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WEAVING INCLUSION: ICTS AT THE SERVICE OF EDUCATIONAL DIVERSITY

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ABSTRACT

This study addressed the impact of Information and Communication Technologies (ICTs) on educational inclusion, focusing on the use of these tools to promote the inclusion of students with disabilities. The central problem of the research was to understand how ICTs can be used to promote educational inclusion, considering the diverse needs of students and the existing barriers in the implementation of these technologies in schools. The overall objective was to analyze how ICTs contribute to the inclusion of students with disabilities, highlighting the challenges and opportunities involved. The methodology adopted was a bibliographic research, in which articles, dissertations and relevant books on the use of ICTs in the educational context were analyzed. The results indicated that ICTs offer essential resources for inclusion, such as screen readers, adaptation software and digital platforms, which help promote access to pedagogical content and improve the performance of students with disabilities. However, the survey also revealed significant challenges, such as the lack of adequate infrastructure in schools, cultural resistance from teachers and administrators, and financial limitations, which hinder the implementation of ICTs. The final considerations highlighted the importance of the continuous training of educators and the need for public policies that encourage the adoption of ICTs in schools, in addition to the suggestion of new studies to complement the findings on educational inclusion through technology.

Keywords: ICTs. Educational Inclusion. Assistive Technologies. Institutional Challenges. Teacher Training.

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INTRODUCTION

The theme of this work addresses the use of Information and Communication Technologies (ICTs) as tools for the promotion of educational inclusion, especially in the context of diversity. ICTs have been consolidated as important allies in education, contributing to the creation of an accessible and dynamic learning environment, meeting the needs of students with different profiles and conditions. Educational inclusion, which aims to ensure the access and permanence of all students in the education system, is one of the biggest challenges faced by educational institutions, and it is essential to consider the diversities present in the school environment, such as physical, cognitive, sensory disabilities and cultural differences. ICTs, with their potential for innovation and adaptation, emerge as an essential resource to ensure equity in education, providing students with the necessary tools so that they can learn according to their possibilities and needs.

The justification for carrying out this study is based on the growing demand for inclusive pedagogical practices, which seek not only to integrate, but to ensure that students with specific educational needs have the same learning opportunities as their peers. The inclusion of students with disabilities, for example, has been neglected or treated superficially, focusing only on physical access to schools, without considering the pedagogical and cognitive barriers that these students face. In this context, ICTs offer practical, accessible, and efficient solutions to overcome these barriers, allowing students to develop their skills and competencies in a full and inclusive way. In addition, the use of ICTs in education is in line with the contemporary demands of society, where technologies are increasingly present in daily life, being essential for the integral formation of individuals.

The question that guides this research is: how can Information and Communication Technologies (ICTs) be used to promote educational inclusion, considering the diversity present in the school context? This question seeks to understand the function of ICTs as instruments of transformation in teaching, especially with regard to their ability to meet the needs of all students, regardless of their conditions or abilities.

The main objective of this study is to analyze how ICTs can be employed to promote educational inclusion, meeting the different needs of students and ensuring quality education for all. For this, a bibliographic review will be carried out that will address the use of ICTs in school inclusion, its benefits, challenges and the pedagogical strategies that can be adopted to maximize its impact.

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The text is structured as follows: after the introduction, the theoretical framework will be presented, in which the main concepts related to educational inclusion, diversity and ICTs will be discussed, in addition to presenting the legislation and public policies relevant to the theme. Then, the work will address the development topics, detailing how ICTs can be applied in pedagogical practice for inclusion, the challenges faced in the implementation of these technologies and successful models. The methodology will explain the procedures adopted in the literature review, and, finally, the discussion and results will present a critical analysis of the impact of ICTs on educational inclusion, with emphasis on the results found in the educational practices studied. The work will conclude with the final considerations, which summarize the main findings and recommendations for improving the use of ICTs in inclusive education.

THEORETICAL FRAMEWORK

The theoretical framework of this work is organized in order to provide an understanding of the fundamental concepts related to educational inclusion, diversity in the school environment and the role of Information and Communication Technologies (ICTs) in this context. Initially, the concept of educational inclusion will be addressed, highlighting its legal and social implications, in addition to public policies that aim to ensure the access and permanence of students with special educational needs in the education system. Then, aspects of diversity will be discussed, including the different conditions and profiles of students that make up the school reality, such as physical, cognitive and sensory disabilities. From this perspective, the relationship between ICTs and inclusion will be explored, with emphasis on how these technologies have proven to be efficient in overcoming educational barriers, promoting access to knowledge in an equitable way. In addition, examples of assistive technological tools and resources that facilitate the adaptation of pedagogical content and methods will be presented, making teaching accessible to all students, regardless of their particularities.

MODELS OF EDUCATIONAL INCLUSION THROUGH ICTS

Information and Communication Technologies (ICTs) have proven to be essential tools in promoting school inclusion, with regard to the care of students with disabilities. These technologies not only expand learning possibilities, but also favor the overcoming of physical and cognitive barriers present in classrooms. According to Barbosa, Carvalho and

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López (2018), the use of ICTs in educational contexts contributes to inclusion, allowing students with visual, hearing and intellectual disabilities to access pedagogical content in a way adapted to their needs. ICT tools, such as screen readers and adaptation *software*, are some of the assistive technologies that enable this accessibility, offering students an equitable learning experience.

Digital inclusion, promoted by ICTs, also strengthens the pedagogical process by enabling the use of resources that facilitate communication and interaction. Fraz (2018) highlights that assistive technology, when well applied, enhances the learning of students with disabilities, transforming traditional teaching methods and enabling personalized learning. The use of adaptive *software* and specific educational platforms has shown positive results, as such tools can be configured to meet the individual needs of each student, allowing the content to be accessible according to the disability presented. This aspect is reinforced by Fachin, Paixão and Pelisari (2020), who highlight:

> Currently, technology, including the internet, is an indispensable tool in teaching. It facilitates access to information, promotes interactivity and enables new teaching strategies. Education needs to adapt to this new reality, integrating technologies into the curriculum and developing new pedagogical practices. However, the implementation of these technologies faces challenges, such as the lack of infrastructure in some schools and the need for teacher training (Fachin; Passion; Pelisari, 2020, p. 05).

In addition, ICTs contribute to the construction of inclusive pedagogical practices by integrating the use of different media, such as videos, audios and interactivity, in order to promote the active participation of students in the teaching-learning process. Machado and Santos (2020) state that, by using resources such as interactive whiteboards and digital activities, educators are able to involve students in tasks that meet different learning rhythms, favoring the inclusion of students with different disabilities. The importance of digital inclusion in this context is also highlighted by Fachin, Paixão and Pelisari (2020):

> Digital inclusion is essential to ensure that all students have access to technological resources. The diversity of experiences in the school requires flexibility in teaching and attention to the individual needs of students. The maintenance and updating of technological equipment are essential to ensure a quality educational experience (Fachin; Passion; Pelisari, 2020, p. 05).

The integration of these technologies into everyday school life thus becomes a pedagogical strategy, allowing teachers to adapt their methodologies and create an inclusive and collaborative environment for all students. Thus, ensuring the training of

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educators and the necessary infrastructure for the use of ICTs is essential to consolidate an educational model that respects differences and offers equitable learning opportunities.

CHALLENGES AND OPPORTUNITIES OF ICTS IN EDUCATION FOR ALL

The implementation of Information and Communication Technologies (ICTs) in the school environment presents significant challenges, ranging from inadequate infrastructure to cultural resistance on the part of educators and managers. The lack of technological resources, such as computers and high-quality internet connections, is one of the main obstacles identified in schools, especially in remote areas or with less public investment. Garcia and Silva (2020) highlight that the scarcity of adequate infrastructure in schools prevents ICTs from being integrated into the teaching process, making it difficult for students to access these tools that could facilitate inclusion. In addition, teacher training is another central challenge, since many educators do not have the necessary training to use ICTs in the classroom. According to Schneider (2010):

> However, ICT, by itself, does not perform the expected functions if it is not mediated by trained teachers. Thus, we have emphasized the fact that the classroom teacher, or the teacher of the curricular discipline, has knowledge of the educational potential of informatics and is able to integrate non-computerized teaching-learning activities and activities that make pedagogical use of computational resources, thus creating conditions for students to build their knowledge, while providing their digital and social inclusion (Schneider, 2010, p. 02).

In addition to issues related to infrastructure and the training of educators, there is also significant cultural resistance to the adoption of ICTs in the school environment. According to Barbosa, Carvalho and López (2018), many teachers still have difficulties in understanding ICTs as an important pedagogical tool, preferring to maintain traditional teaching methods, which are familiar and often safe for them. This scenario is aggravated by the lack of institutional support and the absence of public policies that encourage the use of technologies as central elements in educational practice. However, Schneider (2010) highlights that it is essential to train education professionals so that they can use these technologies:

> In an attempt to promote this training of education professionals, the Continuing Education Course for Teachers in Accessible Technologies – UAB/MEC was born, which in this edition, began on 09/2009 and reaches its end in mid-05/2010, with the following objectives: 1. To train, in service, in the distance modality, via the Internet, teachers from inclusive public schools, with effective teaching in Basic Education, in the appropriation and pedagogical application of Information and Communication Technologies in the scope of Special Education; 2. Develop skills to

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> guide, produce, support the use of technological resources in the construction of pedagogical actions in line with the Specialized Educational Service (SES) team, in the educational units and in the participating municipalities (Schneider, 2010, p. 03).

The opportunities brought by ICTs are significant, especially in the context of inclusive education. The possibility of adapting pedagogical materials, through specialized *software* and digital platforms, allows students with disabilities, for example, to have access to content in an accessible way that is appropriate to their needs. Fraz (2018) emphasizes that ICTs can transform the classroom, offering students with visual, hearing or cognitive disabilities the necessary tools to follow the content efficiently. In addition, Schneider (2010) points out that:

> Information and Communication Technologies (ICT) have been causing a significant impact on the teaching-learning process, presenting new perspectives of access to universal knowledge and enabling other ways of producing them through the constitution of communication networks. [...] Access to technology has expanded the classroom space beyond its physical walls, leading teachers and students to immerse themselves in new diversified and updated knowledge, while helping to overcome other barriers that keep students away from access to education, providing literacy and digital inclusion (Schneider, 2010, p. 04).

In this way, ICTs not only overcome physical barriers, but also provide new forms of interaction and learning, expanding educational opportunities and effectively promoting digital inclusion.

MODELS OF EDUCATIONAL INCLUSION THROUGH ICTS

The implementation of Information and Communication Technologies (ICTs) has provided several successful models in promoting educational inclusion, especially when these tools are used to adapt the learning environment to the needs of students with disabilities. One of the models is the use of digital platforms that facilitate access to educational content in a personalized way. Garcia (2018) highlights that adaptive learning platforms, such as those that use artificial intelligence, allow students with disabilities to access content in a dynamic way, adjusting to the pace of each student and providing inclusive learning. These platforms are complemented by audiovisual resources, which help in understanding concepts through images, videos and audios, benefiting students with different types of educational needs.

In addition, the use of screen reading software, digital book readers and alternative communication applications has proven to be efficient for the inclusion of students with

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visual and hearing impairments. Fraz (2018) mentions that, in several schools, the adoption of these resources has ensured that students with disabilities can participate in school activities, making the most of the content offered, without limitations imposed by traditional barriers. These inclusion models are also complemented by the use of collaborative tools, such as wikis and blogs, which encourage the active participation of all learners in the learning process. In this context, Barbosa, Carvalho and López (2018) state that ICTs offer not only the adaptation of content, but also favor the creation of a democratic and interactive environment, where all students can collaborate equally, regardless of their disabilities.

Another example of success is the integration of technologies in the Specialized Educational Service (AEE), where ICTs are used to enhance the learning of students with special needs. According to Machado and Santos (2020), several schools have adopted technologies such as interactive whiteboards and digital tools to provide inclusive teaching, allowing students with cognitive or motor disabilities to interact with the content in a direct and engaging way. These resources not only help in understanding the content, but also promote socialization and interaction among students, reinforcing the relevance of ICTs in creating inclusive and collaborative learning environments. Thus, educational inclusion models that use ICTs are effective in overcoming pedagogical barriers, providing students with disabilities with the necessary tools for accessible and participatory learning.

METHODOLOGY

The present research is characterized as a bibliographic research, based on the study of academic and scientific sources. The theoretical basis is anchored in the work 'Exploring scientific methodologies: types of research, approaches and practical applications' by Santana, Narciso and Fernandes (2025), which provides subsidies for the definition of the methods used. The objective is to broaden the understanding of the use of Information and Communication Technologies (ICTs) as tools for educational inclusion, in line with the methodological guidelines proposed by these authors.

The approach adopted is qualitative, as it seeks to understand the processes, challenges and benefits of using ICTs to promote the inclusion of students with diverse educational needs. To carry out this research, the review and analysis of scientific literature, such as books, academic articles, dissertations, theses and other relevant documents on the subject, were used as the main instruments. Data collection was carried

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out through research in academic databases, such as *Google Scholar*, *Scielo*, Capes and other academic repositories, seeking sources that addressed educational inclusion, the use of ICTs in education and diversity in the school environment. In addition, references to public policies and guidelines on school inclusion and the use of technologies in education were consulted. The technique used for the analysis of the information was content analysis, with the objective of extracting the main concepts and categories that involve the theme of inclusion and ICTs, allowing an understanding of the effects of these technologies on inclusive education.

The following table presents an organization of the main references consulted during the data collection process, focusing on studies and publications that deal with the theme of educational inclusion and the use of ICTs. The table organizes the information by author(s), title as published, year of publication and type of work, providing a clear and concise view of the sources used.

Chart 1 – References Used in the Research

Author(s)	Conforming title published	Year	Type of work
SCHNEIDER, F. C.	Continuing education of teachers: construction of accessibility and socio-digital inclusion for human diversity	2010	Dissertation
BARBOSA, R. C.; CARVALHO, M. E. P.; LÓPEZ, A. M.	Educational, digital and social inclusion of women in the interior of Paraíba: an experience at UFPB	2018	Article
FRAZ, J. N.	Assistive technology and mathematics education: experiences of inclusion in the teaching and learning of mathematics in visual, intellectual and hearing disabilities	2018	Article
GARCIA, T. G. R.	Pedagogical practice in specialized educational service (SES), with the use of ICT/media	2018	Dissertation
FACHIN, A.; PAIXÃO, M. A.; PELISARI, M. E. S.	The teaching of the Portuguese language and the contribution of PIDIBIDIANS to stimulate the use of ICTs in the educational context	2020	Article
GARCIA, C. de S.; SILVA, A. A. A. da	Inclusion, pedagogical mediation and accessibility in the distance learning environment	2020	Article
MACHADO, G. C.; SANTOS, A. M. dos	The use of ICTs in the educational context of school inclusion	2020	Article

Source: authorship.

After inserting the table, it is emphasized that it offers an overview of the main sources consulted, allowing the reader to follow the theoretical bases that support the analysis carried out throughout this work. The organization of references by author, title, year and type of work facilitates consultation and understanding of the repertoire used, ensuring transparency and the theoretical foundation of the research.

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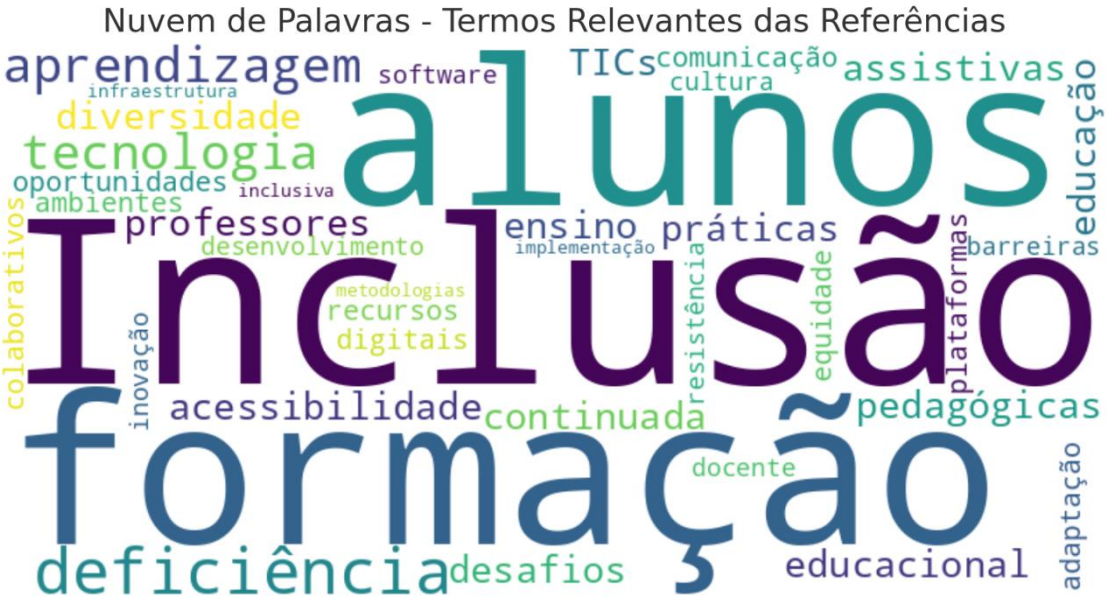
RESULTS AND DISCUSSION

The following word cloud highlights the frequent and significant terms present in the references used in this study. These terms, such as 'educational inclusion', 'ICTs', 'assistive technologies' and 'accessibility', will be addressed in subsequent topics, discussions and outcomes.

Image 1- Word Cloud



Source: authorship.

The visualization presented facilitates the identification of the key concepts that guide the development of the research, in addition to highlighting the main elements that permeate the theme of inclusive education and the use of technologies in the promotion of learning for all students, especially those with disabilities. The analysis of these terms will be fundamental for understanding the impact of ICTs on inclusive education and for discussing the challenges and opportunities that arise with their implementation.

IMPACT OF ICTS ON THE INCLUSION OF STUDENTS WITH DISABILITIES

The impact of Information and Communication Technologies (ICTs) on the inclusion process of students with disabilities has been shown to be significant, especially with regard to access to educational content and the academic performance of these students. ICTs offer resources that facilitate access to teaching materials tailored to the specific needs of each student, allowing education to be inclusive and accessible. Fraz (2018) points out that the use of assistive technologies, such as screen readers, adaptation *software*, and alternative

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communication devices, has contributed to overcoming the barriers that limit the learning of students with visual, hearing, and motor disabilities. These resources make the content accessible, allowing students to follow the classes independently, without depending on other mediators.

In addition, the use of ICTs has shown a positive impact on the academic performance of these students, in relation to autonomy in learning. Garcia, and Silva (2020) point out that digital platforms and specialized educational software offer a form of personalized teaching, which allows students with disabilities to advance at their own pace, without the pressure of following the class in a linear way. This type of adaptation not only improves accessibility to content, but also favors the development of cognitive and academic skills, since students have access to materials that are configured for their individual needs. ICTs, therefore, not only guarantee access to knowledge, but also provide opportunities for students with disabilities to expand their learning capacities, encouraging active participation in school activities.

In addition, ICTs make it possible to create an interactive and engaging learning environment, which has shown positive results in the motivation and performance of students with disabilities. Barbosa, Carvalho and López (2018) state that the use of audiovisual and interactive resources in classes has contributed to increasing students' interest, making the learning process dynamic and engaging. These visual and auditory aids help students understand the content in a clear and accessible way, which in turn improves their performance in school activities. Thus, the results indicate that the use of ICTs in the educational environment not only promotes the inclusion of students with disabilities, but also contributes to their academic development in an equal way, favoring their full participation in the teaching-learning process.

THE TRAINING OF EDUCATORS FOR THE USE OF ICTS

The training of educators in the use of Information and Communication Technologies (ICTs) plays a fundamental role in the effective implementation of these tools for the promotion of educational inclusion. Adequate teacher training is essential for ICTs to be integrated into pedagogical practices and thus meet the specific needs of students with disabilities. Garcia and Silva (2020) point out that, although teachers recognize the potential of ICTs, many face difficulties in using them due to the lack of adequate training. In this context, continuing education programs become essential, as they offer educators the

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opportunity to develop skills both in the use of technologies and in the adaptation of pedagogical content to the needs of each student.

In addition, continuing education is a key element in ensuring that teachers are always up-to-date with new technologies and available resources. According to Fraz (2018), training programs should not only focus on the technical aspect of the use of ICTs, but also provide an understanding of how these technologies can be applied in an inclusive way, promoting the learning of students with disabilities. Such continuous training programmes should be accompanied by appropriate resources, such as teaching materials, e-learning platforms and tutorials, that facilitate the learning process for educators. Machado and Santos (2020) highlight that the lack of pedagogical resources and institutional support makes teacher training still challenging, making it difficult to fully implement ICTs in the inclusion process.

The training of educators, when well structured, has a positive impact on the use of ICTs for educational inclusion, as it allows teachers to feel safe when using these tools. Barbosa, Carvalho and López (2018) state that when teachers are trained and have access to adequate resources and materials, they are likely to integrate ICTs in an innovative way into their pedagogical practices. This results in an inclusive learning environment in which all students, regardless of their educational needs, can benefit from the technological resources available. Therefore, the training of educators is a determining factor for the success of the implementation of ICTs in inclusive education, as it prepares teachers to face the challenges and take advantage of the opportunities that technologies offer to improve the teaching-learning process.

INSTITUTIONAL AND CULTURAL CHALLENGES IN THE IMPLEMENTATION OF ICTS

The implementation of Information and Communication Technologies (ICTs) in inclusive education faces several challenges, both institutional and cultural, which compromise their full adoption in schools. The lack of adequate infrastructure is one of the evident barriers, making it difficult to access the technologies necessary to ensure the inclusion of students with disabilities. Garcia and Silva (2020) highlight that, although the use of ICTs is recognized as a potential tool for inclusion, many educational institutions lack basic resources, such as computers, quality internet, and specialized equipment. This lack of infrastructure limits the possibilities of using ICTs, preventing schools from adopting inclusive pedagogical practices that meet the needs of all students.

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In addition, resistance to change, both on the part of educators and institutions, also represents a considerable obstacle to the implementation of ICTs. Fraz (2018) observes that many teachers still prefer to use traditional teaching methods, which are familiar and considered safe, which results in a resistance to the use of new technologies. This resistance can be attributed to factors such as a lack of confidence in the use of digital tools, a lack of adequate training, and a fear of losing control over the teaching process. Machado and Santos (2020) complement this view, pointing out that, in many cases, school managers are also resistant to change, since the implementation of ICTs requires a significant restructuring of the school environment and adaptive management.

Another limiting factor for the adoption of ICTs in inclusive education is the issue of financial limitations. Barbosa, Carvalho and López (2018) point out that schools, especially those located in less favored regions, face financial difficulties to invest in technology, which impacts the quality of education offered to students with disabilities. Budgetary limitations compromise not only the acquisition of equipment, but also the training of teachers, who lack financial resources to participate in continuing education programs that enable them to use ICTs. These institutional and cultural barriers, therefore, form a set of challenges that hinder the implementation of ICTs, limiting their potential for transformation in the process of educational inclusion.

FINAL CONSIDERATIONS

The final considerations of this study reflect the main findings on the impact of Information and Communication Technologies (ICTs) on the educational inclusion process, with emphasis on the use of these tools to promote the inclusion of students with disabilities. The analysis carried out throughout the work allowed us to answer the central question of the research, which sought to understand how ICTs can be used to promote educational inclusion, considering the diverse needs of students and the barriers that still exist in the implementation of these technologies in schools.

It has been identified that ICTs play an essential role in educational inclusion, as they offer adaptive resources that facilitate access to pedagogical content for students with different disabilities. Tools such as screen readers, adaptation *software* and alternative communication devices were highlighted as elements that favor the active participation of these students in school activities, providing an equitable learning environment. In addition, the use of digital platforms and audiovisual resources has shown positive results, allowing

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students with disabilities to advance at their own pace and with greater autonomy, which contributes to their academic performance.

However, the survey also revealed that the implementation of ICTs in inclusive education faces several challenges. The lack of adequate infrastructure in schools, such as equipment and quality internet access, has been identified as a significant barrier to the adoption of these technologies. In addition, cultural resistance on the part of teachers and managers, who prefer traditional teaching methods, has also proved to be an important obstacle to the implementation of ICTs. The continuous training of educators, combined with the availability of adequate resources, emerges as an urgent need to ensure that ICTs are used in inclusive pedagogical practices.

Despite these challenges, the study pointed out that ICTs offer a range of opportunities for promoting educational inclusion. When implemented, these technologies not only facilitate access to pedagogical content but also help to create a dynamic, interactive, and collaborative learning environment where all students, regardless of their abilities or disabilities, have the same learning opportunities. In this way, ICTs can be seen as tools for the transformation of education, making it inclusive and accessible.

This study contributes to the understanding of the role of ICTs in inclusive education, highlighting both the opportunities and challenges involved in its implementation. However, it is important to note that, despite the advances observed, there are still gaps that need to be filled. The lack of infrastructure and cultural resistance are issues that demand a strategic approach on the part of educational managers and public policy makers. In addition, the continuing education of teachers must be a priority to ensure that ICTs are used fully and efficiently.

Finally, this study highlights the need for new studies that can expand the analysis of the impacts of ICTs on the performance of students with disabilities and explore other ways to overcome institutional and cultural barriers that still limit the use of these technologies in schools. Conducting additional research can contribute to the creation of public policies and the development of innovative pedagogical practices that meet the needs of all students.

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