adopted, pedagogical, ethical, and social questions arise (Baek et al., 2025). Among these are the risks of dehumanizing the pedagogical relationship, the potential for algorithmic biases that reproduce existing inequalities, the need for digital literacy among educators, and the urgency of establishing regulatory and training frameworks that guide its use with pedagogical criteria (Kılıçkaya & Kic-Drgas, 2025). Tutoring, as a privileged space for closeness, listening, and individualized support, thus faces a dual challenge: to adapt to the opportunities presented by AI without losing its human, ethical, and critical dimensions.

Given this scenario, it is both pertinent and necessary to conduct a systematic review of the scientific literature addressing the use of artificial intelligence in tutoring and teacher support, particularly in the school context (Albtosh & Suryawati, 2025). This review aims to identify and analyze current research trends, predominant approaches, the most relevant technological applications, as well as the perceptions and challenges faced by educators regarding this topic. The present study seeks not only to organize the available knowledge but also to contribute to a critical reflection on the meanings, scope, and limitations of using AI in one of the most sensitive and formative functions of teaching: the comprehensive support of students.

Challenges of teacher support and artificial intelligence in Latin America

In Latin America, teacher support constitutes a fundamental strategy to ensure the retention, well-being, and holistic development of students in diverse school contexts (Castro et al., 2024). This function, carried out by educators and educational teams, includes tasks of guidance, personalized follow-up, emotional support, and monitoring of the formative process (Togawa et al., 2025). However, the exercise of this role faces structural limitations that hinder its effective implementation, such as teachers' workload, insufficient specific training in tutoring, inadequate provision of institutional resources, and fragmented educational policies regarding comprehensive support.

In this challenging scenario, artificial intelligence emerges as a technology with the potential to support and strengthen the tutoring function, particularly concerning the personalization of learning, the identification of specific needs, and the automated generation of reports and recommendations (Isea Arguelles et al., 2024). The ability to process large volumes of data in real time, predict behaviors or academic outcomes, and provide tailored feedback positions AI as a strategic ally in responding to the demands of educational support (Francisco & Silva, 2022). However, its incorporation into Latin American school systems presents technical, pedagogical, and ethical barriers that must be addressed with a critical and contextualized approach.

Technically, significant gaps in infrastructure and connectivity persist in many educational institutions, limiting equitable access to AI-based tools (Kılıçkaya & Kic-Drgas, 2025). Pedagogically, the absence of specific teacher training in the critical and ethical use of these technologies generates tensions regarding their effective implementation in the classroom and tutoring spaces. Furthermore, the limited participation of educators in the design and validation of these systems may lead to decontextualized solutions that do not address the real needs of educational communities.

Consequently, the emergence of artificial intelligence in school environments has generated a series of significant transformations in the ways tutoring and support are offered by educators, which constitutes a relevant

factor to consider in redesigning pedagogical practices (Pérez et al., 2025). As educational systems in Latin America transition toward hybrid models, mediated by technologies and with an increasing use of automated tools, a new metamorphosis in teacher roles, interactions with students, and institutional support structures becomes evident (Francisco & Silva, 2022). These changes may impact not only academic performance but also relational, ethical, and socio-emotional aspects of educational support.

From this context, the following problem arises: How is artificial intelligence being utilized in tutoring and teacher support processes in the school context, and what are its main approaches, challenges, and projections? Thus, the purpose of this systematic review is to analyze and organize recent scientific production addressing the use of artificial intelligence in tutoring and teacher support in the school domain, in order to identify prevailing trends, the most relevant contributions, and emerging challenges for its critical and contextualized implementation.

Methodology

In accordance with the aforementioned, a systematic exploratory review was established as the methodological approach. This review focuses on studies addressing the use of artificial intelligence (AI) in tutoring and teacher support processes within the school context, considering only relevant sources directly linked to the investigated topic. In this way, the research contributes to academic reflection, theoretical updating, and the dissemination of relevant information about an emerging phenomenon in contemporary educational practice (Villasis et al., 2020). Furthermore, according to Pardal and Pardal (2020), systematic reviews strengthen the educational field, especially when aligned with technological advancements.

Within this framework, scientific articles that responded to the object of study were selected, considering publications in both Spanish and English, without geographical limitations. This allowed for a broader and comparative perspective on AI applications in various school contexts. The sources were extracted from three databases of high visibility and academic rigor: Scopus, Web of Science, and SciELO, prioritizing indexed research, peer-reviewed articles, and those available in full text. The search, analysis, and categorization procedures were developed following a systematic methodological pathway, which enabled the identification of common patterns, significant contributions, and gaps in recent scientific literature.

Inclusion and exclusion criteria

Inclusion criteria:

- Scientific articles published between January 2023 and June 2025.
- Studies that explicitly address the use of artificial intelligence in tutoring, support, academic guidance, or tutoring roles within the school context.
- Publications in Spanish and English.
- Articles available in full text, peer-reviewed, and indexed in the Scopus, Web of Science, and SciELO databases.

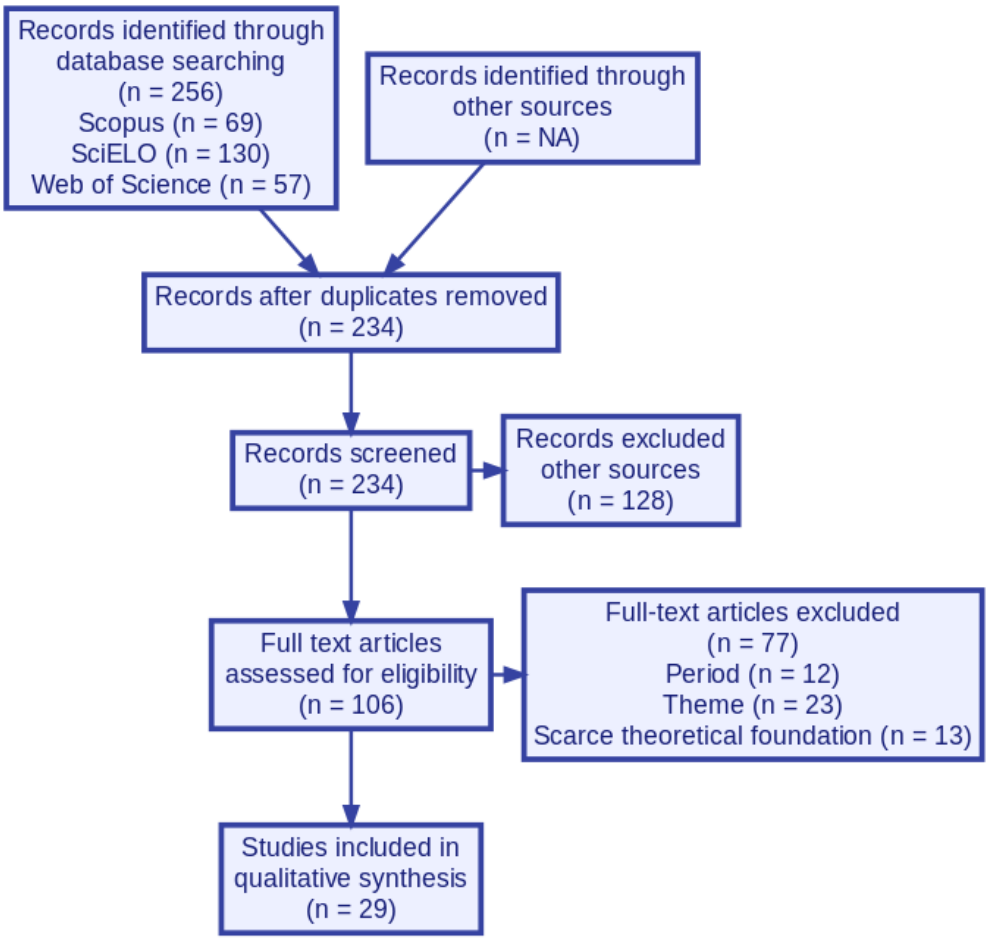
Exclusion criteria:

- Research outside the established time frame.
- Duplicate documents across different databases.
- Studies focused exclusively on higher education, university education, or non-formal education.
- Articles that discuss artificial intelligence in other educational areas (institutional management, disciplinary teaching unrelated to tutoring, etc.).
- Sources with insufficient theoretical grounding or lack of methodological coherence.

Procedure for study selection

The systematic exploration yielded a total of 256 articles as a cumulative sum from the three consulted databases: Scopus, Web of Science, and SciELO. After applying the exclusion criteria and following the PRISMA flow diagram protocol, a final total of 29 selected articles was obtained, as detailed in Figure 1.

Figure 1: *Systematic search and exclusion of articles: PRISMA flow diagram*



Initially, articles duplicated in more than one database were removed, resulting in the exclusion of 22 documents, leaving 234 unique articles for the first review. Subsequently, titles, abstracts, and keywords were evaluated, leading to the exclusion of 128 articles for not aligning with the inclusion criteria. At this stage, studies not directly addressing the use of AI in tutoring or teacher support, as well as those focused exclusively on higher education, educational management, or disciplinary teaching without a tutoring relationship, were excluded.

After this initial thematic filter, a complete reading of 106 articles was conducted, of which an additional 77 studies were discarded due to a lack of methodological rigor, being non-systematic reviews, or other limitations. Thus, the systematic review was consolidated with 29 final articles that meet the methodological, linguistic, thematic, and temporal criteria defined in this study.

Results

Description and analysis of the articles included in the systematic review

The systematic review began with a total of 256 articles identified in the consulted databases. After applying the PRISMA methodology, 29 studies were selected for thorough and detailed analysis. To organize the information, the main characteristics of the research were systematized in different tables.

Table 1
Main characteristics of review studies from Web of Science (WOS)

Author(s) and Year	Database	Language	Title
Adelana et al. (2024)	Web of Science	English	Exploring pre-service biology teachers' intention to teach genetics using an AI intelligent tutoring-based system
Basri (2024)	Web of Science	English	Effectiveness of AI-powered tutoring systems in enhancing learning outcomes
Ilic et al. (2024)	Web of Science	English	Predicting student performance in a programming tutoring system using AI and filtering techniques
Jancarík et al. (2023)	Web of Science	English	Using AI chatbot for math tutoring
Kang et al. (2024)	Web of Science	English	AI-based language tutoring systems with end-to-end automatic speech recognition and proficiency evaluation
Ni & Cheung (2023)	Web of Science	English	Understanding secondary students' continuance intention to adopt AI-powered intelligent tutoring system for English learning
Wang et al. (2024)	Web of Science	English	When tutors simultaneously instruct students from primary, middle, and high school levels in online one-on-one tutoring: Investigating the interaction dynamics using AI, ENA, and LSA methods
Wang (2025)	Web of Science	English	AI-driven autonomous interactive English learning language tutoring system

Table 1 presents studies implementing natural language models, intelligent tutors, and automated pedagogical assistants applied to personalized learning. Although several of these were developed in university settings, their methods and objectives are transferable to the school domain, particularly regarding tutoring and differentiated feedback. There is a noticeable interest in enhancing critical thinking, participation, and improving teaching through technological mediation. These studies demonstrate advancements in digital tutoring with adaptive tools and automated analysis of student performance.

Table 2
Main characteristics of review studies from Scopus

Author(s) and Year	Database	Language	Title
Abdelghani et al. (2024)	Scopus	English	GPT-3-driven pedagogical agents to train children's curious question-asking skills
Belghith et al. (2025)	Scopus	English	Exploring AI intervention points in high-school engineering education: A research through co-design approach
Canonigo (2024)	Scopus	English	Levering AI to enhance students' conceptual understanding and confidence in mathematics
González Campos et al. (2024)	Scopus	English	Higher education and artificial intelligence: Challenges for the 21st century
Li et al. (2025)	Scopus	English	GAI versus teacher scoring: Which is better for assessing student performance?
Rahman & Watanobe (2023)	Scopus	English	ChatGPT for education and research: Opportunities, threats, and strategies

Author(s) and Year	Database	Language	Title
Shi et al. (2024)	Scopus	English	Investigating teachers' use of an AI-enabled system and their perceptions of AI integration in science classrooms: A case study
Steinert et al. (2024)	Scopus	English	Harnessing large language models to develop research-based learning assistants for formative feedback
Sysoyev et al. (2024)	Scopus	English	Teacher vs artificial intelligence: A comparison of the quality of feedback in assessing students' creative writing
Xiao et al. (2025)	Scopus	English	A study of artificial intelligence in writing assessment for secondary school students: A comparative analysis based on the GPT-4 and human raters

Table 2 groups the studies from the Scopus database, where 10 investigations were identified. Most of the works were concentrated in Latin America, Europe, and Asia. The articles mainly covered basic and secondary education levels, with an emphasis on using AI to support the teaching of mathematics, science, and language. Artificial intelligence was mainly applied as an intelligent tutor, an assistant for instructional planning, or a learning assessment and monitoring system. Some studies combined AI with active methodologies, such as problem-based learning and the use of virtual pedagogical agents.

Table 3

Main characteristics of review studies from SciELO

Author(s) and Year	Database	Language	Title
Alfaro Salas & Díaz Porras (2024)	SciELO	Spanish	Perceptions of teaching staff regarding the ethical use of artificial intelligence in their educational work
Caballero Alarcón & Brítez Carli (2024)	SciELO	Spanish	Artificial intelligence in improving teaching and learning, Ministry of Education and Sciences
Castro et al. (2024)	SciELO	Spanish	Toward an integrated curriculum: Connecting literacy in artificial intelligence with technological education in basic education in Chile
Héctor & Millet (2025)	SciELO	Spanish	Artificial intelligence (ChatGPT) in higher education: Reality and ethical considerations
Isea Arguelles et al. (2024)	SciELO	Spanish	Analysis of artificial intelligence in transforming teaching and learning
Pérez Rodríguez et al. (2025)	SciELO	Spanish	Artificial intelligence in the 2023 training plan for education in Uruguay
Sandoval Hernández et al. (2024)	SciELO	Spanish	The use of ChatGPT prompts as an assistant in education
Sánchez Delgado et al. (2025)	SciELO	Spanish	Artificial intelligence in education: Transforming digital environments for personalized learning
Sánchez Trujillo et al. (2024)	SciELO	Spanish	ChatGPT as a pedagogical and didactic tool for pre-service teachers
Sarochar Risso (2025)	SciELO	Spanish	Proposal for categorizing research on and applications of artificial intelligence in education
Zambrano Campozano (2025)	SciELO	Spanish	The impact of artificial intelligence on the digital transformation of education

Table 3 compiles 11 studies from SciELO, with contributions from countries such as Cuba, Paraguay, Uruguay, Chile, and Ecuador. These works, with a contextual and pedagogical focus, analyze the integration of artificial intelligence and its ethical and formative implications. Key topics include teacher training in the use of intelligent technologies, ethical analysis of AI, its curricular incorporation, and the development of educational policies. Additionally, the use of platforms like ChatGPT, conversational systems, and adaptive resources for tutoring, language teaching, and promoting autonomous learning is documented. Collectively, these investigations

highlight the need for teacher support grounded in ethical and pedagogical criteria, enabling the regulated application of AI with a positive impact on school dynamics.

Table 4

Classification related to thematic axes

Abbreviated Reference	Database	Thematic Axis
Basri (2024)	Web of Science	1 – AI-based intelligent tutoring systems
Jancarík et al. (2023)	Web of Science	
Kang et al. (2024)	Web of Science	
Wang (2025)	Web of Science	
Sandoval Hernández et al. (2024)	SciELO	
Abdelghani et al. (2024)	Scopus	
Adelana et al. (2024)	Web of Science	2 – Perceptions, attitudes, and teacher training regarding AI
Sánchez Trujillo et al. (2024)	SciELO	
Shi et al. (2024)	Scopus	
Ilic et al. (2024)	Web of Science	3 – AI applications for personalizing academic support
Ni & Cheung (2023)	Web of Science	
Wang et al. (2024)	Web of Science	
Isea Arguelles et al. (2024)	SciELO	
Sánchez Delgado et al. (2025)	SciELO	
Canonigo (2024)	Scopus	
Li et al. (2025)	Scopus	
Steinert et al. (2024)	Scopus	
Sysoyev et al. (2024)	Scopus	
Xiao et al. (2025)	Scopus	
Alfaro Salas & Díaz Porras (2024)	SciELO	4 – Ethical and pedagogical implications of AI use
Héctor & Millet (2025)	SciELO	
González Campos et al. (2024)	Scopus	
Rahman & Watanobe (2023)	Scopus	
Caballero Alarcón & Brítez Carli (2024)	SciELO	5 – Policies, curriculum, and institutional strategies
Castro et al. (2024)	SciELO	
Pérez Rodríguez et al. (2025)	SciELO	
Sarochar Risso (2025)	SciELO	
Zambrano Campozano (2025)	SciELO	
Belghith et al. (2025)	Scopus	

Table 4 presents the organization of the 29 selected articles based on five thematic axes identified during the analysis process. This categorization reflects both the explicit objectives of each study and the theoretical and practical approaches that underpin them:

1. AI-based intelligent tutoring systems: Studies aimed at the development or application of automated platforms that provide support, feedback, or guidance to students during their learning process.
2. Perceptions, attitudes, and teacher training regarding AI: Research examining how educators interpret, accept, and prepare to integrate artificial intelligence into their educational practices.

3. AI applications for personalizing academic support: Works analyzing how AI adjusts educational processes to the individual characteristics of students, favoring closer and more effective support.
4. Ethical and pedagogical implications of AI use: Studies discussing the ethical and formative challenges associated with the incorporation of intelligent technologies in educational environments.
5. Policies, curriculum, and institutional strategies: Research addressing regulatory frameworks, training plans, and strategies for integrating AI into national or institutional educational systems.

Discussion

The analysis of the research allows for the identification of a complex and multidimensional landscape regarding the use of artificial intelligence (AI) in tutoring and teacher support within the school context. The findings reveal a growing interest among the academic community in exploring how these technologies can optimize personalized learning, expand the scope of tutoring, and strengthen teacher professional development. However, tensions, limitations, and gaps also emerge that require a critical approach to ensure that the integration of AI is not only technically feasible but also pedagogically and ethically sustainable.

A recurring finding in the reviewed literature is the capability of AI-based intelligent tutoring systems to offer interventions tailored to the student's pace, level, and learning style. Research such as that by Basri (2024), Ilic et al. (2024), and Kang et al. (2024) demonstrates that these platforms can analyze performance patterns in real time and adjust content or feedback immediately. In pilot studies, this adaptability has favored student motivation and comprehension of complex concepts, supporting the potential of AI to increase the effectiveness of academic support. However, most of these experiences have been conducted in controlled environments, with small populations and limited implementation periods, making it difficult to extrapolate their results to diverse school contexts, especially those with technological infrastructure constraints (Wang, 2025; Adelana et al., 2024).

Beyond the technical aspect, teachers' perceptions and attitudes toward AI constitute a critical factor for its adoption and sustained use. Alfaro and Díaz (2024) indicate that many educators recognize AI's potential to optimize classroom management and diversify teaching strategies, although they maintain reservations about its impact on the pedagogical relationship. These concerns, shared by Sánchez et al. (2024) and Shi et al. (2024), revolve around fears that teaching judgment may be supplanted by algorithmic decisions, the possible dehumanization of teaching, and excessive reliance on external tools. This tension highlights the need for teacher training programs that integrate not only technical proficiency with tools but also a critical understanding of their pedagogical, ethical, and social implications (Pérez et al., 2025; González et al., 2024).

Regarding the personalization of academic support, evidence confirms that AI enables the identification of learning patterns and generates early alerts in the face of comprehension or performance difficulties (Ni & Cheung, 2023; Canonigo, 2024; Li et al., 2025). Some studies report significant improvements in retention and performance, particularly when AI is used as a complement to human support, combining automated analysis with personalized teacher interventions (Xiao et al., 2025; Wang et al., 2024). However, research by Sysoyev et al. (2024) warns that the quality of feedback generated by automatic systems may differ significantly from that of an experienced teacher, especially in tasks requiring contextual interpretation or understanding of cultural nuances. This raises the need for evaluation frameworks that extend beyond efficiency metrics to include criteria for pedagogical quality, cultural relevance, and equity in access.

Emerging ethical implications serve as a transversal component that conditions both the acceptance and effectiveness of AI in education. Rahman and Watanobe (2023) and Héctor and Millet (2025) caution against the risks associated with the mass collection and processing of student data, as well as the potential reproduction of algorithmic biases that may disproportionately affect certain groups. These concerns intensify when algorithms are opaque to both teachers and students, complicating the understanding and evaluation of the decisions they generate. In this regard, several authors propose models of active teacher supervision (teacher-in-the-loop) and transparency mechanisms that allow for auditing and explaining the functioning of AI systems before their widespread adoption (Belghith et al., 2025; Sarochar, 2025).

Another relevant aspect is the role of public policies, the curriculum, and institutional strategies in the effective integration of AI. Studies by Castro et al. (2024) and Sarochar (2025) show that the absence of clear guidelines at the ministerial or institutional level can lead to fragmented initiatives, dependent on the specific interests of teachers or administrators, which limits sustainable and equitable adoption. Furthermore, the curricular integration of AI literacy—not only as technical content but also as a transversal competence—emerges as an essential step to prepare students and teachers for an informed and critical use of these tools (Caballero & Brítez, 2024; Zambrano, 2025).

Despite the documented potential, the review confirms that significant gaps persist in accessing and using these technologies. Institutions with less technological infrastructure or located in disadvantaged socioeconomic

contexts face greater barriers to implementing intelligent tutoring systems, which threatens to widen educational inequalities (Sandoval et al., 2024; Isea et al., 2024). This scenario presents a dual challenge: on one hand, to design low-cost, scalable technical solutions, and on the other, to implement public policies that prioritize equity in resource distribution and teacher training.

Conclusions

The analysis confirms that artificial intelligence (AI) is a tool with high potential to enhance tutoring and teacher support, particularly in personalizing learning and optimizing feedback processes. However, its positive impact depends on key conditions such as the critical and ethical training of teachers, the adequacy of institutional policies, and the assurance of accessible and equitable technological infrastructure.

It is acknowledged that the application of AI in the school context should not be conceived as a substitute for the teacher's role but rather as a complementary resource that enhances their capabilities while preserving the human, relational, and cultural aspects of tutoring. The reviewed experiences show significant advances, although gaps remain in the research regarding its long-term impact, the evaluation of the pedagogical quality of the systems, and the management of risks associated with ethics and data privacy.

Consequently, it is recommended that future studies delve into the design of hybrid models that integrate active teacher supervision and the use of transparent algorithms, as well as the formulation of public policies that promote equitable access to these technologies. Only through a systemic, contextualized approach grounded in principles of inclusion and sustainability will it be possible to ensure that AI effectively contributes to strengthening tutoring and educational support in the school setting.

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