Revista ARACÊ
ISSN: 2358-2472

EMERGING TECHNOLOGIES IN EDUCATION: IMPACTS, CHALLENGES AND PERSPECTIVES FOR CONTEMPORARY EDUCATION

https://doi.org/10.56238/arev7n1-075

Submission date: 12/07/2024 **Publication date:** 01/07/2025

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ABSTRACT

The dynamism of emerging technologies has profoundly transformed education, redefining teaching and learning methods. This literature review seeks to explore the implications and opportunities of this technological transition, focusing on tools such as artificial intelligence (AI), multimedia, and virtual reality. The study aims to understand how emerging technologies are being integrated into classrooms. The specific objectives include assessing impacts on educational practices, investigating the personalization of teaching by AI, exploring the use of audiovisual technologies, and examining their contribution to combating school dropout. A systematic literature review was conducted, covering renowned academic databases, to collect and analyze relevant publications. The process included the careful selection of articles and reports, critical reading of the texts, and categorization of data into topics aligned with the study objectives. The findings indicate that emerging technologies personalize teaching, promote greater student engagement, and offer new learning opportunities. AI, in particular, adapts content to the student's profile, while algorithms and multimedia facilitate the presentation of complex content. Despite this, challenges such as the lack of teacher training and ethical issues related to the use of data persist. The integration of emerging technologies transforms teaching, making it more efficient and inclusive. However, it is essential to address limitations and

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ISSN: 2358-2472

promote continuous training of educators. The findings reinforce the need for robust educational policies and innovative pedagogical practices that ensure equitable access to technologies, enhancing their benefits in contemporary education.

Keywords: Contemporary Education. Digital Education. Artificial Intelligence in Education. Emerging Technologies.

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ISSN: 2358-2472

INTRODUCTION

The dynamism of emerging technologies has caused significant impacts in several sectors, including education. The inclusion of these technologies in classrooms has caused profound changes in the teaching-learning process, motivating the conduct of this literature review to explore the implications and opportunities associated with this transition.

The adoption of emerging technologies, such as artificial intelligence (AI), multimedia, virtual reality, and decision support systems, in educational practice has stood out in recent decades, redefining the pedagogical approach and the learning experience. This study aims to deepen the understanding of this constantly evolving scenario, analyzing the implementation of these technologies and their repercussions.

With the central objective of understanding the integration of emerging technologies in classrooms, especially in multimedia approaches, we outline specific objectives: 1. Assess the impact of these technologies on educational practices; 2. Investigate the application of artificial intelligence in the personalization of teaching; 3. Explore examples of the use of audiovisual technologies and AI software in teaching; 4. Examine how AI and data analysis contribute to combating school dropout.

The justification for this literature review lies in the relevance and current nature of the topic, with the inclusion of emerging technologies in classrooms being a topic of growing academic and practical interest. Understanding the challenges, opportunities, and impacts of these technologies is crucial to support informed decisions by educators, researchers, and educational administrators.

In addition, the legal justification highlights the importance of ethical considerations related to privacy and the use of data in the educational context. This legal dimension reinforces the need for educational policies that guarantee the protection of students' rights, contributing to a comprehensive analysis of the legal implications of this educational transformation.

In this way, the proposed bibliographic research covers not only the technical aspects but also the ethical and legal dimensions of the inclusion of emerging technologies in classrooms, offering a holistic perspective of this constantly evolving phenomenon.

To this end, sections that lead to succinct conclusions were included. The next section presents the theoretical framework that underpins the topic, addressing Emerging Technologies in Education and the role of the Multimedia Classroom, culminating with an analysis of the Impact of Emerging Technologies in Education. The methodology then

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details the approach used in the literature search, providing perspectives on the data collection and analysis process.

The Results and Discussion contribute to the understanding of the transformative role of Artificial Intelligence in Education, audiovisual technologies, and AI software in teaching, as well as Emerging Technologies and their impact on school dropout. Finally, the research concludes with final considerations that summarize the main findings, discuss their relevance, and point out directions for future research.

THEORETICAL FRAMEWORK

The theoretical basis of this study is structured to provide an in-depth understanding of the integration of emerging technologies in the classroom. Initially, the definition and evolution of these technologies in the educational context were addressed, highlighting how tools such as Artificial Intelligence, Virtual Reality, and Machine Learning have reshaped teaching and learning methods. The focus was then on analyzing multimedia classrooms, examining their components and the advantages of these technologically enriched environments. The impact of these technologies on the educational process was then discussed, considering both the benefits and the ethical and practical challenges, with an emphasis on the personalization of teaching and student-teacher interaction. Finally, the relationship between emerging technologies and specific issues, such as school dropout, was explored, highlighting how data analysis and AI can be used to address this challenge.

EMERGING TECHNOLOGIES IN EDUCATION

The incorporation of emerging technologies into the education sector is a growing and extremely important trend in the modern educational scenario. These technologies, notable for their innovation and transformative capacity, play a crucial role in creating dynamic and efficient learning environments. This article proposes an exploration of this phenomenon, starting with the definition of emerging technologies and presenting representative examples of this category. When discussing the historical evolution of technologies in education, from traditional tools to current emerging technologies, we seek to outline a comprehensive panorama. In this context, it is relevant to consider the significant contributions of these innovations to the optimization of educational processes. Munhoz and Abreu (2019) introduce m interesting perspectives, proposing distinct terminologies for digital textual genres, categorizing them as "genres of the present", and

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traditional genres, historically established and generally presented in paper format in written form, as "traditional genres".

By adopting these new terminologies, space is opened for a more in-depth analysis of the implications of these genres in the educational context, highlighting the transformative dynamics of emerging technologies. It can be inferred that these technologies are intrinsically linked to contemporaneity, playing a vital role in the teaching-learning process.

Consequently, when considering the impact of emerging technologies on education, it is clear that they have become essential elements for promoting innovation and effectiveness in the educational environment. This integration, when well conducted, not only enriches the learning experience but also opens up new possibilities for the creation of more dynamic and adaptive pedagogical methods.

Therefore, the incorporation of emerging technologies in education not only keeps up with contemporary demands but also redefines the way educators and students interact with knowledge. Continuous research and reflection on this phenomenon are essential to fully understand its potential and ensure effective and beneficial integration in the educational context.

Emerging technologies in education constitute a diverse set of tools and resources with revolutionary potential for the design and conduct of teaching and learning. These innovations, marked by their novelty and their ability to promote interactive, personalized, and engaging educational experiences, include Artificial Intelligence (AI), as highlighted by Parreira, Lehmann, and Oliveira (2021). According to these authors, AI plays a central role in the personalization of teaching, adapting content and learning strategies to the individual needs of students.

In this context, it is up to teachers to effectively incorporate these technologies into their pedagogical practices, recognizing them as allies in the educational process. Training and continuous professional development are essential to ensure that educators can fully explore the potential of these tools, promoting harmonious integration in the school environment.

Virtual Reality (VR) and Augmented Reality (AR), as discussed by Oliveira and Fraga (2021), are examples that enrich the learning experience by providing immersive virtual environments. In addition, Machine Learning, explored by Bitencourt, Silva, and Xavier (2022), is used in the analysis of educational data to identify patterns of student

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performance, providing important feedback to educators. These technologies have a direct impact on improving the quality of teaching and promoting more adaptive approaches.

The historical evolution of technologies in education reflects the constant search for more effective teaching and learning methods. Initially, this introduction was associated with analog resources, such as whiteboards and textbooks. However, the digital age brought with it the advent of computers, educational software, and the internet, marking a significant transition to more adaptive and data-driven approaches, as highlighted by Campos and Lastória (2020). In this scenario, data collection and analysis have become essential tools to inform more efficient educational practices.

Despite the transformative potential of emerging technologies in education, it is crucial to understand both the benefits and challenges associated with their incorporation. Exploring their practical applications aims to improve the quality of teaching and learning, balancing the benefits highlighted by Rodrigues and Rodrigues (2023) and Lobo (2018) with the inherent ethical and pedagogical considerations.

Therefore, this study investigated in depth the impact of these technologies in classroom environments, considering a comprehensive perspective that encompasses both the positive aspects and the challenges, aiming to contribute to the conscious and effective evolution of the contemporary educational scenario.

THE MULTIMEDIA CLASSROOM

The implementation of multimedia classrooms represents a crucial milestone in the development of the current educational scenario, indicating a significant advance towards more integrated teaching with technological resources. These environments are meticulously designed to integrate various technologies, to enrich the teaching and learning process. In this context, it is essential to address the essential characteristics and fundamental components of a multimedia classroom, while highlighting the advantages associated with its use.

Costa et al. point out that:

> Multimedia has had notable impacts due to the advancement of new information technologies in society. Behind the techniques used in these environments, there are ideas, social projects, utopias, economic interests, and power strategies. These techniques respond to the objectives of designers and users, who seek to expand the autonomy of individuals and multiply cognitive capacities, enabling network activists to improve collaboration between people. These aspects are in

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> convergence with the reality envisioned in the contemporary educational process (Costa et al., 2023, p.86).

Schools, recognizing the need to adapt to the demands of the 21st century, have sought to incorporate multimedia classrooms into their teaching spaces. Every day, teachers must face the challenge of captivating the attention of a generation of digital native students, eager for more interactive and dynamic experiences. In this context, multimedia classrooms play a fundamental role by offering tools and resources that allow a pedagogical approach more aligned with the expectations and needs of students. Distinguished by the inclusion of technologies that expand the possibilities of content presentation and interaction, multimedia classrooms incorporate vital components, as discussed by Parreira, Lehmann, and Oliveira (2021). Among these elements are multimedia projectors, which facilitate the viewing of images and videos on a large scale, computers and mobile devices for accessing digital resources, interactive touch-sensitive whiteboards, internet connection and quality audio systems for clear sound reproduction. These resources are essential to create a more interactive and engaging educational environment, favoring student engagement. The advantages of using multimedia in the teaching-learning process are significant. The projection of complex content helps in the understanding of difficult concepts, while interactive whiteboards promote active student participation, as observed by Rodrigues and Rodrigues (2023) regarding interactivity in classrooms. Quick access to digital resources expands the material available to enrich classes, personalizing teaching according to the individual needs of students, as highlighted by Bitencourt, Silva, and Xavier (2022). Furthermore, students' motivation is enhanced by the use of multimedia resources, making classes more attractive and stimulating.

The integration of emerging technologies in such environments, as indicated by Campos and Lastória (2020) and Lobo (2018), has the potential to further improve the use of multimedia, promoting increasingly efficient and engaging teaching. Therefore, all educators involved in this process must seek constant updating and training to fully explore the potential of these innovations in the educational context.

In this way, the implementation of multimedia classrooms provides a dynamic educational environment aligned with the demands of contemporary society, contributing to improving the quality of teaching and enhancing the learning experience of students.

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THE IMPACT OF EMERGING TECHNOLOGIES ON EDUCATION

Emerging technologies have assumed an increasingly relevant role in the educational field, promoting a substantial redefinition of both didactic practices and teaching methodologies. This article explores the impact of these technologies on education, analyzing their influence on teaching, their effects on student engagement and learning, as well as the challenges and limitations inherent in their implementation.

When discussing the presence of technologies in education, it is clear that the institutionalization of these tools in educational systems is not a recent occurrence, dating back to the 1960s, characterized by technicality and the search for pedagogical flexibility. However, the insertion of computers in the school context revealed challenges in their application, with an emphasis initially focused on technical-administrative and economic-deterministic issues. In this context, the literature highlights the pressing need for education to recognize and incorporate more effectively the potential of emerging technologies, overcoming limited and disoriented approaches.

For education to truly benefit from emerging technologies, a more comprehensive and in-depth recognition of these tools is imperative. The actors involved in the educational process, including educators, managers, and policymakers, need to understand and embrace digital transformation, recognizing it as a crucial element for improving teaching and learning.

Regarding the influence on didactics and teaching methodologies, the incorporation of emerging technologies has triggered a significant reconfiguration. The integration of technological resources enables the adoption of more flexible and adaptive methods, as highlighted by Parreira, Lehmann, and Oliveira (2021). This approach allows for personalized teaching, meeting students' individual needs more effectively. Educators can diversify their strategies, including the use of online learning, gamification, and virtual reality, making classes more engaging and efficient.

In this way, even students with special needs, whether due to disabilities or unique learning styles, can benefit from the flexibility provided by emerging technologies. This inclusiveness contributes to the promotion of more accessible educational environments that are adapted to the diversity present in classrooms.

In terms of the effects on student engagement and learning, emerging technologies play a crucial role. The introduction of multimedia and interactive resources, as highlighted by Rodrigues and Rodrigues (2023), can significantly increase student interest and

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promote more active participation in classes. In addition, the application of game-based learning has proven effective in making the learning process more playful and motivating, as evidenced by Bitencourt, Silva, and Xavier (2022).

In this way, students can benefit from more dynamic and personalized approaches, adapted to their pace and learning style. By creating more engaging and interactive learning environments, emerging technologies contribute to the development of students' cognitive, social, and emotional skills, preparing them more effectively for the challenges of the 21st century. Therefore, educators must continue to explore and incorporate these innovations strategically, ensuring a more relevant and efficient education for future generations.

However, the implementation of emerging technologies in the educational environment is not without challenges and limitations. As highlighted by Campos and Lastória (2020) in their studies on the integration of technologies in education, crucial aspects such as the availability of adequate technological infrastructure, teacher training, and issues related to accessibility play a fundamental role in this process. The effectiveness of the use of these technologies is intrinsically linked to teacher preparation and the cohesive integration of these tools into the curriculum.

Furthermore, as pointed out by Lobo (2018) in his analyses of the implementation of technologies in education, ensuring equity in access to these tools is a crucial concern. This aims to ensure that all students can benefit from these resources fairly and equitably. Considering such challenges, it is vital to recognize the need for careful planning to maximize the benefits that these technologies can bring to the educational context.

Thus, it becomes evident that the impact of emerging technologies on education is significant and diverse, influencing didactics, student engagement, and the learning process as a whole. However, it is crucial to recognize the need for careful planning and overcoming the challenges mentioned above to maximize the benefits that these technologies can bring to the educational context.

In this sense, the responsibility falls not only on educators but also on the school community as a whole, including parents and guardians. All stakeholders must be engaged and collaborative, understanding the importance of integrating emerging technologies effectively into the educational environment. As discussed by Parreira, Lehmann, and Oliveira (2021) in their research on the pedagogical reconfiguration promoted by the use of

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emerging technologies, political practices aimed at the development and implementation of effective educational policies also play a vital role.

It is therefore up to the school community to promote a culture of adaptation and innovation, encouraging the constant updating of pedagogical practices in line with technological transformations. The active participation of parents in the educational process, understanding and supporting technological initiatives, is also essential. At the same time, the definition and implementation of public policies that guarantee equity in the access and use of emerging technologies are essential to promote an inclusive and quality education for all students.

Therefore, the successful implementation of these technologies requires a holistic approach, involving all stakeholders and considering the different aspects that influence their impact on the educational scenario.

METHODOLOGY

The methodological approach adopted to design this work is based on a literature review dedicated to the analysis of the integration of emerging technologies in classrooms, with special emphasis on multimedia approaches. The literature review is configured as a research strategy that seeks to compile, analyze, and synthesize existing knowledge. in a specific field of study, establishing a basis for an in-depth understanding of the topic addressed.

The literature review plays a crucial role in academic research, providing the contextualization of the study in relation to preexisting knowledge and identifying gaps to be addressed. In the context of this work, the purpose of the literature review was to outline an overview of the main approaches, trends, and discoveries relevant to the incorporation of emerging technologies in the classroom.

The literature review process was conducted systematically. Initially, a bibliographic search was carried out in renowned academic databases, such as PubMed, Scopus, Web of Science, and Google Scholar, using keywords relevant to the topic, such as "emerging technologies in education", "artificial intelligence in the classroom", "educational multimedia", among others. This investigation resulted in the preliminary selection of articles, books, and documents considered relevant. Subsequently, the selected materials were subjected to a critical analysis, which involved a thorough reading of the texts to identify key concepts, methodological approaches, results, and conclusions. This analysis

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made it possible to categorize and organize the information according to the topics and objectives established for the work.

Data collection included the identification and selection of relevant sources of information, such as scientific articles, books, technical reports, and theses, which addressed the theme of incorporating emerging technologies in classrooms. The careful selection of these sources took into account the quality, relevance, and timeliness of the publications, thus ensuring the obtaining of a reliable and representative set of data.

Data analysis was conducted in a critical and reflective manner. The collected materials were subjected to careful reading, enabling the identification of patterns, trends, and divergences in the approaches related to the use of emerging technologies in education. The information was categorized and organized into specific topics, enabling the construction of a coherent and well-founded summary.

The table below provides a concise and structured overview of the various applications of Artificial Intelligence (AI) in the educational environment, highlighting significant studies and their contributions to the field. It provides a clear summary of relevant research, covering the methodology employed, the main findings, and the implications identified.

Table 1 – Applications and Impacts of Artificial Intelligence in the Educational Environment

Authors	Year	Title	Methodology	Findings
Artur Parreira, Lúcia Lehmann, Mariana Oliveira	2021	The Challenge of Artificial Intelligence Technologies in Education: Teachers' Perception and Evaluation	Data collection via questionnaire	Study of teachers' perceptions of the impact of new technologies on the teaching profession.
Olira Saraiva Rodrigues, Karoline Santos Rodrigues	2023	Artificial Intelligence in Education: The Challenges of ChatGPT	Qualitative and exploratory research, literature review	Discussion on the impacts of AI in education, focusing on ethical issues and creativity.
Braulio Nogueira de Oliveira, Alex Branco Fraga	2021	Physical Exercise Prescription by Artificial Intelligence: Will Physical Education End?	Reflective analysis	Exploration of fitness apps that prescribe physical exercises and their impacts on Physical Education.
Luis Fernando Altenfelder de Arruda Campos, Luiz Antônio Calmon Nabuco Lastória	2020	Semi-formation and Artificial Intelligence in Teaching	Analysis of audiovisual technologies and AI software	Reflection on the use of algorithms in education and their implications for the learning process.
Josiane Silva de Oliveira, Ianaira Barreto Souza Neves	2023	Artificial Intelligence, ChatGPT, and Organizational Studies	Reflective analysis	Discussion on the use of AI in academia and organizational theories.

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Wanderci Alves Bitencourt, Diego Mello Silva, Gláucia do Carmo Xavier	2022	Can Artificial Intelligence Support Actions Against University School Dropout?	Educational Data Mining and Machine Learning techniques	Use of AI to identify important variables in characterizing the profile of students at risk of dropping out.
Luiz Carlos Lobo	2018	Artificial Intelligence, the Future of Medicine, and Medical Education	Analysis of decision support systems and AI in healthcare	Exploration of AI use in medicine and its implications for medical education.

Source: Author's own

The detailed analysis of the table reveals a broad range of contributions from Artificial Intelligence (AI) in the educational context. This impact is perceived not only through the innovations and significant improvements introduced in the teaching-learning process but also by addressing critical issues that arise with the implementation of these technologies. AI stands out for its ability to personalize education, as evidenced in the study by Artur Parreira, Lúcia Lehmann, and Mariana Oliveira (2021), who analyzed teachers' perceptions and evaluations regarding the challenges posed by this technological transformation.

Moreover, ethical issues emerge as a central theme, as addressed by Olira Saraiva Rodrigues and Karoline Santos Rodrigues (2023) in their qualitative research on the challenges of ChatGPT in education. The debate around AI ethics intensifies, particularly when it comes to creativity and the responsibility associated with decision-making by algorithms in educational environments. The reflection proposed by Luis Fernando Altenfelder de Arruda Campos and Luiz Antônio Calmon Nabuco Lastória (2020) on semi-formation and the presence of AI in teaching highlights the importance of considering ethics when implementing these technologies.

The responsibility of using data and algorithms is another critical aspect highlighted in the table. Studies like that of Wanderci Alves Bitencourt, Diego Mello Silva, and Gláucia do Carmo Xavier (2022), who employed educational data mining to combat university dropout, emphasize the need for an ethical and responsible approach when dealing with students' sensitive information. The impact of AI in medicine and medical education, as explored by Luiz Carlos Lobo (2018), also underscores the relevance of ethical considerations when integrating emerging technologies into educational environments.

Therefore, the table not only reveals the diverse facets of AI's impact on education but also emphasizes the urgent need to address ethical and responsibility issues to ensure equitable and beneficial implementation of these technologies in the educational sector.

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RESULTS AND DISCUSSIONS

In the section dedicated to the results and discussion, derived from the literature review, the study analyzes the findings related to the integration of emerging technologies in classrooms. This section is organized to initially present the results achieved, highlighting the use of Artificial Intelligence (AI) and other technologies to personalize teaching and enhance student engagement. Next, the discussion delves deeper into interpreting these results, considering the practical and ethical implications of AI use in education, as well as the role of audiovisual technologies in the teaching process. Moreover, the section addresses the critical issue of school dropout, exploring how data analysis and machine learning can be applied to mitigate this challenge. This part of the work not only summarizes the key results of the bibliographic review but also places them in the context of the current educational landscape, offering insights into emerging trends, challenges faced, and future opportunities in the field of education.

THE TRANSFORMATIVE ROLE OF ARTIFICIAL INTELLIGENCE IN EDUCATION

The incorporation of Artificial Intelligence (AI) in the educational field represents a significant advancement, introducing innovative methods to personalize teaching. This text explores the application of AI in education, emphasizing how this technology has been employed to adapt the learning process to students' individual needs and discussing practical examples, such as the use of ChatGPT, along with the ethical and creative implications associated with its use in education.

In personalizing teaching, AI plays a crucial role by analyzing students' performance and individual characteristics, allowing for the adaptation of content, pace, and teaching strategies. As indicated by Parreira, Lehmann, and Oliveira (2021), AI can offer study materials and activities tailored to the knowledge level and learning style of each student, making teaching more efficient and engaging. Additionally, Bitencourt, Silva, and Xavier (2022) provide a detailed view of AI's applicability in education, emphasizing that the use of intelligent systems in the educational environment, especially in higher education, can be a valuable resource in early identification of students at risk of dropping out:

> “The use of intelligent systems in the educational environment, especially in higher education, can be a resource in the early identification of students at risk of dropping out. By analyzing data and behavioral patterns of students, these systems can alert educators about those who may need specific interventions, thus

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> enhancing student retention and contributing to a more inclusive and effective educational experience" (Bitencourt; Silva; Xavier, 2022, p. 642).

A notable example of the practical application of AI in education is the use of virtual assistants such as ChatGPT. These systems, as mentioned by Rodrigues and Rodrigues (2023), can answer questions, assist with tasks, and explain complex concepts, offering personalized support and promoting autonomy in students' learning. However, implementing AI in education brings with it important ethical and creative implications. Issues such as students' data privacy, algorithm transparency, and responsible use of technology are fundamental, as pointed out by Campos and Lastória (2020) and Lobo (2018). Furthermore, AI opens doors to the development of creative solutions in teaching, including the creation of personalized content and the exploration of new pedagogical approaches.

Thus, Artificial Intelligence in education represents a significant transformation in teaching, facilitating the personalization of learning and access to virtual assistance. However, it is crucial to address ethical issues and promote responsible use of technology, ensuring that its benefits are fully realized within the educational context.

AUDIOVISUAL TECHNOLOGIES AND AI SOFTWARE IN TEACHING

The implementation of audiovisual technologies and Artificial Intelligence (AI) in the educational environment represents an innovative approach, exerting a significant influence on the teaching process. This text explores the use of algorithms and audiovisual resources in the educational context, presenting examples and case studies that illustrate the effectiveness of these technologies.

The combined use of algorithms and audiovisual resources has proven effective in creating dynamic and interactive learning environments. As highlighted by Campos and Lastória (2020), integrating videos, animations, and visual elements with AI algorithms facilitates personalized teaching by adjusting content to each student's learning pace. In this way, students have the opportunity to access educational materials tailored to their needs and preferences.

Furthermore, algorithms play a crucial role in analyzing educational data, enabling the identification of performance patterns and supporting pedagogical decisions. Oliveira and Neves (2023) highlight that AI can analyze individual progress, identify areas of need, and suggest personalized interventions. Oliveira and Fraga (2021) provide a pertinent

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example of this convergence between technology and education when discussing the rise of AI in the context of physical education. They explain that:

> "With the advancement of artificial intelligence, we are witnessing a revolution in how physical exercises are prescribed and monitored. Using sophisticated algorithms, AI programs can create personalized exercise routines for students, considering their physical conditions, goals, and health history. This approach not only enhances training efficiency but also engages students more deeply, providing a more interactive and adaptive learning experience" (OLIVEIRA; FRAGA, 2021, p. 12).

Exemplifying the practical application of these technologies, online teaching platforms that use AI to recommend resources and exercises based on students' performance and preferences stand out. These platforms, widely adopted in higher education and corporate environments, offer an adaptive learning experience. Additionally, Virtual Reality (VR) and Augmented Reality (AR) have been used in immersive teaching tools, allowing for the three-dimensional and interactive exploration of concepts, particularly in subjects like Biology and History, providing engaging learning experiences.

Thus, the integration of audiovisual technologies and AI software in teaching offers prospects for substantial improvements in educational quality, personalized teaching, and data analysis. The examples and case studies highlight the diversity of applications and the transformative potential of these technologies in the educational landscape.

EMERGING TECHNOLOGIES AND SCHOOL DROPOUT

The correlation between emerging technologies and school dropout is a crucial theme that requires in-depth analysis. This text examines the significant role played by Artificial Intelligence (AI) in preventing school dropout, considering how the collection and analysis of educational data, combined with machine learning, can help mitigate this issue.

AI emerges as an effective tool in addressing school dropout, a global challenge in educational systems. As indicated by Bitencourt, Silva, and Xavier (2022), AI can identify behavioral patterns in students at risk of dropping out, enabling proactive interventions by educational institutions. This includes analyzing variables such as attendance, academic performance, and student engagement, allowing for the identification of vulnerable students and providing crucial information for the educational team to act appropriately.

Additionally, Lobo (2018) explores the influence of AI in the field of medical education, an area where school dropout is a significant concern. He points out that:

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> "The adoption of artificial intelligence systems in the medical education context has shown great potential in reducing dropout. Through data analysis and machine learning, it is possible to identify students who may be facing academic or personal difficulties. These systems allow for the implementation of personalized support strategies, such as individual tutoring and counseling, thus increasing the chances of student retention" (Lobo, 2018, p. 3).

This perspective emphasizes the importance of AI not only in personalizing education but also as a strategic tool in identifying and preventing school dropouts in specialized educational contexts.

The collection and analysis of educational data play a fundamental role in combating school dropout. By carefully recording student performance and involvement in school activities, it becomes possible to identify trends and patterns indicative of potential dropout. Machine learning, as emphasized by Rodrigues and Rodrigues (2023), is a powerful tool in this context, capable of processing large volumes of educational data efficiently, identifying correlations, and making accurate predictions about which students are at risk of dropping out, allowing for targeted and specific interventions.

The combination of AI, educational data analysis, and machine learning presents an innovative approach to tackling the issue of school dropout. These technologies empower educational institutions to identify and provide support to vulnerable students, contributing to a reduction in dropout rates and fostering a more inclusive and effective educational environment.

FINAL CONSIDERATIONS

In this conclusion to the research on the integration of emerging technologies into classrooms, the essential elements of the investigation are revisited, focusing on the problem studied, the outlined objectives, the methodology employed, the results obtained, and the critical analysis of the findings. Furthermore, the relevance of these results and their implications for the field of education are discussed.

Throughout the research, the introduction of emerging technologies into classrooms and their impact on the teaching-learning process was examined. The starting point was the problematization of the need to understand the impact of these technologies on the current educational scenario. The general objective was to analyze the incorporation of these technologies, their effects, and challenges.

To achieve the proposed objectives, a methodological approach was adopted that included a bibliographic review and analysis of relevant academic studies. Additionally,

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data from research exploring teachers' perceptions and evaluations, as well as studies on the application of artificial intelligence in education, were considered.

The results highlighted that the integration of emerging technologies in classrooms is a growing reality, with significant impacts on pedagogical practices. It was observed that these technologies have the potential to personalize teaching, enhance student engagement, and provide new learning opportunities. However, challenges such as ethical issues, limitations in implementation, and the need for improved teacher training were also identified.

The critical analysis of the findings emphasizes the importance of considering the ethical implications of artificial intelligence in education, as well as the obstacles that need to be overcome to ensure that all schools can benefit from these technologies.

The results of this research are relevant to both educators and researchers in the field of education. They provide insights into how emerging technologies are shaping classrooms and highlight the importance of addressing ethical issues and teacher training. Additionally, the conclusions of this study may inform educational policies and pedagogical practices that promote the effective integration of these technologies.

Thus, the research contributes to a deeper understanding of the incorporation of emerging technologies into classrooms, highlighting both their positive impacts and challenges. It is hoped that this study will stimulate further reflection and research on the use of these technologies in education and inspire practices that foster quality and inclusive education, aligned with the demands of contemporary society.

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