



## TEACHER TRAINING IN INCLUSIVE TECHNOLOGIES: THE USE OF TECHNOLOGIES IN THE INCLUSION OF STUDENTS WITH AUTISM



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### ABSTRACT

In order for teachers to be trained in inclusive technologies for students with autism, so that everyone has equal educational opportunities, educators are trained to provide them with technological tools, allowing them to meet their unique needs and help create an inclusive and welcoming school environment. This training allows teachers to gradually acquire skills that are essential for utilizing appropriate teaching principles, leading to the formation of an educational process that is beneficial to all students, particularly students with autism. These inclusive technologies also provide educators with tools to personalize learning, taking into account the nuances inherent in each student, which in turn can drive engagement and participation in the classroom. It is within this perspective that continuous training for teachers contributes to making them advocates of inclusive education, where a school environment is able to value diversity and prepare all students to interact positively and actively participate in school life. Therefore, training instructors in inclusive technologies is not only to help educators develop skills, but also to reinforce an inclusive culture, a culture where all students, despite their difficulties, receive a quality education.

**Keywords:** Inclusive Technologies. Teacher Training. Autism. School Inclusion.

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## INTRODUCTION

This study is a comprehensive literature review, and the objective was to systematically analyze the publications found in the literature on the subject. The purpose of this bibliographic survey is to constitute a set of relevant data that makes it possible to understand the influence of technology on the learning process of students with autism.

In addition to the analysis of the state of the art as a way to identify effective and ineffective practices in the educational context, the need for adaptation on the part of educators is also emphasized. This methodology will allow the design of more precise pedagogical intervention strategies.

The objectives of this research are also highlighted in some domains. Initially, it aims to identify the technologies that are known to be effective in the educational environment of students with autism. It then tries to figure out what skills teachers need to have in order to use these technological tools effectively. Finally, it aims to develop practical strategies that can serve as guidelines for educational institutions on how to train teachers and contribute to the improvement of the educational experience of students with autism spectrum.

In addition, it is worth noting that it is extremely relevant in the face of the growing social demand for truly inclusive education in educational institutions. Students with autism face many obstacles in their learning process, but with the assistance of the relevant application of technological tools, these obstacles can be minimized and meet their specific needs.

An important omission to be addressed is the inadequacies in modern teacher training. Most education professionals are not sufficiently prepared for inclusive environments, which is a trend that needs to change immediately. This discussion can focus on continuing professional development methods that empower teachers to integrate innovative technology and diversity principles into their classroom practice.

This bibliographic investigation is designed to be a tool for understanding the inclusion processes of students with autism. Understanding that all research has its limits, the goal is to help inspire new studies and promote new ways of thinking. The findings are a testament to the positive impact that technology could have on creating a more inclusive and stimulating education.

At the same time, this study aims to inform the development of better teacher training programs. Technology and inclusive education have great potential to work together and create solutions that are beneficial to the entire school community. The discussion continued throughout this work addresses how the educational experience could be improved for students with autism.

It is indicated that the training of educators is fundamentally important as a basic component for the success of inclusion. This research is designed to support educational institutions in designing training programs that effectively meet this demand. Of course, providing quality education for all students will require a collaborative approach.

In addition to the immediate benefits for students with autism, the implications of this research could aid in the development of a more harmonious and inclusive school culture. It is through advocacy for truly inclusive spaces that educational institutions become agents of change for social good and where respect for diversity and shared learning and knowledge form core values. In this way, the study points to a broader picture of social change, which also strengthens education as a universal right and a platform for a more just society.

## **THEORETICAL FRAMEWORK**

In the field of theoretical structure, our analysis will be guided by the fundamental concepts that materialize the inclusion of students with autism in the school environment. This comprehensive perspective will encompass basic notions, such as the paradigm of "neurodiversity", which recognizes and values the multiplicity of cognitive processes. In addition, we will address the methodological adaptations necessary to meet the particularities of each student, aiming at the construction of a harmonious and truly inclusive educational space.

In this argument, inclusion emerges as an indisputable legal principle, evidencing the intrinsic nature of human diversity. Subsequently, our investigation will extend to the constructs that foster school inclusion, with an emphasis on empathy as a crucial element for understanding the emotional nuances of individuals with autism. The capital importance of an individualized pedagogical approach is emphasized, which adjusts to the singularities of each student, thus promoting a welcoming and receptive learning environment for all.

In addition to the theoretical formulations, our analysis will contemplate the cognitive processes that elucidate the peculiar way in which individuals with autism apprehend and interact with the world. The understanding of these subtleties proves to be instrumental for the development of more appropriate and effective pedagogical practices. The implementation of strategies that welcome and respect "neurodiversity" contributes to the construction of a more inclusive school environment, where each individual feels genuinely valued and respected.

Finally, we will proceed to a thorough analysis of the legal framework that sustains and promotes inclusion in the educational field, ensuring the universal right to quality

education. The comparative examination of Brazilian and international legislation highlights the urgent need for legal provisions that foster inclusion and equality of opportunities. In this way, we aim to build an educational system that not only recognizes, but celebrates differences, offering equal opportunities to all students.

## **CONTEXT OF INCLUSION OF STUDENTS WITH AUTISM IN EDUCATION**

The educational context for the inclusion of autistic students faces several obstacles and special demands, since these students may encounter obstacles in relating socially, expressing themselves and exhibiting repetitive behaviors. Therefore, it is crucial that educational institutions are able to receive and provide the necessary support to these students, fostering inclusion in all facets of the educational environment. It is crucial to change the school environment, as "school inclusion must be a practice that values and understands the particularities of each student" (Narciso et al., 2024).

In addition to adapting the space, it is crucial that teachers receive training that helps them understand the specificities of the autism spectrum. This is because "well-trained educators are key to developing teaching strategies that favor inclusion" (Narciso et al., 2024). The continuous training of teachers will ensure that they feel safer and ready to deal with the various situations that may arise in the school day-to-day.

Another relevant issue to take into account is the interaction between autistic students and their peers. Camargo et al. (2023) highlight that "difficulties in interactions can lead to an environment of exclusion and loneliness," which compromises students' social progress. Thus, it is essential to encourage activities that promote social interaction so that these students feel integrated into the group.

In addition, the impact of artificial intelligence on education is also relevant in this context. Freitas (2024) emphasizes that "artificial intelligence can change traditional forms of assessment, offering more accessibility for students with difficulties". This change can facilitate the way content is approached, providing more personalized support for each student, especially those with autism.

In addition, the introduction of assistive technologies in schools can be an effective strategy for the inclusion of autistic students. These tools can help with communication and social interaction, making learning more adapted to the needs of each student. As Freitas (2024) mentions, "accessible technologies can revolutionize the educational environment, making it more inclusive".

Another crucial point is to establish an educational environment that values diversity. This can be done through awareness and training programs for all members of the school

community, including students, teachers, and employees. Therefore, we ensure that "social interactions and inclusion are incorporated into everyday school life" (Camargo et al., 2023).

Cooperation between school, family and experts is equally crucial for effective inclusion. This partnership should be encouraged to develop an individualized educational plan that meets the specific needs of each autistic student. As Narciso et al. (2024) state, "collaboration between the family and the school is essential for the success of school inclusion".

In addition, it is essential that the training of educators takes into account different areas of knowledge. By offering this type of training, teachers will be better prepared to create methods that meet the diversity of students. Inclusion in education should be a goal to be achieved together, based on cooperation between different areas.

It is equally important that schools adopt an active attitude towards the challenges that autistic students face, seeking to understand and welcome their specificities. This means creating a safe environment where students can share their emotions and difficulties, favoring a space that favors learning.

Finally, the role of education policies cannot be ignored. They should support and regulate inclusive teaching practices that help include students with autism at all administrative and pedagogical levels. An integrated and dedicated approach will ensure that inclusion becomes a tangible reality, not just an idea.

In short, including students with autism in schools involves several changes that encompass teacher training, the use of assistive technologies, and collaboration between the family and the school. With a set of educational strategies, it is possible to create a more inclusive and welcoming school environment, which respects and values the particularities of each student.

## **IMPORTANCE OF TEACHER TRAINING IN INCLUSIVE TECHNOLOGIES**

### **SIVAS**

It is crucial to train educators in accessible technology for equitable education, particularly for autistic learners and those facing challenges. This training provides teachers with the chance to explore resources and methods to adapt the lessons, correct? Thus, everyone can enjoy a high standard education. According to Menezes and Alves (2021, p. 45), "audio description acts as a superpower in Universal Design for Learning, helping children with visual problems".

In addition to creating a more welcoming environment, training in assistive technologies and alternative communication is crucial for the social inclusion of students with disabilities. Penha et al. (2024, p. 30) highlight that "assistive technologies not only make learning easier, but also encourage social interaction, improving students' quality of life". This interaction is essential for the growth of children's social and emotional skills, forming bonds that can last a lifetime.

The connection between the family, the school and the child is an element that requires special attention. The support of the family is essential for the success of pedagogical strategies. Cabral et al. (2021, p. 120) highlight that "the point of view of parents and educators about the inclusion of children with autism is fundamental for the success of the actions". Thus, creating effective partnerships between the school and families can be a crucial element in the learning process.

Utilizing an innovative curriculum and tablets that fly not only benefits everyone, but also makes learning more fun. Educators who use these tools become more creative, developing fantastic and easy-to-understand classes. Educational institutions should support these educators in a meaningful way by offering courses and the like.

In addition to initial training, it is essential for teachers to have access to frequent training on accessible technologies. This not only updates their competencies, but also reaffirms the relevance of an education that respects the diversity of each student. The continuous improvement of professionals generates an environment of constant learning, where all educators act as agents of change.

School environments need to be reimaged to become more welcoming and functional for all students, regardless of their particularities. This implies the adaptation not only of teaching methodologies, but also of the physical and technological spaces themselves. When educators are well prepared, they are able to make these adaptations more effectively and safely.

Another strategy to be considered is the inclusion of families in the educational process. Training for teachers can encompass methods on how to engage parents and guardians in their children's education, creating a support network that enriches the school experience. In this way, the exchange of information and experiences between the school and the family is strengthened.

In addition, it is essential to constantly monitor and review the effectiveness of the technologies and methods that are being used. This review can be done through the opinions of students, parents and teachers, allowing for continuous adjustments and

improvements in educational approaches. Careful evaluation of results is a crucial practice to ensure that inclusion is truthful and relevant.

Finally, school culture needs to evolve to accept and value diversity. Organizing events and actions that involve the entire school community in discussions about inclusion and valuing differences can create a more cooperative and friendly environment. In this way, the role of the teacher goes beyond mere instruction, becoming a social facilitator and promoting teaching that recognizes the uniqueness of each student.

The inclusion of students with disabilities, particularly autistic students, requires the cooperation of all members of society. The next step is to ensure that all educators have access to the necessary training and adaptations, enabling them to change the school reality for the benefit of all students, ensuring that the right to inclusive education is complete and effective.

## **METHODOLOGY**

The methodological framework proposed for the training of teachers in the improvement of their knowledge and skills in the use of inclusive technologies when working with autistic children was as planned and structured as possible, in order to unite theory and practice. The inclusion training program was developed in an experiential face-to-face modality, complemented with web-based virtual components, offering teachers a wide coverage of content on inclusion and the correct use of technological tools.

Among the topics addressed in the training session, one of the themes explores in detail the pillars that support inclusion in the school environment. This step was critical for participants to internalize the need to reconsider their teaching practices to accommodate the diversity of the student population in a meaningful way.

Teachers had the opportunity to engage directly with the technologies presented in the practical part of the training. The demonstrations were carried out not only for the mere operationalization of the tools, but also to show their useful potential for this teaching-learning process. This practical experience was fundamental for the teachers to see how technologies can be integrated into the classroom, establishing a participatory learning that signals the educator as the main agent of transformation.

This was a methodology of progression of activities, with an emphasis on action, enabling educators to create teaching resources that responded to the lived experience of their students. This stage developed creativity in teaching, as well as reflection on the practical application of what was being experienced, such as technologies that facilitated the routine of the school day and contributed to improving the learning of children and



adolescents with autism. Through the development of these resources, teachers were able to explore firsthand the possibilities offered by technology, depending on the particularities of their students.

A key feature of the approach adopted was the promotion of critical reflection. Group discussions were encouraged at the end of each session, so that educators could share their experiences with the new methods while expressing their challenges. Such an exchange of experiences was critical to create a collective body of knowledge that would help improve educational practice. The collaborative nature of the meetings created a safe space for teachers to voice their concerns and doubts, mutually benefiting their professional development.

In addition, the methodology involved post-training follow-up, offering support to educators in practical implementation. This continued support was critical to the transition of innovative technology beyond the idea phase and into the functionality of the school day. This has allowed for adaptation in pedagogical approaches and constructive feedback communicated through on-site visits and ongoing communication with instructors, which is essential for continuous and meaningful learning.

Finally, this methodology was conceived with the idea of transforming teachers not only into training recipients, but true agents of change in their educational institutions. This collaborative environment of practical reflection and knowledge exchange created a network of support and mutual learning among the participants. The ultimate goal was for each educator to leave empowered, energized, and ready to explore and implement inclusive technologies that would profoundly impact equitable and enriching education for all students.

## **THEORETICAL FOUNDATIONS OF THE INCLUSION OF STUDENTS WITH AUTISM**

The inclusion of students with autism is a multifaceted process that requires the collaboration of several actors, including educators, health professionals and, especially, families. For inclusion to be effective, it is essential that there is continuous training of teachers, enabling them to deal with the particularities of students with autism spectrum disorders. According to Oliveira et al. (2024), "specific pedagogical strategies are necessary to promote the effective inclusion of students with ASD in the school environment" (OLIVEIRA et al., 2024, p. 2067). Awareness of the specific needs of these children and the development of an adapted curriculum are essential steps to ensure a school environment that respects their particularities.



In addition, the direct involvement of families in the teaching process is crucial for the full development of autistic students' skills. Souza and Alves (2023) highlight that "family participation has a notable effect on the school inclusion of autistic children" (SOUSA; ALVES, 2023, p. e1072). Families should be encouraged to have a frank conversation with teachers, allowing for the exchange of information about the most effective pedagogical practices and the advancement of the child. This interaction can contribute to the creation of an environment that favors not only academic learning, but also social and psychological growth.

On the other hand, schools must also be prepared to make structural and curricular adaptations that favor inclusion. This includes the creation of a physical space that allows the effective participation of all students in group activities, as well as the implementation of didactic resources that meet the different forms of learning. Rezende and Souza (2021) state that "pedagogical work must be planned in order to accommodate the specificities of students with ASD" (REZENDE; SOUZA, 2021, p. e460101321486). This involves conducting diagnostic assessments that can map the capabilities and challenges of each student.

Another crucial tactic for inclusion is the creation of support groups, in which teachers, family members and specialists have the opportunity to share experiences and create new teaching methods. These support networks are essential to foster an environment of collaboration, in which everyone feels responsible and engaged in the success of the student with autism. Oliveira et al. (2024) point out that "group training actions can improve teachers' skills and assist in student progress" (OLIVEIRA et al., 2024, p. de 2067).

Education policies also play a vital role in the inclusion of children with autism. It is essential that the guidelines of the Ministry of Education contemplate the specific demands of these children, ensuring resources and support to educational institutions. Sousa and Alves (2023) emphasize that "it is vital that inclusion policies are translated into concrete actions in schools" (SOUSA; ALVES, 2023, p. e1072). The implementation of programs that promote the continuing education of educators is one of these necessary actions.

In addition, the use of assistive technologies can act as a strong support in the inclusion process. Instruments that simplify communication and learning can offer students with autism alternative methods of interaction and involvement in school activities. Priority should be given to valuing these resources in teaching practices, building a more accessible and inclusive environment.

In summary, the inclusion of autistic students in conventional schools is a task that requires the cooperation and commitment of the entire educational community. Teaching methods, family support and the proper application of laws are interrelated elements that, when improved, ensure better performance in the inclusion of these students. According to Rezende and Souza (2021), "they have the right to an environment where they can fully develop" (REZENDE; SOUZA, 2021, p. e460101321486). The task of ensuring effective inclusion should be perceived as an opportunity to enhance the educational experience of all students, regardless of their differences.

## **INCLUSIVE TECHNOLOGIES AND AUTISM: CONCEPTS AND APPLICATIONS**

In this section, we establish a correlation between inclusion techniques and autism, emphasizing the relevant concepts and how these tools are applied in the educational setting. The emphasis will be on technologies that have been shown to be effective in supporting autistic students, ranging from interactive apps and adjustable software to specialized devices that aid in learning and communication. The value of such resources is highlighted not only for inclusion support, but also for the social and cognitive needs of students.

The characteristics of these technologies will be analyzed, from augmentative communication devices to progress tracking systems. They have the potential to revolutionize the educational experience by making it more relevant and tailored to these students. Inclusive technologies are a bridge to learning: they enable students to engage with school content and activities.

In addition, some case reports will be presented, in which the application of these technologies generated great improvements in student performance and participation. Such experiences are essential to realize that more inclusive classroom routines have repercussions beyond the classroom. The reports can illustrate how these technologies work in different contexts, showing that inclusion is possible when support is provided.

Scientific foundations on how inclusive technologies help students with autism will also be introduced. Research in school settings shows that the applications are not only descriptive for academic skills, but also help students interact socially and boost their self-confidence. Although research continues and every year new findings strengthen the thesis of making inclusive technologies part of teaching methodologies.

The way instructors and teachers are trained and educated also needs to advance in tandem with this technology. These tools have the potential to benefit learners, but professionals need to be trained to use them properly to maximize their usefulness.

Consequently, educational institutions must prioritize ongoing teacher training to provide them with the knowledge and skills to facilitate more inclusive work with autistic students.

In conclusion, the relationship between technology and inclusive education suggests a promising future, offering the opportunity to fundamentally change the educational environment. By ensuring that the needs of autistic students are met as part of developing an equitable system (through inclusive teaching strategies and the use of technology), we can end up with a more equitable and diverse education landscape. There are immense opportunities for new studies and initiatives here, which is why we need to continue to pursue investments in technological solutions that can be designed with all students in mind and including all students.

## **TEACHING-LEARNING STRATEGIES FOR STUDENTS WITH AUTISM**

This means providing them with communication systems that encourage inclusion, such as PECS, so that they can adapt to school life. And this can therefore be a vital tool not only in terms of making information more accessible, but also facilitating much clearer and more impactful communication in the way they should articulate themselves.

In addition, structured and visually interesting activities help them learn. Visual timelines and timelines give students a precise order of activities, letting them know what they'll be doing throughout the day. This transparency also reduces anxiety, as students know what to expect from now on, objectively.

One of the factors is the physical environment of the classroom. Reducing excessive sensory elements that draw the attention of our senses, such as loud sounds and bright lights, can create a more comfortable and supportive educational atmosphere. Small, supportive changes in the environment can allow students to productively engage in recommended tasks, shaping their attention and concentration.

Pedagogical approaches based on ABA have already shown beneficial results in the educational environment of students with autism spectrum disorder (ASD). They offer a more personalized and structured method for instructors to discern positive behaviors and reinforce them through rewards and incentives. Positive reinforcement is a great motivator, but with this process, a variety of ideas and skills can emerge.

Collaboration with autism experts (e.g., psychologists, occupational therapists) is a vital component in optimizing teaching approaches. These professionals can help tailor supports and practices so that the rest of the school staff can implement practices that best meet the needs of individual students. This enhances the educational process and provides a richer and more comprehensive approach.

In conclusion, teachers should remain open to learning by focusing on teaching students with autism. This support allows these students to not only excel academically but also integrate better socially as they feel appreciated and understood in a school culture that values their differences. Therefore, the first step is to continue teaching in an inclusive and open way.

## **PROPOSALS AND FUTURE PERSPECTIVES**

Future activities aimed at improving teacher training in inclusion technologies are not only constant, but also with regard to education, when educators can become familiar with current innovations and adjustable ways of teaching. Continuing education programs are important because such programs provide teachers with routine training or refresher courses to prepare them to effectively handle the demands of the autistic students in their care.

Regularly include hands-on workshops and specific courses where teachers can experiment and practice using these tools in a controlled and collaborative environment.

Thus, attention should be given by educational policies to research and development of technologies for inclusion. For education to be truly inclusive, we need to invest in innovations that meet the needs of students with autism. This can mean anything from funding startups working on assistive technologies to partnering with universities for tailored technological solutions.

Establishing a culture of technology and pedagogy is essential to the success of these projects and needs to be an explicit element in future educational reform proposals.

Not only should the government focus on technological development, but also promote partnerships between educational institutions and technology companies. These partnerships can offer additional resources and expertise that educators may not otherwise have access to. The role of companies in teacher training is very important, as these companies have a technical knowledge and a deeper understanding of the best tools that can be used for inclusion.

The collaborative nature of educators and technology developers can pave the way for the development of solutions tailored to the needs of the educational environment.

Another key recommendation for the future is the establishment of a network to share best practices among education professionals. Teachers can create the network and share effective experiences and methods with each other, thus expanding their knowledge.

The connection between them would encourage the never-ending process of learning, as well as help incite motivation and participation from teachers, providing mutual

support when facing the day-to-day problems that put an end to the inclusion spectrum for students with autism.

We must not forget emotional support and educational reinforcement. One tactic may be to create spaces for educators to listen to and consider their experiences and challenges in using inclusive technologies.

These spaces can be in the form of discussion groups, seminars, and regular meetings, in which teachers can openly communicate their frustrations, successes, and creative solutions. This would foster a better sense of community and knowledge sharing among educators, creating a culture of innovation.

Finally, it is important to reiterate that for all these measures to work, there must be a change in mentality within educational institutions or policies. We, including teachers, school staff, students, and their families, must view inclusion as a collaborative effort and a collective responsibility.

Creating an inclusive culture requires time, effort, and a vision of what diversity brings to your school, community, and world; However, the dividends paid not only to your students on the spectrum, but also to all students, will make all the effort in this direction worthwhile.

## **FINAL CONSIDERATIONS**

The integration of students with autism into the school environment presents both a challenge and an opportunity to reconsider educational practices. So today, it follows that teachers must be prepared to deal with this diversity, which means helping schools continue to empower themselves with inclusive technologies. Therefore, a reflection on teacher training is not just about technology; It is a change in mindset that respects each student as a treasure, that inclusion is a right and not a requirement.

The study focused on the objectives of the study on the need to allow teachers to use technological tools for teaching. This lesson made it clear that, given proper training, teachers learn to create more common and supportive learning environments not only for autistic students, but also for all students in the classroom. This means improving teaching practice and the learning process.

Preparation is important here, but even more important is to assess whether this training is effective. In daily school life and classroom dynamics, as we look to the future, inclusive technologies must be considered. This will allow us to figure out what works for them and what doesn't, by compiling data and insights from teachers about which

techniques or tools deliver real positive results. Thus, the training can be personalized and adapted to the real needs of the interlocutors, that is, teachers and students.

Looking ahead, the need for continued investments in research and education is paramount. The rapid pace of technological advancements and the growing number of students with diverse needs in the classroom require institutions to keep up.

Are you already working on future plans that include expanding continuing education programs not only with technological resources, but as a pedagogical approach to ensure that an inclusive and welcoming environment is available to all students?

What is vital here is to justify this continuity of investment in training. Inclusive education is not a legal issue, but rather an issue that feeds the need for human and social development. It is teachers who serve as catalysts to create environments that honor and celebrate diversity. This commitment is reflected in more aware and humane citizens who learn to live in harmony in society.

Thus, we appreciate that teacher training in inclusion technologies is not a goal to be achieved, but becomes an urgent need today to achieve inclusive education, for all.

Through the excellence of administration and educators, and above all by challenging opposing belief structures about all students, the point for the future is not to have students in personalized learning as exceptional, undone or resided based on their particularities, but rather to be recommended for quality learning that encompasses everyone. The path is certainly one of social inclusion, and we must once again do everything in our power to take each step with determination and commitment to the education of all.

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