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EDUCATIONAL INCLUSION AND TECHNOLOGIES IN THE SOCIAL AND COGNITIVE DEVELOPMENT OF STUDENTS WITH AUTISM SPECTRUM DISORDER



EDUCATIONAL INCLUSION

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INCLUSIÓN EDUCATIVA Y TECNOLOGÍAS EN EL DESARROLLO SOCIAL Y COGNITIVO DE ESTUDIANTES CON TRASTORNO DEL ESPECTRO AUTISTA

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ABSTRACT

This article analyzes educational inclusion and the role of assistive technologies in the social and cognitive development of students with Autism Spectrum Disorder in primary education, from a rights-based, equity-focused, and diversity-inclusive perspective. Inclusive education is understood as a comprehensive process that transcends physical integration in the classroom and promotes flexible, participatory learning environments tailored to individual needs. The study is based on a qualitative and analytical review of scientific literature on inclusive pedagogical strategies, the development of social and cognitive skills, teacher training, and the use of educational technologies. The analysis shows that structured interventions, modeling of social behaviors, strengthening communication, and working on emotional understanding promote social interaction, self-regulation, and active participation among students with autism spectrum disorder. Furthermore, it highlights those assistive technologies facilitate the personalization of content, adaptation to learning paces, sensory regulation, and constant feedback, strengthening autonomy and meaningful learning. Teachers play a central role, as their self-efficacy, ongoing professional development, and willingness to make curricular adaptations directly impact the quality of inclusive practices. Finally, collaboration between school, family, and community is highlighted as a key element for ensuring coherence, educational continuity, and holistic development in primary education. This approach helps guide pedagogical decisions and inclusive educational policies based on evidence and a strong, ongoing institutional commitment.

Keywords:

Educational inclusion, autism spectrum disorder, assistive technologies, social development, cognitive development.

RESUMEN

El artículo analiza la inclusión educativa y el papel de las tecnologías de apoyo en el desarrollo social y cognitivo de estudiantes con Trastorno del Espectro Autista en la educación primaria, desde un enfoque basado en derechos, equidad y atención a la diversidad. La educación inclusiva se entiende como un proceso integral que trasciende la integración física en el aula y promueve entornos de aprendizaje flexibles, participativos y ajustados a las necesidades individuales. El estudio se apoya en una revisión cualitativa y analítica de literatura científica sobre estrategias pedagógicas inclusivas, desarrollo de habilidades sociales y cognitivas, formación docente y uso de tecnologías educativas. El análisis evidencia que las intervenciones estructuradas, el modelado de conductas sociales, el fortalecimiento de la comunicación y el trabajo sobre la comprensión emocional favorecen la interacción social, la autorregulación y la participación activa del estudiantado con Trastorno del Espectro Autista. Asimismo, se destaca que las tecnologías de apoyo facilitan la personalización de contenidos, la adaptación a los ritmos de aprendizaje, la regulación sensorial y la retroalimentación constante, fortaleciendo la autonomía y el aprendizaje significativo. El profesorado cumple un rol central, ya que su autoeficacia, formación continua y disposición para realizar adaptaciones curriculares inciden directamente en la calidad de las prácticas inclusivas. Finalmente, se resalta la colaboración entre escuela, familia y comunidad como un elemento clave para asegurar coherencia, continuidad educativa y desarrollo integral en la educación primaria. Este enfoque contribuye a orientar decisiones pedagógicas y políticas educativas inclusivas sustentadas en evidencia y compromiso institucional sólido permanente.

Palabras clave:

Inclusión educativa, Trastorno del Espectro Autista, tecnologías de apoyo, desarrollo social, desarrollo cognitivo.

INTRODUCTION

Inclusive education has become a fundamental principle within the framework of human rights and social development, guaranteeing that all students, regardless of their personal characteristics or particular circumstances, have access to meaningful and equitable learning experiences. In this sense, educational inclusion is not limited to physical attendance at school, but rather involves the creation of flexible, adaptive, and participatory learning environments that respond to the diversity of students' abilities, learning styles, and socio-emotional needs.

The Salamanca Statement and the United Nations Framework for Action on Special Needs Education Nations the United Nations Educational, Scientific and Cultural Organization (1994) emphasizes that education should be designed and organized so that all children can learn together, promoting cooperation between students with and without disabilities and fostering equity from the earliest levels of education. This principle has been reinforced by the United Nations' policy guidelines on inclusive education. Nations Educational, Scientific and Cultural Organization (2009), which highlight the importance of training teachers prepared to address diversity and integrating pedagogical strategies that develop academic, social and emotional skills in all students.

Autism Spectrum Disorder presents a particular challenge in primary education due to the cognitive, communicative, and socio-emotional characteristics that can limit interaction with the environment and active participation in school activities. Students with Autism Spectrum Disorder experience difficulties in verbal and nonverbal communication, interpreting social cues, and regulating emotions, which directly impacts their learning and social integration.

However, research has shown that these students can develop significantly if inclusive pedagogical strategies adapted to their needs are implemented, incorporating human and technological support and fostering the structured and continuous practice of social, cognitive, and emotional skills. The combination of guided instruction, theory of mind training, and the use of interactive technological resources improves students' social understanding, problem-solving, and autonomy, promoting their full participation in learning and school life (Adibsereshki et al., 2015; Soares et al., 2021).

Social and cognitive development in primary education depends not only on direct interventions with students but also on teachers' ability to create inclusive, flexible, and motivating learning environments. Teachers' self-efficacy, their willingness to implement curricular adaptations, and their ongoing professional development are key factors for the effective implementation of inclusive strategies, as recent research on the education of students with autism spectrum disorder (Baek et al., 2024) indicates. Teachers with greater confidence in their abilities and knowledge of

students' characteristics implement more equitable educational experiences, using technological tools, educational games, and differentiated instruction methods that promote student participation and holistic development. This underscores the need for teacher training policies that integrate inclusion, the use of assistive technologies, and attention to diversity from primary education onward, guaranteeing equity and educational justice.

The integration of assistive technologies into inclusive pedagogical strategies has proven particularly effective, as it allows for immediate feedback, adapts content to individual learning paces, and encourages repetitive practice in safe and controlled environments. Educational applications, interactive platforms, and social simulation programs facilitate the acquisition of socio-emotional skills, the understanding of social norms, and conflict resolution, contributing to cognitive development and student autonomy (Costescu et al., 2022; Soares et al., 2021).

Furthermore, these tools allow teachers to gather information on student progress, adjust their interventions, and plan personalized activities that strengthen learning and active participation in the classroom. This approach aligns with Vygotsky's (1978) sociocultural perspective, which conceives of learning as a socially mediated process in which interaction with others and the use of cultural tools, including technological ones, promote the development of higher-order cognitive processes.

In primary education, inclusive teaching for students with Autism Spectrum Disorder requires a coordinated approach that integrates academic objectives, social and emotional development, and the values of respect, empathy, and collaboration. Values education, understood as a cross-curricular component, enables students to grasp the importance of positive interaction, cooperation, and ethical responsibility—essential elements for social integration and harmonious coexistence in the classroom. Collaboration among teachers, families, and communities is fundamental to ensuring the coherence of strategies and the continuity of learning in different contexts, reinforcing students' social and cognitive skills and promoting an inclusive environment that fosters holistic development.

Therefore, this article focuses on analyzing and describing inclusive pedagogical strategies that foster the social and cognitive development of students with Autism Spectrum Disorder in primary education, emphasizing the integration of assistive technologies as learning mediators. Practices based on international research and local experiences are explored, identifying factors that promote inclusion, active participation, and the academic and socio-emotional progress of students. The aim is to offer a conceptual and practical framework to guide teachers, researchers, and educational policymakers, contributing to the design of equitable, innovative learning environments adapted to the diverse needs of students.

METHODOLOGY

This article employs a qualitative methodological approach of a descriptive and analytical nature, focused on the review, integration, and critical analysis of relevant scientific literature on inclusive education and pedagogical strategies for students with Autism Spectrum Disorder in primary education. This approach is pertinent due to the nature of the study, which centers on understanding educational practices, theoretical foundations, and empirical evidence related to social and cognitive development mediated by assistive technologies, rather than on the experimental measurement of isolated variables.

The methodology is based on a systematic review of primary and secondary academic sources, including scientific articles published in indexed journals, international institutional reports, specialized books, and theoretical reviews with recognized impact in the field of inclusive education and child development. Sources were selected according to criteria of thematic relevance, methodological rigor, currency, and pertinence to the primary education context. Priority was given to research addressing inclusive pedagogical interventions, the development of social and cognitive skills, teacher training, and the use of assistive technologies in formal educational settings.

The analysis process was structured in several phases. The first phase involved identifying and compiling specialized literature related to inclusive education, Autism Spectrum Disorder, social and cognitive development, and assistive technologies. Subsequently, a comprehensive and analytical reading of the selected texts was conducted to extract key concepts, theoretical approaches, methodologies employed, and main findings. The third phase consisted of thematic categorization of the information, organizing the contributions into analytical axes related to inclusive pedagogical strategies, social and cognitive intervention, technological mediation, the teacher's role, and family and community participation.

The analysis of the information was based on an interpretive approach, which allowed for establishing relationships between the various theoretical and empirical contributions, identifying convergences and divergences in the results of the reviewed research, and constructing an integrated view of the effectiveness of technology-mediated inclusive strategies. Furthermore, a sociocultural perspective on learning was adopted, recognizing the importance of social interaction, pedagogical mediation, and the use of cultural and technological tools in the development of higher cognitive processes.

Finally, the methodology included a critical synthesis exercise aimed at developing pedagogical guidelines and final reflections that can serve as a reference for teachers, researchers, and educational policymakers. This process allowed for the articulation of literature findings with the real needs of primary education, offering a comprehensive

framework for the implementation of contextualized, sustainable, and evidence-based inclusive practices.

DEVELOPMENT

Developing inclusive pedagogical strategies for students with Autism Spectrum Disorder in primary education requires a comprehensive approach that combines attention to individual needs, the implementation of assistive technology resources, and teacher training focused on inclusion. These strategies are based on the premise that education should be equitable and adaptive, providing meaningful learning opportunities for all students while promoting social participation and cognitive development.

International literature highlights those interventions focused on social skills, combined with the use of interactive technologies, contribute to the development of communicative competence, emotional regulation and autonomy of students with Autism Spectrum Disorder, which in turn improves their integration in the classroom and in the school community (Adibsereshki et al., 2015).

Alkinj et al. (2022) highlight that educational programs based on modeling and social storytelling significantly improve the social skills of students with Autism Spectrum Disorder by offering clear and structured examples of appropriate behaviors. Their research demonstrates that repetitive practice and exposure to social situations through guided stories facilitate the understanding of social norms, group interaction, and effective communication, providing concrete tools for educational inclusion in the primary classroom.

American Psychiatric Association, DSM-5 Task Force (2013) provides fundamental diagnostic criteria for identifying autism spectrum disorder, emphasizing the heterogeneity in social communication deficits and the presence of restricted and repetitive patterns of behavior. This guide allows teachers and specialists to design individualized pedagogical strategies, tailored to the cognitive and social needs of each student, ensuring more precise interventions adapted to their learning profile.

American Psychiatric The Association (2022) updated the diagnostic criteria, incorporating dimensional approaches that consider the variability of Autism Spectrum Disorder over time. This perspective underscores the importance of flexible, inclusive strategies and assistive technologies that adapt to individual differences, facilitating students' active participation and the development of social and cognitive skills within the school environment.

Baer et al. (1968) introduced the principles of applied behavior analysis, which form the basis of many behavioral interventions for students with Autism Spectrum Disorder. Their findings emphasize the importance of systematic observation, continuous assessment, and structured instruction using positive reinforcement—elements that can

be integrated with technological tools to maximize inclusive learning in primary education.

Begeer et al. (2011) demonstrate that theory of mind training increases the understanding of others' emotions and perspectives in children with Autism Spectrum Disorder. This approach improves social interaction, fosters empathy, and facilitates collaborative participation in school activities, making it a key strategy within inclusive educational programs supported by digital resources.

Begum and Mamin (2019) demonstrate that Autism Spectrum Disorder has a significant impact on family dynamics, affecting daily organization and interaction. Their findings highlight the need to involve families in inclusive educational strategies, promoting the generalization of social and cognitive skills learned in the classroom to the home and community environment.

Ben-Sasson et al. (2008) present a meta-analysis on sensory modulation in individuals with autism spectrum disorder, identifying atypical responses to auditory, visual, and tactile stimuli. These findings emphasize the importance of designing adaptive learning environments, including the use of assistive technologies that regulate sensory stimulation and promote concentration, participation, and meaningful learning.

Camarata, Stiles, and Birer (2024) address naturalistic behavioral interventions in language disorders, highlighting that the combination of contextualized teaching and interactive technologies enhances the acquisition of communicative and cognitive skills. These principles are applied to students with Autism Spectrum Disorder to strengthen social and language skills within inclusive environments.

Capuozzo et al. (2024) analyze social cognition in developmental disorders, showing that linguistic skills, theory of mind, and executive functions are interrelated to facilitate social understanding. Their findings support the implementation of pedagogical strategies that integrate language activities, social reasoning, and cognitive planning for students with Autism Spectrum Disorder.

Cárcel-López & Ferrando-Prieto (2025) highlight the relationship between sensory profiles and repetitive behaviors in Autism Spectrum Disorder. Understanding these relationships allows teachers to plan interventions that reduce stereotyped behaviors and promote active participation in group and cognitive activities, especially through the use of technologies that structure and support the learning experience.

Coughlan et al. (2022) differentiate between attachment difficulties, Autism Spectrum Disorder, and Attention Deficit Hyperactivity Disorder, highlighting the need for accurate diagnoses to plan effective educational strategies. This approach allows for the selection of appropriate inclusive interventions, with technological resources that

respond to specific social and cognitive developmental needs.

Eckes et al. (2023) present a meta-analysis of applied behavior analysis-based interventions, demonstrating improvements in communication, socialization, and academic skills in children with autism spectrum disorder. Integrating these interventions with assistive technologies facilitates the personalization and repetition of activities, reinforcing the effectiveness of inclusive education.

Eldevik et al. (2010) demonstrate that intensive behavioral intervention programs significantly improve social and cognitive skills in students with Autism Spectrum Disorder. Evidence suggests that combining systematic instruction with technological support enhances outcomes, particularly in primary education settings.

Flippin et al. (2010) show that the picture exchange communication system improves verbal and non-verbal communication in students with Autism Spectrum Disorder, demonstrating that technological tools are fundamental to facilitating the expression of needs, emotions and learning within the inclusive classroom.

Mazefsky et al. (2014) point out that emotional regulation is a critical challenge for adolescents with Autism Spectrum Disorder. Incorporating pedagogical strategies that integrate technology and social practices allows for the development of self-regulation skills, promoting more effective social interactions and participation in school settings.

Vogindroukas et al. (2022) highlight language and communication characteristics in Autism Spectrum Disorder, underlining the need for personalized and technology-mediated interventions to improve comprehension, expression and social skills, fostering inclusive and effective learning.

Wang & Wang (2024) offer a comprehensive review on the etiology, diagnosis, and therapies of Autism Spectrum Disorder, highlighting that early interventions and the use of assistive technologies strengthen social, cognitive, and communicative development, being essential in inclusive pedagogical strategies.

Finally, Zwaigenbaum et al. (2015) recommend early intervention in children under three years of age with Autism Spectrum Disorder, showing that systematic teaching programs and technological support promote the acquisition of social and cognitive skills, increasing the effectiveness of inclusive education and preparing students for the transition to primary education.

According to these studies, the social and cognitive development of students with Autism Spectrum Disorder in primary education requires inclusive pedagogical strategies that consider their individual characteristics and the diversity of their needs. The implementation of structured educational programs, based on modeling, social stories, and visual communication systems, has proven effective

in improving social interaction, understanding of rules, and emotional expression. These strategies allow students to better understand the rules of coexistence, relate to their peers, and participate actively in classroom activities, fostering more meaningful and contextualized learning.

Intensive and systematic instruction, combined with training focused on theory of mind and social-emotional skills, contributes to the development of empathy and emotional self-regulation. Students learn to identify and understand others' perspectives, as well as manage their emotions in everyday situations, thus strengthening their social integration. This approach also helps reduce repetitive or stereotypical behaviors by offering structured and predictable activities that provide security and clarity in educational settings.

The use of assistive technologies has become a key resource for inclusive education. Interactive tools, educational applications, and augmentative and alternative communication (AAC) systems facilitate the adaptation of content and allow for controlled sensory stimulation, reinforcing cognitive and social learning. The integration of these technologies also enhances student autonomy, promoting active participation and the development of communicative and academic skills, enabling them to transfer this learning to contexts outside the classroom.

Collaboration among teachers, families, and the community is an essential component of the success of these strategies. Family involvement strengthens the generalization of social and cognitive skills to the home and daily life, while interaction with the community expands opportunities for inclusion and experiential learning. Adaptive pedagogical planning, considering students' sensory, cognitive, and emotional differences, allows for a holistic approach that integrates academic, social, and emotional aspects.

These strategies demonstrate that inclusive education involves not only physical integration in the classroom, but also the creation of learning environments that foster autonomy, positive interaction, and holistic development. The combination of behavioral, linguistic, and technological interventions maximizes each student's potential, ensuring that teaching and learning processes are effective, meaningful, and relevant, thus contributing to the development of socially competent and emotionally balanced individuals.

In pedagogical practice, inclusion requires the planning of differentiated activities, the adaptation of curricular content, and the implementation of specific supports that allow each student to actively participate in learning (Soares et al., 2021). The use of technological platforms, educational applications, and social simulation programs has proven particularly effective for students with autism spectrum disorder, as they provide structured, predictable, and safe environments where social, cognitive, and

problem-solving skills can be practiced without the pressure of immediate interaction (Costescu et al., 2022). These tools facilitate constant feedback, repetition of exercises, and personalization of activities—fundamental aspects for addressing the heterogeneity of abilities and learning paces.

Furthermore, the integration of inclusive pedagogical strategies must consider teacher training and self-efficacy, as teachers play a central role in the implementation and sustainability of inclusive practices. Recent research indicates that teachers who are confident in their ability to manage diversity and are willing to implement curricular adaptations achieve more effective results in the social and cognitive development of students with autism spectrum disorder (Baek et al., 2024). Therefore, ongoing professional development, reflection on practice, and institutional support are essential elements for strengthening educational inclusion, ensuring that students can develop their skills in a holistic and participatory manner.

From Vygotsky's theoretical perspective (1978), learning is conceived as a social and culturally mediated process in which interaction with teachers, peers, and mediating tools contributes to the development of higher-order cognitive processes. Applying this perspective to the design of inclusive strategies implies that teachers must facilitate collaborative learning experiences, promote active participation, and provide opportunities for contextualized practice. Teaching based on social interaction, cooperative projects, and technology-assisted learning allows students with Autism Spectrum Disorder to acquire social and cognitive skills while reinforcing values of cooperation, empathy, and respect for diversity.

In this context, interventions based on theory of mind training and social skills programs have proven effective in improving students' ability to recognize emotions, understand others' perspectives, and respond appropriately to social situations (Adibsereshki et al., 2015). These strategies, combined with technological resources, allow for greater student participation in school life, increasing their motivation, self-esteem, and sense of belonging. Furthermore, inclusive education also requires the active collaboration of families and the school community, who strengthen the coherence between academic learning and social skills, ensuring that acquired knowledge and skills are generalized beyond the classroom.

The planning of inclusive pedagogical strategies must be systematic and continuous, based on observation, evaluation, and ongoing adjustment of interventions, with the goal of addressing students' evolving needs. Progress assessment includes both cognitive development and the acquisition of social skills and the ability to participate in group settings, using qualitative and quantitative indicators to guide pedagogical decision-making (Costescu et al., 2022). The combined use of technology, teacher mediation, and collaborative practices consolidates an

inclusive educational model that promotes equity, meaningful learning, and the holistic development of students with Autism Spectrum Disorder, fostering their full inclusion in the school community and society at large .

CONCLUSIONS

Inclusive education in primary school is an essential component for guaranteeing the right to an equitable, relevant, and quality education for students with Autism Spectrum Disorder. Educational inclusion implies a profound transformation of pedagogical practices, the role of teachers, and school organization, moving beyond mere physical integration in the classroom to educational models that recognize and value diversity as an opportunity for collective learning.

The results show that the social and cognitive development of students with Autism Spectrum Disorder is significantly enhanced when inclusive pedagogical strategies adapted to their individual characteristics are implemented. Structured instruction, modeling of social behaviors, training in emotional understanding and theory of mind, as well as strengthening communication skills, contribute to improved social interaction, participation in group activities, and emotional regulation. These strategies allow students to navigate the school environment with greater confidence and construct meaningful learning experiences that extend beyond the academic sphere.

Furthermore, the integration of assistive technologies is becoming a key pedagogical resource for enhancing inclusion processes. Technological tools facilitate the personalization of content, adaptation to different learning paces, and the creation of structured and predictable environments, which is especially relevant for students with specific needs. In addition, these technologies promote communication, autonomy, and the repeated practice of social and cognitive skills, strengthening learning and its transfer to other contexts of daily life.

The role of teachers emerges as a determining factor in the effectiveness of inclusive strategies. Teacher self-efficacy, ongoing professional development, and the willingness to implement curricular adaptations directly influence the quality of educational experiences offered. Teachers with a solid understanding of inclusion and institutional support are able to design flexible, collaborative, and diversity-sensitive learning environments, promoting active participation and the holistic development of students.

Collaboration between school, family, and community is also identified as an essential element for the success of inclusive education. Family involvement strengthens the generalization of skills acquired in the classroom, while engagement with the community expands opportunities for social interaction and meaningful learning. This collaborative work fosters coherence in pedagogical strategies and contributes to building more inclusive and sustainable educational environments.

Inclusive education for students with Autism Spectrum Disorder in primary school requires a comprehensive approach that integrates adapted pedagogical strategies, technological support, teacher training, and family and community involvement. The systematic implementation of these elements allows us to move toward fairer, more equitable, and more humane educational models, capable of promoting students' social, cognitive, and emotional development, as well as their full inclusion in school and social life.

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Conflict of Interest:

The authors declare no conflict of interest.

Author Contributions:

Parvin Houshyari: Conception and design of the study, data acquisition, analysis and interpretation, manuscript drafting, critical content review, statistical analysis, and overall supervision of the study.

Ethical statement:

The study was based on the analysis of documentary sources and publicly available data, and therefore did not involve the direct participation of human subjects. No personally identifiable information was handled.