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THE ROLE OF TECHNOLOGIES IN EDUCATION: TRENDS, CHALLENGES AND OPPORTUNITIES

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ABSTRACT

This article addresses the impact of digital technologies on education, highlighting the main trends, challenges, and opportunities that arise with their implementation. The research explores how technological tools have transformed the educational environment, promoting more dynamic, interactive and accessible pedagogical practices. The methodology of bibliographic research is used to analyze relevant studies and articles on the integration of digital technologies in education. The theoretical foundation examines contemporary trends and challenges in education, as well as the integration of digital technologies and innovative methodologies to promote more personalized and flexible learning. The approach offers a holistic and interdisciplinary view of education, emphasizing the importance of reflective teacher training integrated with educational practices. The main results indicate that the integration of digital technologies in education can improve the quality of teaching and promote a more inclusive and adaptable environment. The literature review reveals that, although hybrid education and active methodologies are essential to engage students and prepare them for the challenges of the twenty-first century, the lack of infrastructure and the need for continuous training of educators are still significant challenges. In addition, the integration of technologies must be done critically, considering their social and human

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impacts to avoid perpetuating inequalities. Finally, the article exposes that the combination of digital technologies with innovative methodologies is crucial to transform education, highlighting the importance of strategic planning and community involvement to implement sustainable and effective changes.

Keywords: Digital Technologies. Hybrid Education. Active Methodologies. Teacher Training. Educational Inclusion.

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INTRODUCTION

The advent of digital technologies has profoundly transformed several sectors of society, including education. This article addresses the impact of digital technologies on education, highlighting the main trends, challenges, and opportunities that arise with their implementation. The research explores how technological tools have transformed the educational environment, promoting more dynamic, interactive and accessible pedagogical practices.

The incorporation of technologies in education is an emerging need to prepare students for an increasingly digital and interconnected world. Understanding the trends and challenges of this integration is crucial to develop effective strategies that improve the teaching-learning process and promote digital inclusion. Despite the transformative potential of technologies in education, their implementation faces significant challenges, such as the lack of adequate infrastructure and the need for continuous training of educators. This article seeks to answer the question: how can technologies be effectively integrated in the contemporary educational context?

The overall objective of this study is to analyze the impact of digital technologies on the transformation of education, with an emphasis on emerging trends, challenges faced by educators, and opportunities that arise in this context. Specifically, the article seeks to: identify and explore key technology trends in education, including hybrid education; assess the challenges associated with infrastructure and teacher training for the effective integration of technologies; examine the effects of implementing technologies on educational practice and learning outcomes; and propose strategies to overcome the challenges and maximize the opportunities offered by digital technologies in education.

The importance of this topic lies in understanding how digital technologies are transforming education, a field that directly touches the lives of all of us. Today, we are immersed in an increasingly interconnected global environment, where digital networks play a central role in our daily lives and educational practices. Thus, the way we learn also needs to keep up with this change. Exploring trends such as hybrid education is essential for us to create more engaging and effective learning environments.

However, it is also essential to recognize the challenges, such as the lack of infrastructure and the need to better prepare teachers. By discussing these points, the goal is to ensure that all students, regardless of their conditions, can have access to quality education that is inclusive and capable of preparing them for the challenges of the future.

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Thus, education becomes a true tool for transformation, not only for the individual, but for society as a whole.

METHODOLOGY

The methodological approach adopted was bibliographic research, as outlined by Eco (2010), enabling an in-depth analysis of existing materials, such as books and academic articles. To achieve these objectives, the research uses the methodology of bibliographic research, analyzing relevant studies and articles on digital technology in education. The theoretical foundation highlights the works of authors such as Gadotti (2000), Moran (2013, 2017, 2021, 2022 and 2023), discusses the potentialities and challenges of digital education, while Morin (2017) defends the integration of diverse knowledge for a more complete understanding, the consideration of the multidimensionality of the human being and interdisciplinary collaboration, in addition to a holistic view that includes uncertainties and random phenomena and Nóvoa (1992, 1999 and 2017), highlights that teacher training and the teaching profession are interconnected, emphasizing that quality training requires valuing the profession and must be reflective, promoting autonomy and integration with educational practices and innovations in schools.

The methodological procedures were conducted through a documentary and bibliographic research, focusing on the literature review. Scientific articles found in academic databases such as Web of Science, SciELO and Google Scholar were used. The search was guided by specific keywords related to the integration of technologies in education, which enabled the selection of documents relevant to the theme. To ensure the relevance and quality of the selected material, strict inclusion and exclusion criteria were applied.

After the collection stage, data analysis began, where the information was organized and evaluated in detail. This process included the identification and categorization of the central themes, the comparison of different approaches and the synthesis of the findings, aiming to deepen the understanding of the theme of digital education. From this analysis, it was possible to discuss the effective strategies of technological integration highlighted in the literature. This methodology allowed the construction of a solid theoretical base, which supported the formulation of practical recommendations and pointed out directions for future research in the area.

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THEORETICAL FOUNDATION

The theoretical foundation of this study addresses the educational transformation provided by the integration of digital technologies. This chapter highlights the contribution of authors such as Gadotti (2000) who discusses contemporary trends and challenges in education. The author examines the current state of education, reflecting on the changes and new demands that influence the educational field. It analyzes how education is being impacted by social, cultural, and political transformations, and proposes a discussion on how to address these challenges to promote more effective and inclusive education. The article is known for addressing fundamental questions about educational practice and its implications for the future of education.

Moran (2013, 2017, 2021, 2022 and 2023) is of paramount importance to this article for bringing a solid basis to the discussion presented, the author explores how innovative schools use modern pedagogical practices and emerging technologies to transform the school environment, promoting more personalized and flexible learning. In his works, he discusses the importance of integrating digital technologies, such as gamification and adaptive platforms, to enrich education and create collaborative learning experiences tailored to the individual needs of students. José Moran also highlights that hybrid education and active methodologies are essential to engage students and develop broad competencies, balancing individual and collective learning, while school transformation requires planning and community involvement to implement sustainable changes.

In this sense, Moran (2013) contextualizes that innovative schools are those that explore how modern pedagogical practices and emerging technologies can transform the school environment, promoting more personalized, flexible learning adapted to the needs of students, aiming to better prepare students for the challenges of the century. In addition, the author argues that digital technologies, when innovatively integrated into educational institutions, expand opportunities for flexible, personalized, and collaborative learning, allowing students to learn anywhere and anytime, using resources such as gamification, adaptive platforms, and maker labs to enrich the educational process.

In Moran (2017), he broadens the discussion and presents how schools can become more relevant in a rapidly changing world, exploring the conflict between traditional content-focused approaches and progressive approaches that emphasize competencies, active methodologies, personalization, and projects. It highlights the need to redesign curricula, spaces, and pedagogical practices to engage students and develop broad competencies,

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including the use of active methodologies, hybrid teaching, and digital technologies. School transformation requires planning, whole-community engagement, and a step-by-step approach to implementing meaningful and sustainable change.

In addition, Moran (2021) highlights that hybrid education reflects the contradictions of society, integrating formal and informal learning methods. It involves combining diverse practices and technologies while adapting to the needs of students. Education should also focus on building meaningful life projects, with mentor guidance, balancing individual and collective learning. In this same article, she emphasizes the importance of integrating fundamental values and cognitive and socio-emotional skills in education, experiencing these principles in the curriculum and in the daily practice of innovative schools. The focus is on creating a comprehensive, collaborative, and affective learning environment that motivates students both intrinsically and extrinsicly, connecting education to integral human development.

In another article called "Transformative Education with the support of technologies", Moran (2022) presents welcoming and technologically integrated educational environments, which promote trust, experimentation and personalization, transform education by actively engaging students, using innovative methodologies and digital technologies to create more meaningful, collaborative learning experiences adapted to individual needs.

And finally, Moran (2023) discusses the central idea that education must adapt to the rapid transformations of the world, becoming more flexible, hybrid and digital. The author argues that, for this, distance education needs to go beyond the traditional model, taking advantage of digital technologies to offer greater flexibility and personalization. He highlights that active methodologies and hybrid learning are crucial to create engaging teaching experiences that are tailored to students' needs. In this way, the combination of digital technologies with innovative methodologies is essential to develop both cognitive and socio-emotional skills, promoting an educational environment that supports students' autonomy and effectively integrates different learning spaces and times.

In Morin (2017), the author highlights the importance of integrating knowledge from different areas to overcome disciplinary fragmentation and obtain a more complete understanding of the world. He emphasizes that education must address the multidimensionality of the human being, considering its physical, emotional and social dimensions. In addition, it advocates interdisciplinary collaboration to solve complex problems, recognizing that opposing ideas can coexist and complement each other. In

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addition, it proposes a holistic view of complexity, which includes not only quantitative aspects, but also uncertainties and random phenomena.

Nóvoa (1992, 1999 and 2017) emphasizes the essential relationship between teacher training and the teaching profession. According to him, quality training is not possible if the profession is not properly valued. Likewise, a solid profession requires training that goes beyond the simple knowledge of disciplines and pedagogical techniques. The author believes that continuing education should be a reflective process, starting with a critical analysis of teaching knowledge and integrating it into educational practices. He emphasizes that this training should promote the autonomy of teachers and be aligned with changes and innovations in schools. Thus, it highlights teacher training as a crucial component of educational transformations, helping to shape more effective pedagogical practices that are connected with the reality of educational institutions.

Here is the table with the references and their respective contributions and importance to the theoretical foundation of the article:

Chart 1: Authors of the Theoretical Foundation

Author and Year	Summary	Importance for the Rationale
Gadotti (2000)	Gadotti examines contemporary trends and challenges in education, reflecting on the social, cultural, and political changes that influence the educational field. It proposes strategies to address these challenges and promote more effective and inclusive education.	The work provides a critical view of the transformations in education and proposes reflections on how to adapt it to new demands, essential to understand the current context of educational practice and its challenges.
Moran (2013, 2017, 2021, 2022, 2023)	Moran explores the integration of digital technologies and innovative methodologies to transform the school environment, promoting more personalized and flexible learning. He also discusses the importance of active methodologies and hybrid education to engage students and prepare for challenges of the 21st century.	Moran's research provides a solid basis for discussion on the integration of modern pedagogical technologies and practices, highlighting how these approaches can improve the teaching-learning process and better prepare students for the future.
Morin (2017)	Morin advocates the integration of knowledge from different areas to overcome disciplinary fragmentation and promote a more complete understanding of the world. He highlights the importance of the multidimensionality of the human being and interdisciplinary collaboration.	Morin's work is crucial for the foundation by emphasizing the need for a holistic and interdisciplinary approach in education, helping to contextualize the importance of integrating different areas of knowledge and considering the multiple dimensions of the human being.
Nóvoa (1992, 1999, 2017)	Nóvoa emphasizes the interdependence between teacher training and the teaching profession, arguing that quality training is impossible without valuing the profession and vice versa. It highlights the importance of reflective continuing education, in line with the changes in schools.	Nóvoa's approach is fundamental to understand the relationship between teacher training and professional practice. He highlights the need for training that goes beyond the technical domain, promoting a reflective

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		pedagogical practice aligned with the needs of institutions.

Source: Prepared by the authors.

This table organizes the information clearly and highlights the importance of each author for the theoretical foundation of the article, offering a comprehensive view of the contributions to the field of education.

EXPLORING THE THEORETICAL CONTRIBUTIONS TO THE INTEGRATION OF TECHNOLOGIES AND BLENDED LEARNING IN EDUCATION

The integration of technology into teaching represents a significant shift in the methods we use to transmit and absorb knowledge. Using online learning platforms, augmented reality, and artificial intelligence, technology has established itself as an essential resource in the educational environment. Thus, according to Gadotti (2000) "New technologies have created new spaces of knowledge. Now, in addition to the school, the company, the home space and the social space have also become educational" (Gadotti, 2000, p.07)

One of the most significant trends in the use of technologies in education is the implementation of hybrid education models. "This teaching modality not only reflects the digital transformations in society, but also responds to the demands for more flexible, personalized and adaptable teaching methods to the individual needs of students" (Narciso; Santos, 2024, p. 1890). This flexibility becomes crucial in an increasingly diverse educational landscape, where personalized learning is critical to academic success.

> "Hybrid models are not reduced to mixing face-to-face and digital, but to achieving all possible forms of integration: between people, areas of knowledge, methodologies, forms of evaluation in different spaces, times, and platforms, but always with affection, real, effective, and visible welcome from all and for all" (Moran, 2022, p.3).

This approach combines face-to-face teaching with online learning, allowing students to have greater flexibility and autonomy in their studies. "Hybrid means mixed, blended, *blended*" (Moran, 2021, p. 1).

The personalization of learning, facilitated by digital platforms, allows educators to tailor content to individual student needs, promoting more effective and student-centered learning. In this bias, "This mix between the classroom and virtual environments is

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fundamental to open the school to the world and to bring the world into the school" Moran (2021, p. 10).

In consonance, Narciso and Santos (2024, p. 1895) state that "the idea of personalization is one of the pillars of Blended Learning, as it recognizes the individual differences of students and seeks to adapt teaching to meet these differences efficiently".

To facilitate the understanding of the discussion, here is a table with the authors and their contributions to the discussion on the integration of technology in education, highlighting the relevance to the article and to the educational field:

Table 2: Integration of Technology in Education

Author and Year	Summary	Relevance
Gadotti (2000)	Gadotti argues that new technologies have expanded educational spaces, now including not only the school, but also companies, home and social environments, creating new contexts for learning.	Gadotti provides a historical perspective on how technology has transformed learning environments, underscoring the importance of integrating different educational spaces in the digital age. This insight is essential to understanding the broad impact of technology on education.
Narciso and Santos (2024)	The authors point out that hybrid education not only reflects digital transformations, but also responds to the demand for more flexible and personalized teaching methods. They highlight that personalization is a fundamental pillar of this model, as it recognizes and adapts teaching to the individual differences of students, aiming to meet these variations efficiently.	The contribution of Narciso and Santos is crucial to the article, as it contextualizes the need for hybrid educational models that adjust to digital changes and the individual needs of students, promoting a more adaptable and inclusive approach. The emphasis on personalization, as highlighted by them, reinforces the importance of adapting education to individual student differences, being essential to create a more effective and student-centered learning environment within hybrid models.
Moran (2021)	Moran defines blended learning as the combination of face-to-face and digital methods, emphasizing that this integration must be comprehensive and involve not only different areas of knowledge and methodologies, but also a focus on welcoming and	Moran's definition and comprehensive view of blended learning are essential to the article, as they highlight the need for complete integration between different forms of teaching and technologies, emphasizing the importance of a welcoming and adaptable

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	affection. He points out that this approach allows greater flexibility and autonomy for students, while promoting the connection between the real world and the school environment, bringing the world into the school and taking school knowledge outside of it.	educational environment. Moran clarifies how hybrid models provide flexibility and personalization of teaching, as well as highlighting the importance of connecting education to the real world and students' lives, which is crucial for the effectiveness of hybrid teaching methods.
Moran (2022)	Moran explores how hybrid models are not limited to combining face-to-face and digital, but integrate various aspects of learning, promoting an environment that includes all students with affection and acceptance.	Moran's approach is relevant to understanding how hybrid models should be implemented effectively, ensuring that all students are included and welcomed, and showing the importance of full integration of educational technologies.

Source: Prepared by the authors.

This table summarizes the main ideas of the authors and their importance for the theoretical foundation of the article, emphasizing how each perspective contributes to the understanding and application of modern technologies and methodologies in education.

THE IMPORTANCE OF TECHNOLOGY AS A TOOL FOR INCLUSION IN EDUCATION

A new paradigm of knowledge is emerging from the interconnections between previously separate knowledges and the interaction of human subjectivity with everyday life and the social and cultural context. The increasing complexity of communication and information networks is overcoming disciplinary barriers and creating new ways of understanding human relations and the world (Mantoan, 2003). According to Montoan: "Inclusion, therefore, implies a change in this current educational paradigm, so that it fits into the map of school education that we are redrawing" (Mantoan, 2003, p. 12).

Technology plays a key role in education, offering tools that promote inclusion and enhance the teaching and learning process. Firstly, digital technologies facilitate access to varied and adaptable educational resources, allowing students to find materials and teaching methods that meet their particularities.

In addition, the use of educational platforms and apps encourages active student participation while offering personalized support and real-time feedback. This contributes to more efficient and engaging learning. With technology, education becomes more inclusive and dynamic, as it enables the creation of diverse and accessible learning environments, reflecting the evolution of pedagogical practices and responding to the contemporary needs

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of students. Thus, the integration of technologies in education not only improves the quality of teaching but also promotes a more equitable and adaptable environment for all students.

> Technology, when inserted in the educational context, should not be seen merely as a superficial facilitator, but as an element of transformation capable of democratizing access to knowledge for all, including those with special needs (Adorno, 1995, p. 134).

In this perspective, education should be understood as a dynamic process of exploration and questioning, constantly seeking deep meanings and understandings, instead of being limited to the simple assimilation of information (Arendt, 2012, p. 89). Furthermore, when integrating new technologies into education, it is crucial to consider their human implications, reflecting on how these technologies can perpetuate inequalities or cause exclusions (Arendt, 2012, p. 143). Therefore, when implementing educational technologies, it is essential to maintain a critical vigilance over their social and human impacts, ensuring that they do not contribute to the perpetuation of inequalities, but rather to the promotion of a more inclusive and equitable environment (Arendt, 2012, p. 154).

Here is a summary table with the authors, year, summary of the works and their relevance to education and the article:

Chart 3: Theoretical Contributions to the Integration of Technology in Education and Teacher Training

Author and Year	Summary of the Work	Relevance
Adorno (1995)	Adorno argues that technology should be seen not only as a superficial enabler, but as a transformative element capable of democratizing access to knowledge for all, including people with special needs.	Adorno's work is crucial to the article by highlighting technology as an agent of inclusion and transformation in education. Their perspective helps to substantiate the argument that technological integration in education can promote a more equitable and accessible environment for all students.
Arendt (2012)	Arendt emphasizes that education should be an active process of exploration and questioning, seeking deep meanings rather than simple assimilation of information. She also warns of the human implications of educational technologies, noting that they can perpetuate inequalities or exclusions if not implemented carefully.	Arendt's work is relevant to the article in providing a critical basis for the implementation of educational technologies. It reinforces the need for a reflective and critical approach to ensure that technologies foster an inclusive and equitable educational environment, addressing both the transformative potential and

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		risks associated with technology in education.
Mantoan (2003)	Mantoan explores how a new paradigm of knowledge is emerging from the interconnections between previously separate knowledges and interaction with everyday life and social and cultural context. It discusses how the increasing complexity of communication networks is overcoming disciplinary barriers and creating new ways of understanding human relationships and the world.	Mantoan contributes to the understanding of how education must adapt to the new complexities and interconnections of the contemporary world. His work is relevant to the article by highlighting the importance of changing the educational paradigm to one that includes the interconnection of knowledge and the social and cultural context, promoting a more integrated and inclusive education.

Source: Prepared by the author

This table is relevant since it offers a clear and concise view of the contributions of the cited authors to the theoretical foundation of the article. He highlights how each work and author contribute to the discussion on the integration of technology in education and teacher training, reflecting on the need to adapt educational practices to new realities and challenges.

CHALLENGES IN THE IMPLEMENTATION OF TECHNOLOGIES IN EDUCATION

One of the main challenges in integrating technologies into education is the inadequate infrastructure in many educational institutions. The lack of access to devices and high-speed internet limits opportunities for effective use of digital technologies. Additionally, inequality in access to technologies can exacerbate educational disparities, creating a digital divide that negatively affects students from disadvantaged socioeconomic backgrounds.

Preparing educators to effectively use technologies in the classroom is another significant challenge. Many teachers lack adequate and continuous training to integrate technological tools into their pedagogical practices effectively. Teacher training plays a crucial role in the quality of education and cannot be treated in isolation from the teaching profession.

According to Nóvoa (2017), quality training is only possible when the profession is properly valued and robust. On the other hand, a strong profession requires training that goes beyond the simple mastery of disciplines and pedagogical techniques. In this way, teacher education and the teaching profession are interconnected and influence each other.

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In the same sense, Nóvoa (1999) argues that continuing education should be understood as a reflective process, starting with a critical analysis of teaching knowledge and integrating with educational practices. In addition, training should stimulate the professional development of teachers, promoting autonomy and encouraging active participation in the implementation of educational policies.

For training to be effective, it is essential to diversify models and practices, including experimentation and innovation in pedagogical work. It is also essential that the training of teachers is articulated with the projects and transformations of the institutions in which they work. As Nóvoa (1992) points out, educational changes do not occur in isolation, but rather through a continuous effort of innovation and adaptation that involves both professionals and school contexts.

Therefore, teacher education should be seen as a central component of educational changes, connecting closely with other sectors and areas of intervention to promote an effective transformation of pedagogical practices.

ANALYSIS AND RESULTS

The integration of digital technologies in education has had a significant impact on both the way teaching is delivered and the way students learn. When analyzing the emerging trends and associated challenges, it is clear that while there is considerable potential to enhance education through technology, effective implementation still faces substantial barriers.

First, hybrid education models have stood out as one of the most promising trends. The combination of face-to-face teaching with digital platforms allows for greater flexibility and personalization in the learning process. However, this approach goes beyond the simple combination of traditional and digital methods; It involves a comprehensive integration of different methodologies and technologies, creating a more adaptable and responsive learning environment. Thus, digital tools, such as online learning platforms, educational apps, and augmented reality, are used to enrich content and provide a more engaging and interactive experience for students.

In addition, the personalization of teaching, facilitated by these digital technologies, has allowed educators to tailor content to the individual needs of students, promoting more effective and student-centered learning. This adaptation is especially relevant in diverse

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educational contexts, where the ability to adjust teaching to individual differences is crucial for academic success.

However, despite the advances, the implementation of digital technologies in education still faces significant challenges. First, the lack of adequate infrastructure in many schools limits the ability to effectively integrate technologies into teaching. In addition, the continuous training of educators is a critical aspect that needs to be addressed. Many teachers find it difficult to adapt to new digital tools and methodologies due to a lack of adequate training and support. This challenge is aggravated in contexts where technologies are introduced quickly without proper preparation of education professionals.

Another important challenge is the need to ensure digital inclusion. While technology has the potential to democratize access to knowledge, it can also perpetuate inequalities if not implemented equitably. Therefore, it is essential that educational policies and practices consider differences in access to and use of technologies, in order to avoid the exclusion of certain groups of students.

Finally, the successful integration of digital technologies in education offers several opportunities. Personalising teaching and creating hybrid learning environments can lead to more inclusive education tailored to the individual needs of learners. In addition, digital technologies have the potential to foster collaboration and interaction between students and teachers, enriching the teaching-learning process. Additionally, these technologies can facilitate the creation of more dynamic and accessible educational environments, reflecting contemporary social and cultural changes. This scenario can contribute to a more relevant education that is connected to the real world, better preparing students for future challenges.

CONCLUSION

The integration of digital technologies in education represents a significant transformation in the way teaching is conducted and in the way students interact with knowledge. In this context, emerging trends such as hybrid education and the personalization of teaching have the potential to profoundly revolutionize the educational environment. These approaches not only offer new ways of learning but also increase flexibility and allow for better adaptation to individual student needs.

However, the effective implementation of these technologies faces substantial challenges. First, the lack of adequate infrastructure and the need for continuous training of

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educators are significant barriers that need to be overcome. To ensure that all students can take advantage of the opportunities offered by technology, it is essential that education policies address these issues seriously, promoting a more equitable and efficient integration of digital technologies.

In addition, it is essential that digital inclusion is a priority to prevent technologies from perpetuating inequalities. Instead, they should foster a more inclusive and accessible educational environment. Education needs to evolve to reflect the complexities and interconnections of the contemporary world, using technologies as tools to enrich and diversify learning.

Therefore, the integration of digital technologies in education has the potential to transform teaching and learning in significant ways. However, to maximize the benefits of these technologies, a continuous effort is needed to overcome existing challenges and ensure that all opportunities are seized. In this way, we can create an educational environment that is more effective, inclusive, and tailored to the needs of students.

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