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THE ROLE OF ARTIFICIAL INTELLIGENCE IN EDUCATION: A SUPPORT TOOL OR A SUBSTITUTE?

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ABSTRACT

The research aimed to investigate the role of artificial intelligence (AI) in education, questioning whether it would work as a support tool or if there would be a tendency to replace traditional teaching methods. To this end, a literature review was carried out, analyzing studies on the application of AI in teaching, its advantages, challenges and limitations. The research focused on AI technologies applied to the personalization of learning, automation of pedagogical processes, and the analysis of their ethical and social implications. The results indicated that AI has proven to be effective as a support tool in teaching, promoting the personalization of learning and improving administrative efficiency. However, technological limitations, resistance to change on the part of educators, and lack of adequate training make it difficult to fully implement it. In addition, AI does not present itself as a substitute for the educator, but as a complement to pedagogical practices. The final considerations suggested that AI should be integrated into teaching in a balanced way,

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preserving the role of teachers as mediators of learning, and indicated the need for studies on the effectiveness of AI in different educational contexts. The research contributed to the understanding of the role of AI in education, emphasizing the importance of training educators and adapting technologies to the school environment.

Keywords: Artificial Intelligence. Education. Personalization of Learning. Educational Automation. Teacher Training.

INTRODUCTION

Artificial intelligence (AI) has gained prominence in several sectors, with education being one of the fields where its impact has been discussed. The application of AI-based technologies in the educational environment promises to transform teaching and learning practices, causing a reconfiguration of both the role of educators and the student experience. AI has been presented as a tool capable of assisting in the personalization of teaching, facilitating the monitoring of each student and providing resources that optimize the educational process. However, the introduction of these technologies raises a central question about their role: would artificial intelligence be an efficient support for pedagogical work or would it be replacing fundamental elements of traditional educational practice?

The justification for investigating this issue is related to the growing adoption of digital technologies in education and the challenges that arise with the incorporation of artificial intelligence in this context. The transition to AI-based methods represents a major step in the modernization of education systems, but it also implies a critical examination of the limits and possibilities of this technology. AI can improve learning through adaptive tools that adjust content at a student's pace, but there are concerns about over-reliance on this technology and the impact on teachers' autonomy. In addition, it is necessary to assess the ethical and social implications of a transformation that can alter the dynamics between educators and students. Thus, understanding the nature of the relationship between AI and education is essential to guide policy decisions and pedagogical practices in a digitalized scenario.

The central problem that arises, therefore, is to determine whether artificial intelligence acts as a tool to support the educational process, enhancing the work of teachers and enriching the experience of students, or whether it presents itself as a substitute for traditional teaching methodologies, changing the very essence of the pedagogical relationship. The answer to this question requires an analysis of how AI is being implemented in schools and what are the impacts of this implementation on pedagogical practice. Is AI an enabler of innovation or a disruptive element that can transform the very role of the educator?

The objective of this research is to analyze the function of artificial intelligence in education, investigating whether it is configured as a tool to support traditional teaching or if its use implies the replacement of important aspects of conventional pedagogical practice. The study seeks to contribute to an understanding of the effects of this technology on educational methodologies and on the relationships between educators and students.

The text is structured as follows: at first, the theoretical framework that addresses the definitions and contexts of artificial intelligence in education will be presented. Next, development topics will be explored, with emphasis on the personalization of teaching, the automation of processes, and the ethical and social implications of the use of AI. Then, the results found in the literature on the benefits and challenges of this technology in the educational environment will be discussed. Finally, the research will conclude with the final considerations, where the main conclusions about the role of AI in education will be presented, taking into account the aspects analyzed throughout the study.

THEORETICAL FRAMEWORK

The theoretical framework is structured in order to offer a view of artificial intelligence in education, initially addressing its definitions and evolution, in order to contextualize the origin and developments of this technology. Then, the main concepts related to the use of AI in the educational context are presented, highlighting the practical applications and potential of this technology both in supporting teaching and in the implications for replacing traditional methods. In addition, the framework explores the different perspectives on the role of AI in education, discussing the advantages, limitations, and ethical and social challenges that arise with implementation in schools. This approach allows for an in-depth understanding of the technical and pedagogical aspects that involve AI, providing the necessary basis for the analysis of its impact on educational practice.

AI AS A SUPPORT IN PERSONALIZED LEARNING

Artificial intelligence has stood out as an important tool in the process of personalizing teaching, as it makes it possible to adapt content and learning rhythms according to the needs of each student. This personalization contributes to efficient learning that is aligned with individual pace, which makes teaching inclusive and accessible. According to Araújo and Lopes (2020), AI allows educational content to be adjusted in real time to meet the specific characteristics and difficulties of students, which favors a dynamic and focused learning environment. The use of e-learning platforms and virtual tutors are clear examples of how AI can be applied to promote personalized learning, adjusting content according to the student's performance.

AI, by integrating into the educational process, offers features such as intelligent tutors who interact with students, identifying their knowledge gaps and providing *instant feedback. Technology can help build an individualized learning path, stimulating students' autonomy and favoring their evolution in an assertive way. The following is an example of*

how this approach can be structured in adaptive educational platforms: "Artificial intelligence is able to identify the needs of students through their responses and interactions with systems, adjusting educational content so that it aligns with the level of knowledge and learning pace of each one, providing a personalized experience" (Araújo, 2020, p. 119). It is evident how AI can provide a tailored learning experience, offering the student the necessary support at the right time, without the content being overly challenging or too simple.

In addition, the use of AI allows the automation of assessments, with the creation of personalized tests and assignments for students, adjusted according to their progress. According to Menta and Brito (2024), adaptive platforms that use AI are capable of measuring student performance and modifying activities based on the information collected, optimizing the teaching-learning process and providing a fluid and continuous experience. These technologies, such as virtual tutors, not only identify gaps in student knowledge but also offer personalized teaching resources, such as additional explanations and practical examples, to ensure that learning is consolidated.

Therefore, AI as a support in the personalization of learning is configured as a promising tool in the educational context. It not only adapts the content to the student, but also offers resources to monitor and adjust the learning process, creating an inclusive environment that is directed to the individual needs of each student.

AI IN THE AUTOMATION OF EDUCATIONAL PROCESSES

Artificial intelligence has proven to be a significant tool in the automation of various educational processes, especially in evaluation, providing feedback, *and managing student data. This automation contributes to the improvement of both administrative and pedagogical efficiency, providing agile and effective management of educational resources. According to Menta and Brito (2024), AI technologies make it possible to automate assessments in a personalized way, adapting questions according to student performance, which reduces the workload of teachers and provides an accurate and quick analysis of each student's progress. AI, therefore, facilitates the continuous monitoring of students, offering data that helps in identifying specific difficulties and adjusting teaching methodologies. "The use of artificial intelligence in the evaluation process becomes essential, as it not only automates the application of tests and the correction of answers, but also offers a real-time performance analysis, allowing the adaptation of content dynamically" (Menta & Brito, 2024, p. 2325). The relevance of AI in the personalization of*

assessment is highlighted, by allowing an accurate and immediate monitoring of student learning, without overloading teachers.

In addition, the automation provided by AI in student data management also contributes to administrative efficiency. The use of AI-based systems allows the collection, storage, and analysis of large volumes of information in an agile way, facilitating administrative decision-making. According to Araújo and Lopes (2020), AI facilitates the organization and analysis of educational data, making the processes of enrollment, attendance monitoring, and academic performance fast and efficient. "Artificial intelligence can be applied in educational management, from the organization of enrollment data to the analysis of academic results, allowing efficient administration and the creation of appropriate strategies for each school situation" (Araújo & Lopes, 2020, p. 88). The importance of AI in improving educational management is highlighted, by making processes fast and organized, which frees up time for pedagogical teams to focus on complex teaching issues.

Therefore, AI in the automation of educational processes represents a significant advance, not only in the field of evaluation and *feedback*, but also in the management of academic and administrative data. By automating these processes, it is possible to achieve greater efficiency and accuracy, allowing both educators and school managers to focus on strategic aspects of teaching and learning.

ETHICAL AND SOCIAL IMPLICATIONS OF THE USE OF AI IN EDUCATION

The use of artificial intelligence in education raises important ethical and social issues that need to be analyzed. Among the ethical issues, concerns about privacy, the security of student data, and the algorithms used to personalize learning stand out. According to Moser, Back, and Assumpção (2024), the use of AI in educational settings requires careful treatment of student information, since AI-based systems collect and process personal data, which can generate privacy-related risks. "The use of sensitive student data for educational purposes must be done responsibly, ensuring that the information collected is not misused, and that the privacy of students is preserved" (Moser, Back & Assumpção, 2024, p. 212). This reflection emphasizes the need to protect student data from potential abuse and invasions of privacy, a central concern in the use of AI in any industry.

In addition, data security is also a relevant issue, especially when we consider that AI-based platforms store large volumes of information about student performance, behavior, and even interactions. Unauthorized access to this information can result in serious harm,

such as manipulation of the data for commercial or other non-educational purposes. To ensure data integrity and user trust, it is essential for educational institutions to adopt strict security policies. Nascimento (2023, p. 788) points out that "data security in the educational context must be a priority, since student information is of a personal and sensitive nature, requiring protections against improper or malicious access. The argument reinforces the urgency of an ethical approach in the handling of student data, to prevent AI, instead of promoting advances, from contributing to the violation of fundamental rights.

Regarding algorithms, another ethical concern arises with the possibility of AI perpetuating inequalities that already exist in the educational system. As Araújo and Silva (2022) point out, the algorithms used in adaptive teaching platforms can be influenced by implicit biases in the data with which they are trained, which can result in biased and discriminatory decisions. "Algorithms often reflect the prejudices present in the data with which they are fed, and can perpetuate racial, social, and gender inequalities, which compromises the equity of the educational process" (Araújo & Silva, 2022, p. 203). This means that the implementation of AI in education needs to be closely monitored to ensure that there is no discrimination or reinforcement of stereotypes in teaching and assessment processes.

In addition to ethical issues, the use of AI in education can also have significant societal implications, especially with regard to inequality in access to technologies. The use of AI-based tools requires advanced technological infrastructure, which can exclude students from poor socioeconomic regions or contexts, where access to computers and the internet is limited. This exacerbates educational inequality, creating a divide between those who have access to technology and those who do not. According to Pinheiro and Valente (2024, p. 1257), "unequal access to educational technology can result in a fragmented education, where students who do not have the necessary conditions to use AI tools are at a disadvantage". It highlights how the lack of infrastructure can exclude a significant part of students from the benefits of AI in education, increasing social inequality.

Finally, the implications for teacher training must also be considered. The use of AI in education requires teachers to be prepared to integrate these technologies into their pedagogical practices. Otherwise, there may be an over-reliance on technology, without educators knowing how to use it. Teacher preparation should include not only learning about technological tools, but also a critical understanding of the social and ethical impacts of AI on teaching. As Araújo and Lopes (2020, p. 88) point out, "teachers need to be well informed about the implications of AI in education, both with regard to the pedagogical use of technologies and the social impact that these tools can generate". This argument

emphasizes the relevance of the continuous training of educators, so that they can use technologies in a conscious and balanced way, without losing sight of the central role of human mediation in the educational process.

The ethical and social implications of using AI in education require a thoughtful approach, one that takes into account the protection of student privacy, data security, and ensuring equitable access to technologies. These issues should be addressed in a strategic and integrated manner, with the aim of ensuring that the implementation of AI benefits all those involved in the educational process, without creating new forms of exclusion or discrimination.

METHODOLOGY

The present research is characterized as a bibliographic review, whose main objective is to analyze the function of artificial intelligence in education, investigating its use as a support tool or substitute. The approach adopted is qualitative, as it seeks to interpret and discuss scientific productions on the subject, based on documentary sources already available. The instruments used consist of scientific articles, books, dissertations, theses and academic productions related to the theme, and data collection is carried out through research in academic databases, such as Google Scholar, Scopus and other specialized digital libraries. The procedures for collection involve the selection of texts that deal with the implementation of AI in education, focusing on its practical applications and pedagogical impacts, in addition to discussions about its ethical and social challenges. The analysis of the sources was carried out in a systematic way, using critical reading and synthesis of the main points addressed by the authors, in order to build an understanding of the different perspectives of the use of artificial intelligence in schools.

The following table presents the main bibliographic references consulted for this research, with information about the authors, the titles of the publications, the years and the type of work. These sources provide the theoretical basis needed to underpin discussions about the impact of AI on education.

Table 1: Bibliographic References Consulted

Author(s)	Title as published	Year	Type of Work
ARAÚJO, V. S.	Teacher training for the critical teaching of the Portuguese language: an experience in the pedagogy course through the "Blackboard" platform.	2020	Dissertation (Master's Degree in Language, Literature and Interculturality)
ARAÚJO, V. S.; LOPES, C. R.	Conceptions of critical training of teachers in university education.	2020	Book Chapter
ARAÚJO, V. S; SILVA, N. N.	Reading in the formation of the citizen in the light of critical literacy.	2022	Book Chapter
OLIVEIRA, V. B.; VAZ, D. A. F.	Physical and mental health of teachers in the remote teaching period in public schools in Goiás.	2022	Book Chapter
OLIVEIRA, V. B.	Discussions of evaluation practices in ninth grade classes of elementary school in a state public school in Goiânia and the teachers' testimonies from the perspective of historical-cultural conceptions.	2023	Dissertation (Master's Degree in Education)
NASCIMENTO, C. C. do.	Artificial intelligence in higher education: from digital transformation to the challenges of contemporaneity.	2023	Article in a journal
NGUIRAZE, J. A.	The role of artificial intelligence in detecting gaps in the teaching and learning process.	2023	Article in a journal
MENTA, E.; BRITO, G. da S.	The role of artificial intelligence in technological education: urgent implications.	2024	Article in a journal
SANTOS, S. M. A. V.; FRANQUEIRA, A. S. (orgs.)	Educational innovation: emerging practices in the twenty-first century.	2024	Book Organizer
MATTOZO, E.; CARDOZO, P. F.	Ethical challenges and pedagogical innovations: artificial intelligence in contemporary education.	2024	Article in a journal
CARDOSO, A. F.; PIRES, D. A. T.	The perception and use of artificial intelligence in education by teachers and students in the interior of Goiás.	2024	Article in a journal
PINHEIRO, W. S.; VALENTE, E. A. T.	Artificial intelligence in education: between technological innovation and ethical challenge.	2024	Article in a journal
SANTOS, S. M. A. V. (org.)	Education 4.0: management, inclusion and technology in the construction of innovative curricula.	2024	Book Organizer
SANTOS, S. M. A. V. (org.)	Education in the XXI century: interdisciplinary and technological approaches.	2024	Book Organizer
SANTOS, S. M. A. V. (org.)	Integral inclusion: contemporary challenges in education and society.	2024	Book Organizer
MOSER, G.; BACK, S. N. B.; ASSUMPÇÃO, J. J.	Didactic-pedagogical experiences: a debate on the use of artificial intelligence in course completion papers.	2024	Article in a journal
SANTOS, S. M. A. V.; FRANQUEIRA, A. S. (orgs.)	Media and technology in the curriculum: innovative strategies for contemporary teacher training.	2024	Book Organizer

Source: The Authors

This table offers an organized view of the main sources that underlie the research, allowing a critical analysis of the selected publications to understand the different aspects of the use of artificial intelligence in the educational context. From this selection, the necessary data were extracted for the analysis of the impact of AI on pedagogical practice and its implications for education.

RESULTS OBTAINED IN THE USE OF AI AS A SUPPORT IN EDUCATION

The use of artificial intelligence as a support in education has generated a series of studies that indicate positive effects on student performance and the improvement of pedagogical practices. AI has been pointed out as a tool to personalize learning, adjusting content according to the needs of each student, which contributes to focused and efficient development. According to Nascimento (2023, p. 788), "artificial intelligence, when applied in the educational context, offers a personalization in teaching that would not be possible to achieve only by traditional methods, promoting an increase in student performance by adapting the pace and content according to their individual needs". The relevance of AI in adapting the teaching process is highlighted, allowing the student to advance according to their own ability, which contributes to learning and better use of the content.

In addition, the use of AI also has a direct impact on the pedagogical practice of teachers, by enabling the automation of repetitive tasks, such as correcting tests and monitoring student performance, which allows teachers to focus time on creative and interactive pedagogical activities. According to Araújo and Silva (2022, p. 203), "AI in the educational environment has been recognized for its ability to relieve teachers of bureaucratic tasks, allowing them to dedicate themselves to the interactive and formative part of the educational process". It is evident how technology can be used to improve teachers' time management, making them focused on learning mediation, while AI-based platforms take care of administrative tasks.

Another relevant study is that of Pinheiro and Valente (2024), who argue how AI tools positively impact student performance by providing a personalized and continuous approach to learning. They state that "AI systems are able to monitor students' progress on an ongoing basis, adjusting content dynamically and providing constant monitoring, which results in a significant increase in academic performance" (Pinheiro & Valente, 2024, p. 1257). The argument shows how AI can act as a constant monitoring tool, allowing teachers to closely monitor student progress and adjust their pedagogical approaches according to individual progress.

Therefore, the results observed in the use of AI in education reveal positive effects both on student performance and on the improvement of teachers' pedagogical practices. The personalization of teaching, the automation of administrative processes, and the ability to continuously monitor are factors that contribute to the effectiveness of teaching and the optimization of educators' time. With this, AI proves to be not only a support tool, but a resource that transforms educational dynamics, providing benefits for both students and teachers.

CHALLENGES AND LIMITATIONS IN THE USE OF AI IN EDUCATION

The implementation of artificial intelligence in schools faces several challenges, both technological and pedagogical, that hinder the full adoption of this technology in the educational environment. One of the main obstacles is the resistance to change, observed both among teachers and in school administration. Araújo and Lopes (2020, p. 88) highlight that "many teachers show resistance to the adoption of new technologies, either due to lack of confidence in the tools, or due to the work overload that the implementation of new practices can generate". This argument reflects the reality of many educational institutions, where skepticism about the effectiveness of AI and fears of a disruptive change in traditional teaching methods result in a significant barrier to the implementation of technologies. Teacher resistance is often related to a lack of proper training, which leads to suboptimal use of AI tools.

The lack of training of educators is, therefore, another important challenge. The implementation of AI in education requires teachers to possess not only technical skills but also an understanding of how to integrate these tools into the pedagogical process. According to Araújo and Silva (2022, p. 203), "the continuous training of teachers is essential to ensure that technologies are integrated efficiently, allowing educators to use AI as a tool to support teaching, and not as a replacement for pedagogical practice". It is evident that there is a need for training programs that help teachers become familiar with the new tools and adapt them to their teaching methods. Without this preparation, AI adoption tends to be limited and ineffective, compromising the benefits that these technologies could offer.

In addition to issues related to resistance and lack of training, the adoption of AI in schools also faces technological and pedagogical limitations. Technological limitations refer to the infrastructure required for AI implementation, such as the availability of computers, high-quality internet access, and the appropriate technical support. Menta and Brito (2024, p. 2325) state that "the implementation of AI in schools depends on a technological

infrastructure, without which AI tools cannot be applied efficiently, which limits their impact on the teaching-learning process". The idea that the lack of adequate technological resources prevents the use of AI is reinforced, creating a disparity in access to technologies, especially in regions with less infrastructure.

On the other hand, pedagogical limitations involve the need to rethink the traditional teaching approach to incorporate technological tools in a meaningful way. As Nascimento (2023, p. 785) observes, "the integration of AI into the pedagogical process requires a reconfiguration of traditional teaching practices, which can be a challenge, as it involves changing both the way teachers teach and the way students learn". This reflection addresses the challenge of aligning technology with pedagogical methodologies, a process that requires time, planning, and continuous adjustments. Adapting to the new teaching model, which mixes technology and pedagogy, is essential to ensure that AI is a support tool and not an obstacle to learning.

Thus, the challenges in the use of AI in education are multiple and involve both issues of resistance to change and lack of teacher training and technological and pedagogical limitations. Overcoming these obstacles requires a collective effort from educational institutions, teachers, managers, and students, so that AI is used in an efficient and integrative way, contributing positively to the teaching-learning process.

THE FUTURE OF AI IN EDUCATION: TOOL OR SUBSTITUTE?

The future of artificial intelligence in education raises a debate about its function as a support tool or as a replacement for traditional teaching methods. As technology advances, questions arise about how AI will be integrated into the educational process and to what extent it will replace the role of the teacher and other conventional forms of teaching. Araújo and Silva (2022) highlight that AI is not just a support tool, but a possibility to transform the very nature of teaching, with the ability to adjust the content, pace, and interaction with students in a way that, in the near future, teachers may find themselves in a position focused on learning mediation rather than direct instruction. Thus, they suggest that AI can significantly change the way of teaching, transforming educators from direct instructors into facilitators of the learning process, while AI takes on responsibilities, such as adapting content according to the student's progress.

While AI offers considerable benefits, such as personalizing learning and automating processes, concerns arise that over-reliance on this technology could lead to the replacement of fundamental pedagogical practices. Menta and Brito (2024, p. 2325) argue that

> while AI is a powerful tool to support teaching, it cannot replace the human interaction that is essential in the educational process. The ideal future would be an integration of AI with the pedagogical experience of educators, where technology complements teaching, but does not replace the figure of the teacher".

This reflection points to the risk of replacing human interaction in the learning process, emphasizing the importance of maintaining the balance between the use of technologies and the fundamental role of educators.

On the other hand, some forecasts indicate that AI may still play a central role in education, especially in distance learning contexts or in areas with a lack of qualified human resources. According to Pinheiro and Valente (2024, p. 1258), "with the growth in the use of AI in adaptive teaching systems and online learning platforms, AI technologies can be expected to play an active role, adjusting content according to the needs of each student and, in some cases, replacing the role of the teacher in environments where the shortage of educators is a challenge". In this way, in specific contexts, such as remote areas or in situations of shortage of human resources, AI can become a practical alternative to provide quality education, partially replacing the role of the teacher.

Based on these perspectives, the future of AI in education seems to be moving towards gradual integration, where technology will complement traditional teaching rather than replace it completely. However, the success of this integration will depend on how AI is used strategically, maintaining the role of educators as facilitators of learning and ensuring that technology does not replace human interactions that are essential for students' social and emotional development. The challenge will be to find a balance between the use of emerging technologies and the preservation of the human aspects of teaching.

FINAL CONSIDERATIONS

The use of artificial intelligence (AI) in education has been consolidated as a tool with great potential to transform teaching-learning processes. The research sought to answer the central question of whether AI is configured as a support tool or as a substitute for traditional teaching methodologies. The results suggest that AI is, in fact, a support tool in teaching, with the ability to personalize learning, improve administrative and pedagogical efficiency, and provide greater autonomy to students. The personalization of teaching through adaptive systems, for example, allows the content to be adjusted to the pace and level of learning of each student, which enhances academic performance and favors learning.

However, the implementation of AI also raises significant challenges, such as resistance to change by educators, lack of adequate training, and technological limitations

in educational institutions. These barriers need to be overcome in order for AI to be integrated into the educational process in a productive way. While AI has proven to be a powerful support tool, there is no clear indication that it will replace educators in their role as learning mediators. The relationship between teachers and students, essential for the development of socio-emotional skills and for the construction of a humanized education, remains irreplaceable.

The contributions of this study focus on the analysis of the role of AI in education, highlighting its benefits and limitations within the current educational context. The research emphasizes the importance of a balanced approach, where technology complements the work of educators without replacing pedagogical practices that involve human interaction. AI should be seen as an ally in improving teaching, providing personalization and efficiency, but not as a substitute for traditional teaching and the pedagogical experience of teachers.

It is important to highlight that, despite advances in the application of AI in education, there are still gaps that need to be investigated in depth. There is a need for studies to evaluate the effectiveness of AI in different educational contexts, considering the diverse realities of schools and different student profiles. In addition, it is essential to investigate the impact of AI on students' social and emotional skills, as the excessive use of technologies can affect the interaction between students and educators. Continuing education for teachers should also be a field of study, so that they can integrate AI tools into their pedagogical practice.

Thus, although the research has revealed that AI, for the most part, works as a support tool in education, the debate about its role in the future of teaching is still open. The combination of technology and traditional pedagogical practices seems to be the promising path, and further studies are needed to keep up with the evolution of technology and its implications in education.

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