



## Teaching practices for autistic children: a narrative review of the literature

*Práticas de ensino para crianças autistas: uma revisão narrativa da literatura*

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### Abstract

Autism Spectrum Disorder (ASD) refers to conditions related to impairments in neurological development, social communication, and restricted and repetitive movements. Receiving a student with ASD in a regular school can be a source of insecurity. Given this fact, the present research aims to evaluate teaching practices developed with children with ASD. This research is a narrative review of the literature. For the study, scientific articles that examined teaching practices for children with ASD in the databases Scopus, Web of Science, and Scielo were selected. After applying the protocols, 22 articles were identified and analyzed using the criteria: use of technology in teaching, teaching strategies, language and mathematics teaching methods, and teacher preparation. The results point to a gap in research with proposals that can help teachers with differentiated and adapted teaching strategies for children with ASD in the inclusion process.

**Keywords:** teaching practices; child; Autism, ASD.

### Resumo

O Transtorno do Espectro Autista (TEA) refere-se a condições relacionadas a prejuízos no desenvolvimento neurológico, na comunicação social e a movimentos restritos e repetitivos. Receber um aluno com TEA em uma escola regular pode ser motivo de insegurança. Diante desse fato, a presente pesquisa tem como objetivo avaliar as práticas docentes desenvolvidas com crianças com TEA. Trata-se de uma revisão narrativa da literatura. Para o estudo, foram selecionados artigos científicos que examinavam práticas docentes com crianças com TEA, nas bases de dados - Scopus, Web of Science e Scielo. Após a aplicação dos protocolos, foram identificados e analisados 22 artigos pelos critérios: uso da tecnologia no ensino, estratégias de ensino, métodos de ensino de línguas e matemática e preparação de professores. Os resultados apontam para uma lacuna em pesquisas com propostas que possam auxiliar professores com estratégias de ensino diferenciadas e adaptadas para crianças com TEA no processo de inclusão.

**Palavras chave:** práticas de ensino; criança; Autismo; TEA.

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## 1 Introduction

Brazil published the National Policy on Special Education from the Perspective of Inclusive Education (PNEEPEI) in 2008. In this document, ASD is mentioned in the group of pervasive developmental disorders (PDD), and it is indicated that students who were part of this group presented changes in reciprocal social interactions and communication, in addition to restricted and repetitive behaviors.

The history of ASD diagnosis follows the different approaches to mental illnesses developed since the 1940s (Wuo; Yaedu; Wayszceyk, 2019). In 2013, the American Psychiatric Association (APA) published the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), defining ASD as a neurodevelopmental disorder characterized by a triad of impairment in communication, socialization, and behavior. The DSM-5 considers that symptoms and behaviors change as the individual develops. Some behaviors are present in some individuals and not in others, which ends up making the diagnosis of autism difficult (American Psychiatric Association, 2014; Pezzi; Frison, 2023). However, it is necessary to identify and understand each behavior that an individual with ASD may present. These behaviors are the conditions that define the classification level (Giaretta, 2021; Zañartu; Pérez-Salas, 2023).

In this sense, the DSM-5 divided the severity of autism into three levels, according to the behaviors and characteristics that each individual presents, namely:

- Level 1 (the individual needs support);
- Level 2 (individual needs substantial support);
- Level 3 (individual needs very substantial support).

The objective of these levels is to support a more transparent and more precise diagnosis of ASD (American Psychiatric Association, 2014). It is understood, therefore, that the main factors for classifying the level of severity of an atypical person depend on the severity of the impairment of the specific symptoms mentioned in the DSM-5. The greater the need for intervention, the more severe the level of autism (Balbueno; Stravogiannis, 2021; Park et al., 2023).

In summary, ASD is classified as a neurodevelopmental disorder with a multifactorial cause, with significant impairments in socio-communicative skills, deficits in social interaction, and stereotypical or repetitive behaviors (Mota et al., 2020; Sousa, et al., 2022; Trevizan; Araújo, 2022).

This article analyzes scientific publications that address teaching practices for children with ASD to provide a comprehensive and updated view of research in this field.

2 Methods

A narrative literature review was conducted to answer this study's guiding question. According to Silva et al. (2002), the narrative review allows the researcher to report on other works based on their understanding.

This document covers articles published between 2013 and 2023. The time interval was defined to select recent articles highlighting scientific publications regarding teaching practices for autistic children in the inclusion process.

This study collected information in three databases, Scopus, Web of Science, and Scielo, between June and July 2023. The following keywords and combinations were used for the search: "teach" AND "children" AND "autism". The results of the combinations in each database are presented in Table 1.

Table 1- Number of Articles Selected in the Database

Keyword	Scopus	Web of Science	Scielo	Total
"teach" AND "children" AND "autism"	8	5	9	22

Source: Own authorship (2023).

The process of creating this narrative literature review is presented in Table 2.

Table 2- Document Scanning Process

Data base	Scopus	Web Science of	Scielo
Results	879	1140	4268
2013 to 2023	577	872	2546
Original Articles and Review Articles	433	794	1671
Duplicate Documents	0	3	4
Documents Deleted by Title	265	498	1402
Documents Deleted by Abstract	125	209	233
Documents Misaligned with the Research Objective	35	79	23
Selected Documents	8	5	9

Source: Own authorship (2023)

The exclusion of duplicate articles was implemented for the document selection. Duplicate documents in the databases were removed using Mendeley software.

The second exclusion filter verified the studies' adherence to this research theme. To this end, the titles of the selected works were initially analyzed, checking

whether they indicated that they dealt with teaching children with ASD. When these were not clear enough, the abstracts of the works were analyzed.

If the lack of clarity persisted, a complete reading of the selected articles was carried out to confirm the exclusion of studies that were not aligned with the objective of this research.

After the filter process, the themes and objectives of the 22 articles were read and analyzed. With this analysis, four main themes were identified, which became the analysis criteria of the present study:

- The use of technology in teaching children with ASD;
- Inclusive pedagogical practices;
- Teaching strategies for students with ASD;
- The teacher and students with ASD in the inclusion process.

The modeling of this article follows the IMRaD model, which proposes a structure organized into sections aimed at the logical exposition of research results and palatable reading (Pilatti et al., 2023).

### 3 Results

Table 3 highlights the authors, the articles' titles, the research's objective, and the main findings of the studies selected in the databases.

**Table 3** - List of the most relevant articles about teaching practices for students with ASD

#	Authors	Objectives	Results and Contributions
A1	Abdo & Osman (2019)	Assess the methodology and limitations of published literature investigating the use of technology to teach reading and writing skills to children with ASD.	There is a lack of software applications adapted for children with autism.
A2	Accardo <i>et al.</i> (2017)	Investigate teacher preparation to use effective practices in teaching children with ASD.	Teachers with greater confidence in using effective practices have a higher perception of their teaching ability.
A3	Ainsworth <i>et al.</i> (2016)	To teach letter-sound correspondence to small groups of students with intellectual disabilities	For students with severe and multiple disabilities, there are many barriers to literacy acquisition.
A4	Aporta & Lacerda (2018)	Present activities were offered to a student with ASD in the second year of elementary school at a private school.	Few studies present practical strategies for the learning effectiveness of children with disabilities.

#	Authors	Objectives	Results and Contributions
A5	Asaro -Saddler (2016)	Review the characteristics of students with ASD that may affect their writing. Examine evidence-based practices and how these practices can be implemented in teaching writing.	Teachers often do not know the best way to teach students with disabilities.
A6	Conn_(2018)	Explore whether the account of learning, which involves a shared way of thinking, is suitable for describing the learning of students with ASD.	Effective pedagogy and inclusive practice are located in the quality of learning relationships and the context-sensitive, moment-to-moment professional judgments teachers make in learning interactions.
A7	Conner <i>et al.</i> (2022)	Identify how teachers of students with disabilities are being trained in literacy skills.	Teachers receive literacy training that is inconsistent with what they implement in the classroom.
A8	Cox & Jiménez (2020)	Extend the work of Fleury (2014) by expanding his findings of interventions for teaching academic content to students with ASD.	Teachers need access to scientifically validated strategies that can be effective with this heterogeneous population to teach grade-aligned mathematics to individuals with disabilities.
A9	Fleira & Fernandes (2019)	Analyze the mathematical practices of a student with ASD included in Elementary School.	Analyzes highlight the importance and influence of mediating instruments (materials and semiotics) in the mathematical practices of atypical students.
A10	Fleira & Fernandes (2021)	Understand how Basic Education teachers of autistic students analyze pedagogical practices in their Mathematics classes.	Teachers have expectations regarding their students' learning and believe in their potential, regardless of the uniqueness that each one presents.
A11	Goh <i>et al.</i> (2013)	To evaluate the feasibility and effectiveness of an innovative curriculum designed to teach communicative and expressive receptive language to nonverbal children with autism through reading and writing.	Literacy instruction can be a path to language acquisition for some children with autism who have little or no spoken language.
A12	Gomes & Souza (2016)	To evaluate the teaching of oral reading and reading comprehension of three boys with autism, students at regular schools.	Broad assessments of the characteristics and behaviors of students with ASD and diverse repertoires during teaching are necessary.
A13	Howorth <i>et al.</i> (2019)	Describe ideas for using a specific Augmented Reality (AR) app to teach phonics and word identification, support reading fluency, and embed videos in texts as tips for reading comprehension.	Augmented Reality applications can provide instructional support for students with ASD. Using AR can help teachers implement reading skills practices and provide more opportunities for independent practice.

#	Authors	Objectives	Results and Contributions
A14	Love <i>et al.</i> (2019)	Develop an instrument that can be used to measure teachers' self-efficacy to work effectively with students with ASD.	Using a measure of student-specific teaching self-efficacy may provide more helpful information to support teachers' beliefs about teaching students with ASD.
A15	Moore <i>et al.</i> (2013)	Test a procedure involving point-of-view video modeling, backward chaining, and reinforcement to teach a child with ASD to write their name.	Point-of-view video modeling, in combination with backward chaining and reinforcement, can be an effective tool for teaching new academic skills.
A16	Picharillo & Postalli (2021)	Evaluate the effects of teaching relationships between dictated numbers, Arabic numbers, and quantity using the Matching to Sample (MST) procedure based on the stimulus equivalence paradigm. Then, evaluate generalization through manipulative materials with students with ASD.	Data replicated and expanded the results of the stimulus equivalence paradigm as a resource for teaching relationships between dictated numbers, Arabic numbers, and quantities with autistic children.
A17	Ravet (2018)	Identify whether the many teachers prepared for professional practice participate in initial teacher training courses at universities worldwide.	Most teachers and tutors have some essential awareness of autism but little or no knowledge and understanding of autism teaching strategies.
A18	Rocha <i>et al.</i> (2019)	Conduct an integrative review of scientific articles on curricular intervention protocols, which focus on linguistic aspects, for teaching individuals with ASD.	There is a gap in national primary education, which may justify the country's low-quality aspects of inclusive education.
A19	Rocha <i>et al.</i> (2021)	Describe the overview of the pedagogical context in preschool education for students with ASD.	The scenario of the pedagogical context in preschool teaching for students with ASD requires reflection. Information about the characteristics of ASD, training courses, and knowledge about individual monitoring are necessary so that teachers are prepared to promote effective teaching-learning.
A20	Souza & Silva (2019)	Present alternatives to help students with ASD have full access to the school curriculum.	Technological resources can represent a pedagogical alternative when working with autistic students.
A21	Vasconcellos <i>et al.</i> (2020)	Analyze the educational practices adopted in the schooling of a student with ASD in Integrated Technical Education.	There is a lack of adequate schooling conditions for students with ASD. However, there are also challenges concerning weaknesses in the training of educators and the need to institutionalize educational guidelines and practices based on human diversity.

#	Authors	Objectives	Results and Contributions
A22	Wu (2023)	Propose a teaching model that implements AR and video modeling to solve mathematical problems.	The teaching model, video, and AR provide an alternative way for classroom teachers to teach students with disabilities to solve math problems.

Source: Own authorship (2023).

The analysis of the results obtained from the 22 selected articles makes it possible to understand the contributions of these studies and identify possible gaps and challenges related to teaching practices for children with autism.

This analysis is accompanied by a reflection on the topics covered, allowing a more comprehensive and critical view of the relevance and impacts of this research in the educational context. Furthermore, they provide a basis for further studies and improved understanding regarding teacher training in this area of knowledge (Prodanov; de Freitas, 2013).

4 Discussion

The contexts and discussions addressed in the articles under study are relevant to the objective of this research. Figure 1 consists of a word cloud formed from the frequency of the most recurrent terms in articles. Displaying terms in sizes proportional to their frequency of occurrence gives a dimension of the frequency of occurrence and the correlation between these terms. This visual representation aims to provide a panoramic and intuitive view, allowing the identification, in the foreground, of the most recurring and relevant terms in the study area and, in the background, the correlation between the terms. In this way, it is feasible to initially identify the most discussed topics in the literature on teaching practices for children with ASD and also to identify a multiplicity of research problems and respective objectives.



**Figure 1** - Word cloud constructed from the articles' keywords



**Source:** Own authorship (2023).

As shown in Figure 1, the most common terms in the articles analyzed are autism, teacher, teaching, and ASD. The word “teaching,” present among the four most recurrent, refers to teaching focused on the preparation of teachers to teach children with ASD and on evaluations of teaching methodologies that are used in unique and regular schools with children with ASD in the process of inclusion (Abdo; Osman, 2019; Accardo et al., 2017; Fleira; Fernandes, 2019; Howorth et al., 2019; Rocha et al., 2019; Rocha et al., 2021; Sousa; Silva, 2019; Vasconcellos et al., 2020; Wu, 2023). Studies aimed at individual teaching strategies for students with ASD were also identified based on tests and investigations of teaching methods and teacher preparation (Ainsworth et al., 2016; Love et al., 2019; Aporta; Lacerda, 2018; Asaro-Saddler, 2016; Conn, 2018; Conner et al., 2022; Cox; Jiménez, 2020; Fleira; Fernandes, 2021; Goh et al., 2013; Gomes; Souza, 2016; Moore et al., 2013; Picharillo; Postalli, 2021; Ravet, 2018).

From this general analysis of the articles, four main themes were identified and exposed in the methods section, which constituted analysis criteria and are analyzed and presented individually below.



#### *4.1 The use of technology in teaching children with ASD*

One of the most recurring themes among the articles was the use of technology as an alternative means of teaching individuals with ASD. The scope of this theme includes evaluating the use of technology as a teaching methodology (Abdo; Osman, 2019), testing video modeling procedures as reinforcement for teaching atypical children to write their names (Moore et al., 2013; Wu, 2023); the use of technology to improve spelling skills (Asaro-Saddler, 2016); the use of an Augmented Reality (AR) application as a tool and support for teachers to implement their teaching planning (Howorth et al., 2019; Wu, 2023); and the use of digital educational technological resources for inclusion (Souza; Silva, 2019). These themes appear in seven articles among the 22 selected in the databases. Teaching strategies with technological tools were tested with students with ASD and with teachers to implement their pedagogical practice when teaching these children. These studies were carried out in small groups of children with ASD or individually. None of the articles used technological tools for teaching practices in a regular classroom, which is one of the challenges teachers have encountered when working with atypical children and meets this research's objective.

#### *4.2 Inclusive pedagogical practices in mathematics and Portuguese classes*

Article A3 aimed to study teaching letter-sound correspondence to small groups of students with diagnoses of cerebral palsy, ASD, Rett syndrome, Down syndrome, and significant intellectual disability using Accessible Literacy Learning (ALL). Students had to be between 11 and 16 years old and functionally non-verbal to participate in the study.

Students learned five letter sounds through direct instruction using the ALL Curriculum. The results of this study indicate that high school students with severe disabilities and communication disorders can benefit from direct instruction in letter-sound correspondence as provided in the ALL Curriculum and presented in small groups.

This study contributes to the limited research on teaching letter-sound correspondence to students with severe disabilities and communication disorders. Students who cannot orally demonstrate knowledge of the sounds associated with orthographic representations present a unique challenge. Unfortunately, this often means that these students do not have opportunities to learn phonics (Ainsworth et al., 2016).

Article A09 investigated the knowledge of four teachers about inclusion and which pedagogical actions are applied in their classrooms for students with ASD. The criteria for choosing the interviewed professionals were being a teacher who works on mathematical content in their classes with students with ASD and being a primary education teacher.

The researchers found that teachers recognize that education is a right for everyone, that inclusion in the group of professionals interviewed happens, and that those interviewed believe in the potential of all students and have valid experiences related to the inclusion of students with ASD.

The inclusive practices in mathematics classes with students with ASD are adapted according to the student's interests and abilities. The teachers presented a vast repertoire of teaching practices that are used in classes: explanatory videos and comparative images related to the topic, making materials with students, concrete materials with many colors, and even supermarket games, in which they make recipes and, with that, they practice mathematics (Fleira; Fernandes, 2019).

The study developed in article A11 aimed to evaluate the feasibility and effectiveness of an innovative curriculum designed to teach receptive and expressive communicative language to non-verbal children with ASD through reading and writing. Eighteen children with ASD aged between five and thirteen participated in the study. Tests were carried out in private practices, special schools, and regular schools with tutors and specialized professionals. The tests used images and words to better associate students with ASD.

The results of this pilot study suggest that the acquisition of reading and writing skills may be possible in some of the most severely affected children with ASD, even in the absence of functional speech. Although the test non-completion rate was high, the study showed significant improvement in reading and writing skills in the literate group (Goh et al., 2013).

Article A12 aimed to verify the effects of a reading procedure that included direct instruction in naming syllables and teaching the naming of pictures to introduce combinatorial reading with comprehension, that is, the ability to read orally and understand compound words of simple syllables based on the combination of syllables. The researchers carried out tests with three students with mild and moderate ASD. They used dictated words, printed words, pictures, and low-cost materials.

During the study process, the researchers used reinforcing stimuli for each participant. Researchers introduced points and compliments, toys, cartoon figurines,

praise, games, and a scoring system that gave the right to watch cartoon videos online, jokes, and praise.

The research results indicate positive learning for the three students with ASD, even with few teaching sessions (15 to 26). The low-cost materials suggest viable resources for familiar school teachers in the literacy process of their students with ASD. The researchers make it clear that this teaching method cannot be generalized to all students with ASD, as each one has different characteristics. The three atypical students who participated in the study were talkative, and the ASD levels presented in the report were between mild and moderate (Gomes; Souza, 2016).

In article A16, the research aimed to investigate strategies for teaching mathematical relationships to students with ASD. The principles of Applied Behavior Analysis (ABA), stimulus-stimulus, and stimulus-response were used as theoretical support. The researchers used a mouse computer program adapted for the teaching and testing session. All stages of the procedure were carried out individually, and the atypical children participating in the study attended regular education and special classes.

The results indicated positive learning for children with ASD during the tests. According to the results, the equivalence paradigm can be a resource to be used for teaching relationships between dictated numbers, Arabic numbers, and quantities using a computerized pairing procedure with the matching-to-sample (MTS) model based on stimuli (Picharillo; Postalli, 2021).

#### *4.3 Teaching strategies for students with ASD*

Article A4 sought to present pedagogical proposals for a student with ASD in the second year of elementary school at a private school. The researchers interviewed the school's class teacher, director, and pedagogue. They observed the materials used to carry out the activities with the child with ASD and which the teacher carried out specific individualized teaching strategies.

From the results found, the fact that the interviewed teacher reported feeling challenged and insecure with the arrival of a child with ASD in her class was highlighted. The teacher was concerned about teaching methods because more attention would be needed for the atypical student than the others. The researchers highlighted the need for initial surveys to develop teaching and learning and to understand what the student brings with them, their skills, and their difficulties.

Finally, the authors explain that there is no single way of teaching students with ASD; pedagogical adjustments are necessary to create different learning situations according to what is meaningful for each student. In the interview, the teacher presented adjustments in mathematics and Portuguese activities for the students with ASD according to their characteristics and interests; adjustments with positive results can serve as inspiration for teaching other children with autism (Aporta; Lacerda, 2018).

Article A21 investigated how teaching practices have occurred for a student with ASD participating in Integrated Technical Education in IT in Belo Horizonte – MG.

The research results demonstrated a lack of adjustments to educational practices accessible to young people with ASD, resulting in difficulty in carrying out the proposed activities followed by dropout. Furthermore, the weakness in teacher training to work with the unique education public was highlighted, even for teachers with bachelor's degrees (Vasconcellos et al., 2020).

Article A19 presents research that describes the panorama of the pedagogical context in preschool education for students with ASD in a municipality in São Paulo. The study was carried out in seven regular schools between 2018 and 2019.

The research sought to understand the factors involved directly and indirectly in the pedagogical performance of teachers and how they may or may not influence these practices and contribute to the quality of education for children with ASD in the municipality investigated.

The authors ensure that a small percentage of early childhood education professionals who worked in regular schools stated that they did not know about ASD. The vast majority of teachers indicated that they knew the characteristics of ASD. The authors state that even though the percentage of teachers who were unable to identify the main characteristics of ASD is low, it is a worrying factor (Rocha et al., 2021).

#### *4.4 The role of the teacher with students with ASD in the inclusion process*

Of the 22 articles selected with titles about teaching practices for autistic children, seven emphasize the teacher's role, practices, and training to work with atypical students in the regular classroom.

The studies developed in articles A2, A6, A7, A8, A10, A14, and A17 investigated the preparation of teachers to teach students with ASD to read and write (Accardo, 2017; Conner et al., 2022; Ravet, 2018) the assessment of the self-efficacy of teachers who teach children with ASD (Love et al., 2019; Conn, 2018) and

assessments of teaching pedagogical practices regarding the inclusion of children with ASD in primary education (Fleira; Fernandes, 2021; Cox; Jiménez, 2020).

All articles mentioned in this section point to the need for teacher training for the education of children with ASD. In summary, this set of studies presents that to teach atypical children, the teacher needs knowledge that enables him to carry out pedagogical practices and strategies according to his student's specificity. However, the studies also show that there is a lack of Public Policies aimed at schools to equip them with resources of different types to encourage inclusion and promote transformations to improve the quality of teaching.

Article A18 consulted the databases Education Resources Information Center (Eric), PubMed, Scopus, Regional Portal of the Virtual Health Library (VHL), and Web of Science to identify translated and adapted school curricular intervention instruments for Brazilian Portuguese, which favored linguistic aspects, available for use by Brazilian teachers to teach learners with ASD (Rocha et al., p. 2, 2019).

This research considered articles in English and Portuguese from the last 20 years. The inclusion criteria used were being a school curriculum intervention instrument that favors linguistic aspects, being aimed at learners with ASD, and being translated and adapted into Brazilian Portuguese.

The results reveal that even though people with ASD gain essential rights in the social, economic, and educational spheres, there is a lack of pedagogical proposals to assist the teacher's work about linguistic aspects according to the objective of the research (Rocha, 2019).

## 5 Conclusions

The result of this research presents a lack of studies focused on teaching strategies that are effective in the learning of students with ASD and studies that favor the work of regular school teachers with students with ASD. The articles analyzed in this study confirm that teachers feel insecure and challenged with the process of school inclusion for students with ASD. The vast majority of professionals recognize the characteristics of ASD but do not hesitate to say that they do not have qualified training to serve the public of ASD in the process of inclusion with excellent teaching strategies, and this ends up harming the development of students with ASD. From the studies found, specific proposals were observed for a single individual with ASD or in small groups of students, focused on their specificities, evaluated and tested by specialized professionals, which often ends up not being valid for other students with

ASD in the regular classroom, because within the spectrum, each individual demonstrates different characteristics from each other.

In summary, the main focus of this research was to recognize teaching practices for students with ASD in regular education, as it is expected that students with ASD can improve their socialization capacity and expand their perception of the world, in addition to having access to knowledge through regular classes. The school's role is to provide teaching strategies for developing the interaction and integration skills of students with ASD and students without disabilities in the school context.

This research allows us to recognize a gap in training education professionals who work in regular schools with students with ASD in the inclusion process. The lack of specialized training ends up generating insecurity and uncertainty when teaching a student with ASD. It is necessary to understand very well the strengths and deficits associated with ASD. However, this research draws attention to the lack of research related to teaching strategies for the target audience of ASD in regular schools.

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