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TEACHING MATHEMATICS TO STUDENTS WITH DOUBLE EXCEPTIONALITY, AUTISM SPECTRUM DISORDER (ASD), AND HIGH ABILITIES/GIFTEDNESS IN THE EARLY YEARS

O ENSINO DE MATEMÁTICA A ESTUDANTES COM DUPLA EXCEPCIONALIDADE TRANSTORNO DO ESPECTRO AUTISTA (TEA) E ALTAS HABILIDADES/ SUPERDOTAÇÃO NOS ANOS INICIAIS

ENSEÑANZA DE MATEMÁTICAS A ESTUDIANTES CON DOBLE EXCEPCIONALIDAD, TRASTORNO DEL ESPECTRO AUTISTA (TEA) Y ALTAS CAPACIDADES/DOTACIÓN EN LOS PRIMEROS AÑOS

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ABSTRACT

This article discusses pedagogical practices for teaching mathematics to students with dual exceptionalities—those who are simultaneously diagnosed with Autism Spectrum Disorder (ASD) and High Abilities/Giftedness (HA/GD) in the early years of elementary school. The research is based on a systematic literature review, with case study analysis and a descriptive approach, aiming to understand the challenges faced by this population and propose inclusive and personalized teaching strategies that consider their specific needs. The results indicate that methodologies based on explicit instruction, curricular enrichment, and visual approaches are effective in enhancing the mathematical abilities of these students, respecting their cognitive and emotional particularities. Although there have been theoretical and legal advances in the field of inclusion, gaps remain in teacher training and school practices, especially in the recognition and appropriate support of dual exceptionalities. The discussion emphasizes the importance of curricular flexibility, individualized assessment, and intentional pedagogical mediation in the teaching-learning process. It is concluded that a personalized approach that values both the talents and challenges of students with ASD and AH/SD is fundamental to ensuring a meaningful, inclusive and equitable mathematics education.

Keywords: Double Exceptionality. Autism. High Abilities/Giftedness. Mathematics Education. Inclusion.

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RESUMO
Este artigo discute práticas pedagógicas voltadas ao ensino de Matemática para estudantes com dupla excepcionalidade, aqueles que apresentam, simultaneamente, diagnóstico de Transtorno do Espectro Autista (TEA) e Altas Habilidades/Superdotação (AH/SD) nos anos iniciais do ensino fundamental. A pesquisa fundamenta-se em uma revisão bibliográfica sistemática, com análise de estudos de caso e abordagem descritiva, visando compreender os desafios enfrentados por esse público e propor estratégias de ensino inclusivas e personalizadas, que considerem suas necessidades específicas. Os resultados indicam que metodologias baseadas no ensino explícito, no enriquecimento curricular e em abordagens visuais são eficazes para potencializar as habilidades matemáticas desses estudantes, respeitando suas particularidades cognitivas e emocionais. Embora haja avanços teóricos e legais no campo da inclusão, ainda persistem lacunas na formação docente e nas práticas escolares, especialmente no reconhecimento e no atendimento adequado da dupla excepcionalidade. A discussão enfatiza a importância da flexibilização curricular, da avaliação individualizada e da mediação pedagógica intencional no processo de ensino-aprendizagem. Conclui-se que uma abordagem personalizada que valorize tanto os talentos quanto os desafios dos estudantes com TEA e AH/SD é fundamental para garantir uma educação matemática significativa, inclusiva e equitativa.

Palavras-chave: Dupla Excepcionalidade. Autismo. Altas Habilidades/Superdotação. Ensino de Matemática. Inclusão.

RESUMEN
Este artículo analiza las prácticas pedagógicas para la enseñanza de las matemáticas a estudiantes con doble excepcionalidad (aquellos con diagnóstico simultáneo de Trastorno del Espectro Autista (TEA) y Altas Capacidades/Superdotación (AA/TG) en los primeros años de la educación primaria. La investigación se basa en una revisión sistemática de la literatura, con análisis de casos prácticos y un enfoque descriptivo, con el objetivo de comprender los desafíos que enfrenta esta población y proponer estrategias de enseñanza inclusivas y personalizadas que consideren sus necesidades específicas. Los resultados indican que las metodologías basadas en la instrucción explícita, el enriquecimiento curricular y los enfoques visuales son eficaces para potenciar las habilidades matemáticas de estos estudiantes, respetando sus particularidades cognitivas y emocionales. Si bien se han producido avances teóricos y legales en el ámbito de la inclusión, persisten lagunas en la formación docente y las prácticas escolares, especialmente en el reconocimiento y el apoyo adecuado a las dobles excepcionalidades. La discusión enfatiza la importancia de la flexibilidad curricular, la evaluación individualizada y la mediación pedagógica intencional en el proceso de enseñanza-aprendizaje. Se concluye que un enfoque personalizado que valore tanto los talentos como los desafíos de los estudiantes con TEA y AH/SD es fundamental para garantizar una educación matemática significativa, inclusiva y equitativa.

Palabras clave: Doble Excepcionalidad. Autismo. Altas Capacidades/Superdotación. Educación Matemática. Inclusión.

1 INTRODUCTION

Contemporary inclusive education proposes to meet the diversity of students, considering their multiple singularities and promoting the right to learning for all. In this context, students with double exceptionality — especially those with HA/DS associated with ASD — challenge traditional pedagogical practices and demand specific educational interventions. These students present a complex profile: they can demonstrate exceptional cognitive abilities, particularly in areas such as Mathematics, while facing significant difficulties in communication, social interaction and behavioral flexibility.

Understanding the interaction between ASD and high abilities is essential to develop pedagogical strategies that enhance the capabilities of these students and respect their specific needs. Despite the advances provided by public policies, such as the National Policy on Special Education in the Perspective of Inclusive Education (BRASIL, 2008), cases of underdiagnosis, invisibility and lack of adequate support are still recurrent, which can result in frustration, demotivation and low school performance.

In the teaching of Mathematics, specifically, it is essential to adopt differentiated approaches that consider both the talents and the limitations of these students. Strategies such as curriculum enrichment, use of visual resources, structured teaching, and individualized assessment can favor learning and integral development. In view of this scenario, this article seeks to reflect on pedagogical practices aimed at teaching Mathematics to students with double exceptionality in the early years of elementary school, contributing to the construction of a fairer, more inclusive and responsive educational environment to the singularities of this public.

2 METHODOLOGY

This study adopted a qualitative approach with the objective of understanding the pedagogical practices in the teaching of mathematics to students with double exceptionality, specifically those diagnosed with ASD AH/SD. To this end, a systematic literature review was carried out, seeking to identify and analyze scientific productions published between the years 2019 and 2024.

The selection of bibliographic material was based on searches in the SciELO, CAPES Periódicos and Google Scholar databases, using combinations of keywords such as "double exceptionality", "autism", "high abilities/giftedness" and "mathematics teaching". To ensure the relevance and quality of the studies analyzed in this master's project, clear criteria for

inclusion and exclusion of articles were defined. The inclusion criteria considered peer-reviewed scientific publications, available in full text, published in the last ten years, and that directly addressed the central theme of the research. In addition, studies in Portuguese, English and Spanish were prioritized in order to expand the database and ensure diversity of contexts. On the other hand, the exclusion criteria included duplicate articles, abstracts without access to the full text, opinion publications or without a defined methodology, as well as studies that, despite containing terms related to the theme, did not contribute significantly to the objectives of the research. This careful selection sought to ensure the consistency and depth of the theoretical analysis.

After the initial screening, the abstracts and titles were read to select the most relevant materials, followed by the full reading of the chosen texts. Thematic analysis was used as a technique for the organization and interpretation of the data, grouping the information into categories that emerged from the literature: cognitive and socio-emotional characteristics of students with double exceptionality, pedagogical strategies in mathematics teaching, challenges faced by teachers and recommended inclusive practices. The analysis of the studies allowed the identification of patterns, gaps and trends that supported the discussion of the results.

3 RESULTS

The qualitative analysis revealed that the identification of students with ASD and HA/DS is a considerable challenge, since the behaviors associated with autism can often mask high abilities. For example, a student's intense fixation on a topic, a hallmark of ASD, can easily be confused or misinterpreted, when in fact it can be a manifestation of talent and deep mastery in an area, such as mathematics. This difficulty in identification can lead to an underestimation of the student's intellectual capacities, resulting in a gap between their potential and the learning opportunities offered to them.

Mathematics plays a central role in the education of all students, including those belonging to the Special Education Target Audience (PAEE), which includes individuals with disabilities, global developmental disorders and high abilities/giftedness. Qualified access and success in this discipline are determining factors for strengthening skills that favor an autonomous life (BOUCK et al., 2021).

Legislative advances, such as the Brazilian Inclusion Law (Law No. 13,146/2015), have established clear guidelines for the implementation of inclusive education, and it is observed that the implementation of these principles in school practices still faces considerable challenges. In mathematics teaching, in particular, the need to simultaneously meet the specific demands and cognitive potentials of students with double exceptionality requires not only curricular adaptations, but also the construction of pedagogical practices that recognize the uniqueness of these subjects and promote the full development of their competences.

The analysis of the selected studies revealed that students with double exceptionality, specifically those diagnosed with ASD and High AH/DS, have a very unique cognitive profile in the field of mathematics. In general, these students demonstrate advanced mathematical skills, such as logical-abstract thinking, rapid problem solving, and the ability to identify complex patterns (Assouline, Foley-Nicpon & Whiteman, 2012; Ronksley- Pavia, 2015). However, such potentialities coexist with socio-emotional and communicative difficulties characteristic of ASD, which can negatively affect their academic performance and their interaction in the school environment (Oliveira, Almeida & Fleith, 2021).

It was found that many of these students, despite demonstrating high capacity in specific mathematical tasks, face challenges in understanding verbal utterances, adapting to activities that require cognitive flexibility or collaborating in group work. These obstacles often lead to an underutilization of their skills, particularly in educational contexts that are not adequately prepared to deal with the complexity of double exceptionality (Foley-Nicpon et al., 2013).

Regarding pedagogical practices, the results indicate that strategies based on explicit teaching, visual organization of information and curricular enrichment are the most effective to serve this audience (Baum, Schader & Hébert, 2014). The use of visual schemes, clear instructions and step-by-step scripts proved to be fundamental to favor students' understanding and engagement (Assouline & Foley-Nicpon, 2012). In addition, the possibility of working with mathematical research projects, adapted to the specific interests of the students, contributed to the maintenance of motivation and the development of autonomy (Reis, Baum & Burke, 2014).

4 DISCUSSION

Although the Brazilian Inclusion Law (Law No. 13,146/2015) represents an important normative milestone in the consolidation of the educational rights of people with disabilities and discharges habilities/giftedness, the effectiveness of a truly inclusive education still depends on structural changes in pedagogical practice.

As Mantoan (2003) and Stainback and Stainback (1999) argue, school inclusion is not restricted to physical access, but requires the construction of educational practices that value diversity and recognize difference as the organizing axis of the teaching-learning process. In mathematics teaching, serving students with double exceptionality implies creating environments that respect their cognitive singularities, promoting strategies that simultaneously challenge their potential and respond to their specific needs.

Curricular enrichment, through the offer of more advanced content or extracurricular projects, was identified as a practice capable of valuing the high capacities of these students without disregarding their support needs. In addition, the incorporation of assistive technologies, such as mathematical simulation software and adaptive digital platforms, was also highlighted as an important tool to promote more personalized and effective learning (Van Tassel-Baska & Hubbard, 2016).

However, the studies also highlighted numerous challenges faced by educational institutions and teachers. The absence of specific training to deal with the double exceptionality, the resistance to curricular flexibility and the difficulty in correctly identifying these students were pointed out as significant barriers (Ronksley-Pavia, 2015; Oliveira et al., 2021). Often, students with ASD and HA/DS are mistakenly perceived only for their social limitations, which leads to the neglect of their academic potential, or they are seen exclusively as "geniuses", ignoring their socio-emotional needs (Baum et al., 2014).

The discussion of the results reinforces the need for an educational approach that recognizes the complexity of double exceptionality, promoting both the development of mathematical skills and the support for the difficulties associated with the autistic spectrum. The continuing education of teachers, the performance of multiprofessional teams and the creation of individualized educational plans emerge as essential elements for the construction of effective inclusive practices (Foley-Nicpon et al., 2013; Reis et al., 2014).

Table 1

Effective practices and main challenges in teaching mathematics to students with double exceptionality (ASD + AH/SD)

Effective Pedagogical Practices	Key Challenges Identified
Explicit teaching organized in clear stages;	Absence of specific teacher training;
Use of visual schemes, diagrams and adapted visual resources;	Underdiagnosis and inadequate identification;
Curricular enrichment with mathematical research projects;	Resistance of school institutions to curricular flexibility;
Adaptation of communication and simplification of statements;	Difficulties in social interaction in collaborative activities;
Use of assistive technologies for personalized learning;	Lack of adequate pedagogical resources and specialized support;
Socio-emotional support focused on self-regulation;	Mismatched academic expectations (overvaluation or underestimation);

Source: authors-2025.

When we analyze the picture, we can see that the demand for carefully elaborated pedagogical practices that articulate the recognition of their high cognitive skills with the fulfillment of their specific needs in the socio-emotional and communicational field. In this context, the implementation of effective educational strategies must be based both on scientific evidence and on sensitive listening to the particularities of these subjects.

Among the teaching strategies with the greatest potential for impact, explicit teaching stands out, structured in sequential stages and with objective language, which favors predictability and understanding of the contents. The use of visual supports such as diagrams, diagrams and adapted images is also fundamental, especially because it aligns with the more visual learning style often observed among students with ASD. Curricular enrichment, in turn, allows the broadening of the horizons of traditional mathematical content, through research projects that stimulate creativity, logical reasoning and critical thinking, respecting the interests and unique rhythm of each student.

In addition, the adequacy of language in the statements of activities, the incorporation of assistive technologies aimed at personalizing the teaching-learning process and the offer of socio-emotional support, with a focus on self-regulation and the enhancement of self-esteem, are indispensable measures for the promotion of an inclusive educational environment, in which the potential of these students can be fully recognized and developed.

However, the consolidation of these practices encounters a series of structural and formative obstacles. The lack of teacher training specifically aimed at understanding the double.

Exceptionality represents one of the greatest challenges, aggravated by the lack of knowledge, on the part of many education professionals, about the pedagogical implications resulting from this condition. Underdiagnosis or misidentification contribute to the invisibility of this group, hindering effective and personalized interventions. In addition, institutional resistance to curricular flexibility, combined with the scarcity of adapted pedagogical resources and specialized support, compromises the effectiveness of educational proposals.

Other factors, such as difficulties in social interaction, especially in collaborative learning contexts, and the existence of unadjusted academic expectations, either due to overvaluation of intellectual capacities or underestimation of behavioral limitations, further aggravate the challenges faced. Such aspects highlight the urgency of an interdisciplinary pedagogical approach, based on attentive listening, the personalization of strategies and the commitment to equity. Meeting the specificities of students with ASD and AH/DS is, above all, an essential step towards strengthening a truly inclusive and transformative education.

5 CONCLUSION

The present study showed that the teaching of mathematics to students with double exceptionality, specifically those diagnosed with ASD and HA/DS, demands pedagogical practices that are simultaneously challenging and sensitive to their socio-emotional needs. The research revealed that these students have a remarkable potential for mathematical learning, but that this potential is often compromised by difficulties in communication, social adaptation and the absence of adequate educational practices.

The most effective teaching strategies identified in the literature include the use of explicit teaching, visual materials, assistive technologies, and curricular enrichment projects aimed at the individual interests of students. Such practices not only expand the possibilities of expression and understanding of mathematical content, but also promote motivation, autonomy, and the development of socio-emotional skills essential for learning.

On the other hand, the challenges for the effective inclusion of these students remain significant. The lack of specific teacher training, the lack of knowledge about double exceptionality and the lack of adapted educational policies reinforce the urgent need for investments in the continuing education of teachers and in the construction of truly inclusive

educational environments. In addition, the importance of collaborative work between teachers, specialists in special education, psychologists and families in the elaboration of individualized educational plans that contemplate both the potentialities and the support needs of these students.

In summary, ensuring the full development of students with double exceptionality requires a paradigm shift in the school context: it is necessary to recognize the coexistence of giftedness and the difficulties associated with ASD, overcoming fragmented views that value only one of the aspects of the identity of these subjects. In this way, fairer, more inclusive and effective educational practices can be consolidated, enabling these students to fully realize their academic and personal potential.

It is suggested, for future research, to carry out field studies that explore specific pedagogical interventions in the teaching of mathematics for this audience, as well as the development of instruments for early identification and continuous support to students with double exceptionality.

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