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Inclusive Education and Science: Approaches for Students with ASD in Monte Negro (RO)

ARTICLE

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Abstract
The aim was to identify elements in teacher training, analyze teachers' conceptions about the educational process of students with ASD and science teaching, and examine the challenges faced by educators in this context. A qualitative approach was adopted using questionnaires, direct observations, and document analysis. Results highlighted the need for enhanced teacher training, improved school infrastructure, and greater availability of adapted materials. Despite limitations, diverse pedagogical strategies were observed, reflecting teachers' efforts to foster inclusion. It is concluded that investing in continuous training, adequate resources, and institutional support is essential to ensure inclusive and high-quality education for students with ASD.
Keywords: Inclusive Education. Science Teaching. ASD. Teacher Training. Pedagogical Practices.

Educação inclusiva e Ciências: abordagens para alunos com TEA em Monte Negro (RO)

Resumo
A pesquisa teve como objetivo identificar os elementos presentes na formação de professores, levantar concepções dos docentes sobre o processo educacional dos estudantes com TEA e o ensino de Ciências, bem como analisar os desafios enfrentados pelos professores nesse contexto. Foi adotada uma abordagem qualitativa, utilizando questionários, observações diretas e análise documental. Os resultados destacaram a necessidade de maior capacitação dos professores, melhorias na infraestrutura escolar e maior disponibilidade de materiais adaptados. Apesar das limitações, foram observadas estratégias pedagógicas diversificadas, indicando o esforço dos docentes em promover a inclusão. Conclui-se que é essencial investir em formação continuada, recursos adequados e apoio institucional para garantir uma educação inclusiva e de qualidade para estudantes com TEA.
Palavras-chave: Educação Inclusiva. Ensino de Ciências. TEA. Formação Docente. Práticas Pedagógicas.

1 Introduction

The inclusion of students with Autism Spectrum Disorder (ASD) in mainstream schools is a significant challenge for contemporary education, both in Brazil and in several other countries, involving pedagogical, structural, and social issues (Lemos *et al*., 2017). This challenge is not limited to the availability of places in schools, but also requires profound changes in the curriculum, teacher training, and teaching practices, with a view to ensuring the effective participation and full development of these students in the school environment (Mantoan, 2018).

In this context, science education plays a crucial role in promoting school inclusion, as it offers students opportunities to explore the natural world, develop cognitive and social skills, and participate in practical activities that encourage interaction and collective learning. Studies show that subjects such as science can be adapted to meet the specific needs of students with ASD, contributing to their inclusion and strengthening their potential (Oliveira; Strohschoen, 2019).

In addition, science education promotes cross-cutting skills, such as problem solving and critical thinking, which are fundamental to autonomy and citizenship (Oliveira; Benite, 2015). Therefore, for inclusion to be effective, the adoption of inclusive teaching methodologies and practices is essential. Strategies such as the use of visual resources, adaptation of curriculum content, and diversification of teaching and learning activities have proven effective in meeting the specific needs of students with ASD (Facci; Barroco, 2004).

Continuing education for teachers is also essential so that they can understand the particularities of this audience and plan practices that promote active and meaningful participation in the school environment (Barbosa, 2023). In this scenario, it is important to recognize that inclusion is not only a legal or political demand, but also a matter of equity and social justice.

As a privileged space for socializing and learning, schools must be accessible to all students, regardless of their conditions or limitations. To achieve this, managers and educators need to develop a reflective approach that is sensitive to the needs of each student, promoting

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teaching practices that value diversity and respect the unique characteristics of students with ASD (Carvalho, 2008).

Thus, this study aimed to identify the elements present in teacher training, to survey teachers' conceptions about the educational process of students with ASD and about science teaching in school contexts that have these students in the municipality of Monte Negro (RO), as well as identifying the challenges faced by teachers who teach science and work with autistic students, based on an assessment of the strategies and teaching practices used by these professionals.

2 Methodology

This study was conducted in five schools in the municipality of Monte Negro (RO), namely: Escola Estadual de Ensino Fundamental e Médio Aurelio Buarque de Holanda Ferreira; Escola Estadual de Ensino Fundamental e Médio Mato Grosso; Escola Municipal de Ensino Fundamental Justino Luiz Ronconi; Escola Municipal de Educação Infantil e Ensino Fundamental Francisco dos Santos; and Escola Municipal de Ensino Fundamental Maria de Abreu Bianco. These schools are located in the urban area of the municipality.

The selection of participants was based on specific criteria that ensured the inclusion of science teachers who work with students with ASD. Sixteen teachers were invited to participate in the study, ten of whom accepted, after agreeing to and acknowledging the Free and Informed Consent Form and the Free and Informed Assent Form, as approved by the CEP (CAEE No. 0963123.4.0000.5300).

The questionnaire was the main tool used to produce and collect data from teachers at public schools in the municipality of Monte Negro (RO). Visits were made to the five schools to present the research, administer the questionnaires, and observe the location and its operations.

After administering the semi-structured questionnaires to teachers, these data and other information collected were recorded in a field diary, which included observations about the school environment, classroom interactions, and teaching strategies observed.

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The systematization of the collected information was used for analysis and comparison, with the aim of identifying the challenges pointed out by teachers regarding the learning process of autistic students in relation to science teaching in the selected schools.

The analysis process aimed to assess the state of education for autistic students in the schools surveyed and to identify what is needed to improve the provision of special and inclusive education.

3 Results and discussion

Ten science teachers from selected schools, distributed between elementary and middle school, participated in the study. These participants met the established requirements and demonstrated interest in sharing their experiences and insights on teaching students with ASD. Table 1 summarizes teacher participation, specifying the number of teachers invited and those who actually participated in each school.

Table 1 – Summary of teacher participation in the survey

School name	Invited teachers	Participating teachers
Escola Estadual de Ensino Fundamental e Médio Aurelio Buarque de Holanda Ferreira	2	1
Escola Estadual de Ensino Fundamental e Médio Mato Grosso	3	2
Escola Municipal de Ensino Fundamental Justino Luiz Ronconi	1	1
Escola Municipal de Educação Infantil e Ensino Fundamental Francisco dos Santos	2	1
Escola Municipal de Ensino Fundamental Maria de Abreu Bianco	8	5
Total	**16**	**10**

Source: prepared by researchers based on survey data (2024).

Elementary school covers the early years of basic education, from 1st to 5th grade, focusing on literacy and the development of basic skills in reading, writing, math, and other areas of knowledge, such as science, history, and geography. This stage is marked by a multidisciplinary approach, usually led by teachers with training in education, who act as facilitators of integrated learning for students. For this stage, the research was conducted at the Escola Municipal de Ensino Fundamental Maria de Abreu Bianco, which has eight

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students with ASD who receive support from a Specialized Educational Assistance (AEE) classroom equipped with adapted materials, such as visual resources, educational games, and technological tools.

Middle school, which covers the final years of basic education, from 6th to 9th grade, deepens the content covered in the early years and organizes the curriculum into specific subjects, taught by teachers who are specialists in areas such as science, math, and geography. At this stage, teaching requires greater emphasis on the development of academic skills and preparation for high school, as well as a more technical and segmented pedagogical approach.

The study involved four schools from this stage: Escola Estadual de Ensino Fundamental e Médio Aurelio Buarque de Holanda Ferreira, Escola Estadual de Ensino Fundamental e Médio Mato Grosso, Escola Municipal de Educação Infantil e Ensino Fundamental Francisco dos Santos and Escola Municipal de Ensino Fundamental Justino Luiz Ronconi. These institutions serve a total of 20 students with ASD and have special education classrooms equipped with technological resources and adapted materials to support inclusive learning.

The differences between the two stages are evident both in teacher training and in pedagogical approaches. In elementary school, teachers, most of whom are educators, play a more generalist role, focused on introducing learning and creating a playful and welcoming environment. In middle school, teachers have specific training in the subjects they teach, which allows for more in-depth and technical teaching.

In addition, the challenges for including students with ASD vary between stages: in elementary school, the focus is on initial adaptation of content and social and emotional development, while in middle school, efforts are concentrated on adapting specific content, applying advanced teaching strategies, and preparing for future academic challenges.

The organization of schools and the provision of education in the municipality of Monte Negro (RO) reflect the diversity of stages and modalities served, as well as the commitment to the inclusion of students with ASD. This is because each institution has specific characteristics and challenges, which vary according to the stage of education and

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the structure available for special education services. To better understand this dynamic, it is essential to map schools, their teaching methods, and the resources offered, especially for the target audience of special education.

3.1 Teachers who teach science and work in elementary school

Initially, data from elementary school teachers were analyzed, involving five teachers from the Escola Municipal de Ensino Fundamental Maria de Abreu Bianco. The education, age, and length of teaching experience of this group of teachers are presented in Table 2.

Table 2 – Profile of elementary school teachers participating in the study

Nº	Fictitious name	Graduation	Postgraduate studies	Age	Length of service
1	Teacher A	Pedagogy	Psychopedagogy	38 years old	14 years
2	Teacher B	Pedagogy	Early childhood education and management	31 years old	7 years
3	Teacher C	Pedagogy and Mathematics degree	Mathematics and ABA	40 years old	Not informed
4	Teacher D	Not informed	S Management and Guidance	49 years old	23 years
5	Teacher E	Science degree	Not informed	41 years old	Not informed

Source: prepared by researchers based on survey data (2023).

It can be observed that, of the five teachers interviewed, three have a Pedagogy degree, one of them also has a degree in Mathematics, another has a degree in Biological Sciences, and one teacher did not respond. As for those with postgraduate degrees, this can be seen in Table 2. The length of time spent in teaching is also noteworthy, with only two teachers having more than ten years of teaching experience.

The analysis in Table 2 reveals a heterogeneous composition in terms of academic background, professional experience, and areas of specialization. The predominance of training in Pedagogy and Psychopedagogy indicates an emphasis on understanding

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educational processes and supporting students' individual needs. The diverse age range, which varies from 24 to 49 years old, contributes to an environment enriched by different generational perspectives. In this regard, teacher D stands out, with a degree in Pedagogy and a specialization in special and inclusive education, demonstrating a commitment to promoting inclusion in educational practice.

Teacher C, with a degree in Pedagogy and a degree in Mathematics, demonstrates the possibility of including an interdisciplinary approach in her repertoire, while teacher E, with a degree in Biological Sciences, stands out for being more specifically within the area of study of this research. The length of service of teachers varies, with some professionals accumulating more than two decades of experience, suggesting a combination of pedagogical experience and adaptation to changes over time. The diversity present in this group of teachers is also noteworthy, as it can contribute significantly to the creation of inclusive and adaptive educational environments.

Continuing with the analysis, we will now present the teachers' responses to the questionnaire. Question 1 ("Do you think teachers need more training on the subject (autism)?") sought to assess the professionals' understanding of the need for training. It was evident in the responses that 100% of teachers (5 out of 5) believe that teachers need more training on the subject of autism, indicating a demand for more training in this area.

In the second question ("Have you taken a training course on autism?"), it was found that 60% (3 out of 5) of teachers had already participated in training courses on autism, while 40% (2 out of 5) had not yet had this opportunity. These findings confirm the observations made by Lemos *et al*. (2017) when they discuss the importance of professionals being able to deal with the diversity they encounter in the classroom, in order to offer better quality teaching that meets students' expectations.

With regard to the adequacy of the school structure, teachers were asked to evaluate it as follows: "3. Regarding the structure, assess the level of adequacy of the school: Totally inadequate; Somewhat inadequate; Moderately adequate; Quite adequate or Totally adequate." The results were as follows: "Totally inadequate": 0% (0 out of 5); "Somewhat inadequate": 60% (3 out of 5); "Moderately adequate": 20% (1 out of 5); "Quite adequate": 20%

(1 out of 5) and “Totally adequate”: 0% (0 out of 5). These data highlight that most teachers consider the school structure to be “Somewhat inadequate,” but the absence of responses indicating “Totally inadequate” suggests that, despite structural limitations, minimal resources are available.

This finding, coupled with the lack of training on the subject, raises a critical warning about the urgent need for a more attentive approach and effective investment in these schools. Similarly, Osório and Sardagna (2020) emphasize that inclusive classrooms require the provision of pedagogical support through specialized work in resource rooms. These pedagogical spaces aim to provide support to both students and teachers, with the goal of overcoming barriers to learning.

The lack of infrastructure and adequate training for professionals not only limits learning opportunities for autistic students, but also compromises the goal of promoting inclusive, quality education for all students. Therefore, it is essential that educational policies and practices be reviewed and improved to ensure that the specific needs of these students are met effectively and fairly.

In this regard, when answering the following question: “4. Assess the availability of adapted materials at the school, selecting from the following options: No suitable materials available; Few adapted materials available; Some variety of adapted materials available; Good variety of adapted materials available; and Wide variety of adapted materials available,” most teachers stated that there are few adapted materials, and some noted that there is some variety of materials.

The responses were: “No suitable materials available”: 0% (0 out of 5); “Few adapted materials available”: 80% (4 out of 5); “Some variety of adapted materials available”: 20% (1 out of 5); “Good variety of adapted materials available”: 0% (0 out of 5); and “Wide variety of adapted materials available”: 0% (0 out of 5). Thus, the results indicate that 80% of teachers perceive the availability of adapted materials as insufficient, requiring greater attention to the provision of these resources.

These data confirm the findings to date regarding the urgent need to focus school resources on providing adequate care for students with autism. In this sense, one way of

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overcoming this challenge envisaged by the researcher refers to the support provided by other professionals, raising the following question: “5. Indicate the degree of support provided by other professionals,” which showed greater variation in responses: “No support”: 20% (1 out of 5); “Little support”: 40% (2 out of 5); “Some support”: 20% (1 out of 5); “Good support”: 20% (1 out of 5) and “Excellent support”: 0% (0 out of 5).

It should also be noted that the absence of “excellent support” reflects the perception that support from other professionals is still limited, even though there is some level of collaboration. Furthermore, as this was a closed question, it was not possible to assess what type of support the professionals were referring to when marking their answers.

As for family support for those responsible for students with autism (question 6), the results were: “No support”: 0% (0 out of 5); “Little support”: 60% (3 out of 5); “Some support”: 20% (1 out of 5); “Good support”: 20% (1 out of 5); and “Excellent support”: 0% (0 out of 5). These data reveal that 60% of teachers consider family support to be insufficient, which can hinder coordination between school and family in meeting the needs of autistic students. Similarly, it was not possible to assess the type of support referred to by the teachers.

Regarding school support (question 7), especially from the school management where they work, the responses were: “No support”: 0% (0 out of 5); “Little support”: 40% (2 out of 5); “Some support”: 40% (2 out of 5); “Good support”: 20% (1 out of 5) and “Excellent support”: 0% (0 out of 5). Although 60% of teachers indicated satisfactory levels of support (some or good), these responses can be questioned when, in the question about the existence of after-school programs for students with autism in schools, 100% of participants (5 out of 5) reported that schools do not offer this option, which already reflects that support is still lacking (question 8).

In question 9 (“In which areas do you find it most difficult to work with autistic students?”), the results showed that 60% of teachers (3 out of 5) mentioned difficulties related to learning, while 40% (2 out of 5) highlighted challenges in communication. These findings highlight the need to invest in pedagogical strategies that address both cognitive

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development and the facilitation of social interactions, in order to more effectively meet the needs of autistic students.

Regarding communication with autistic students (question 10), the results were as follows: speech was mentioned by 80% (4 out of 5) of teachers, gestures by 40% (2 out of 5), and signs by 20% (1 out of 5). These data show that speech is the main form of communication used, while gestures and signs are employed as complementary strategies, highlighting the need to diversify communication practices to meet the individual needs of autistic students.

Moving on to the open-ended questions, the following question was asked: “11. What teaching strategies are used?”, allowing teachers to list their teaching strategies, which were summarized in Table 3.

Table 3 – Teaching strategies used by science teachers – elementary school

Teacher	Description
A	Progressive and historical-critical pedagogical models.
B	Chats, videos, music and games.
C	Visual stimulation and colorful activities.
D	Routine activities, adequate time, verbal encouragement, and space for socialization.
E	According to each student’s needs.

Source: prepared by researchers based on survey data (2023).

The information presented in Table 3 allows us to visualize different approaches pointed out by teachers regarding working with students with ASD, even if in a sporadic and non-systematic manner. It should be noted that the responses vary between references to pedagogical concepts, such as those presented by teacher A, and more practical examples of classroom activities, such as the use of videos, games, and visual stimulation (teachers B and C). There are also references to organizational aspects of the school routine (teacher D) and adaptation according to student needs (teacher E).

Although the reports do not allow for the clear identification of a coordinated set of methods or strategies, they indicate that teachers seek to respond to the demands of

inclusion with the resources they have and according to their individual understanding of the topic, corroborating the understanding of Silva and Gaia (2018) when they affirm the importance of teachers adapting their daily activities in order to meet the diverse needs that arise in their class and with their special students.

This intentionality dialogues with the assumptions of Vygotsky and Luria (1996), recognizing that development occurs through mediation and social experience. The use of visual aids, games, and group activities, even when adapted empirically, can be understood as part of a process of constructing meaning that contributes to inclusion and learning.

In question 12 (“What activities are applied in your teaching practice?”), we obtained the responses described in Table 4.

Table 4 − Activities carried out by elementary school science teachers

Teacher	Description
A	Activities that stimulate critical thinking, painting, collage, sensory activities, and visual perception.
B	Word searches with drawings, crossword puzzles, reading, and help with activities.
C	Songs, illustrated activities, educational games, and dialogue.
D	Activities that stimulate logical thinking, with vibrant colors that attract attention, and activities with sounds and games.
E	Routines, visuals and art.

Source: prepared by the researchers based on survey data (2023).

The activities used in teaching practice vary among teachers, including proposals such as educational games, sensory activities, visual aids, and, in some cases, the use of assistive technology. In general, these choices reflect an attempt to respond to the diversity present in the classroom, considering students with or without ASD. It is important to note that, among the participating teachers, one of them was not working with autistic students at the time of the research.

Even so, the other teachers show a clear concern for adopting strategies that promote learning for all, coordinating actions that also aim to meet the specific needs of

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students with autism. This stance indicates a move toward more inclusive practices, even in the face of the structural and educational limitations identified throughout the study.

Although not all responses provided detailed justifications, the choices indicate an inclusive intent and an effort to create an accessible, welcoming environment that is responsive to different ways of learning. In this regard, Almeida (1997) already pointed to the need to seek adaptive solutions that allow students to feel part of the context and develop their skills and competencies in various situations. In question 13 ("What challenges do you face as a teacher?"), teachers described various situations, which were compiled in Table 5.

Table 5 − Challenges reported by teachers working in elementary school

Teacher	Description
A	Lack of materials, structure and assistants.
B	Lack of dialog with the non-verbal student.
C	Lack of time, materials, and adequate space.
D	Difficulty understanding the child's emotions.
E	Difficulty communicating with the student.

Source: prepared by the researcher (2023).

The challenges mentioned by teachers include lack of training, behavior management, and the need for constant adaptation and understanding of the individual needs of each student with autism. These findings are consistent with those reported by Mantoan (2018), who states that teaching professionals need to have adequate training and appropriate curricular adaptations to meet the individual needs of autistic students.

The results of the questionnaire administered to elementary school teachers highlight that additional training for teachers regarding autism is essential. They also show that most of these professionals face challenges in areas such as communication and availability of adapted materials. The adequacy of school facilities and the level of support vary widely among the participants' responses.

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These results may be useful for school principals and educational authorities in developing training programs and specific support strategies aimed at meeting the needs of students with autism and their teachers, since they are based on questionnaire responses and reflect the perceptions of the teachers who participated in the survey.

The analysis of the results obtained with teachers reinforces the importance of aligning teaching practices with the specific needs of students with ASD, promoting an inclusive approach that values their potential and respects their limitations. Understanding the strategies adopted and the challenges faced by teachers is essential to identifying ways to strengthen the support offered to teachers and students, ensuring quality education in the context of school inclusion.

3.2 Science teachers working in middle school

Data collection in the middle school segment involved the participation of five teachers from four different schools located in the municipality of Monte Negro (RO). For this stage, printed questionnaires were used as the main tool, allowing us to profile the teachers and obtain detailed information about the challenges faced in teaching and learning students with ASD. Next, Table 6 presents the profile of the teachers participating in the study, highlighting aspects such as academic background, specializations, and length of teaching experience.

Table 6 − Profile of teachers participating in the study

Fictitious name	Graduation	Postgraduate studies	Age group	Time at work
Teacher 1	Degree in Biological Sciences	Audit management and environmental expertise	32 years old	4,5 years
Teacher 2	Degree in Biological Sciences	Audit management and environmental expertise	32 years old	4,5 years
Teacher 3	Pedagogy and Geography	Human Science of Nature	40 years old	12 years

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Fictitious name	Graduation	Postgraduate studies	Age group	Time at work
Teacher 4	Biological Sciences	Teaching Methodologies in Biological Sciences	34 years old	10 years
Teacher 5	Pedagogy	Psychopedagogy	45 years old	10 years

Source: prepared by the researchers based on survey data (2023).

The analysis of the profile of teachers working in middle school, as presented in Table 6, reveals a diversity of academic backgrounds and professional experiences. Teachers 1 and 2 have degrees in Biological Sciences, complemented by postgraduate degrees in Audit Management and Environmental Expertise, suggesting an emphasis on environmental aspects in their training. On the other hand, teacher 3 has a dual degree in Pedagogy and Geography, with a postgraduate degree in Human Sciences of Nature, reflecting an interdisciplinary approach in her educational practice.

Teacher 4, with a degree in Biological Sciences and a specialization in Teaching Methodologies in Biological Sciences, stands out for her expertise in the specific field of science education. Finally, teacher 5, with a degree in Pedagogy and a postgraduate degree in Psychopedagogy, demonstrates an approach focused on the pedagogical and psychological development of students. The varied age range and length of service among the teachers add richness to the team, providing a combination of perspectives and experiences that can enrich the educational environment.

These professionals in the field of Science responded to the questionnaire, whose answers were compiled and presented next.

Question 1 (“Do you think teachers need more training on the subject (autism)?”) sought to assess teachers’ understanding of the need for training. The results indicated that 100% of participating teachers (5 out of 5) believe that teachers need more training on the subject of autism, highlighting a demand for further training in this area. When addressing the second question (“Have you ever taken a training course on autism?”), it was found that the majority (60%, 3 out of 5) responded that they had taken a training course on the subject, while 40% (2 out of 5) had not had this opportunity.

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Thus, as observed by Oliveira (2013), it is essential that professionals are prepared to deal with diversity in the classroom, with the aim of providing quality teaching that is aligned with students' expectations. Regarding the adequacy of school infrastructure (question 3), most teachers (60% or 3 out of 5) rated the structure as "Not very adequate," while 20% (1 out of 5) considered it "Moderately adequate" and another 20% (1 out of 5) rated it as "Quite adequate." None rated the structure as "Fully adequate," indicating a perception that schools need improvement to adequately serve students with ASD.

It should also be noted that, as was the case with teachers working in elementary school, none of them selected the option "Totally inadequate." Most expressed concern about the lack of adequate spaces to work with autistic children. This, coupled with the lack of training on the subject, highlights the need for a closer look at these schools.

The subsequent question, "4. Assess the availability of adapted materials at the school by selecting one of the following options: No suitable materials available; Few adapted materials available; Some variety of adapted materials available; Good variety of adapted materials available; and Wide variety of adapted materials available," revealed that 60% of teachers (3 out of 5) stated that there are few adapted materials, while 40% (2 out of 5) noted some variety of materials available. These data reinforce the conclusions reached so far, highlighting the need to focus on school resources to ensure adequate care for students with autism.

The survey also addressed the support provided by other professionals, leading to the question: "5. Indicate the degree of support provided by other professionals." The responses varied considerably, with one teacher (20%) reporting no support, while 20% (1 out of 5) reported little support, 40% (2 out of 5) reported some support, and 20% (1 out of 5) reported receiving good support. No participant mentioned excellent support, highlighting the importance of strengthening professional support in schools. Furthermore, due to the nature of the closed question, we emphasize that it was not possible to determine the type of support to which teachers were referring when marking their answers.

With regard to family support for those responsible for students with autism (question 6), 40% of teachers (2 out of 5) indicated little support, another 40% (2 out of 5)

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indicated some support, and 20% (1 out of 5) reported having good support. These data show that, although there is some level of family support, it is still insufficient to fully meet the needs of students with ASD.

The lack of significant family support was highlighted as a factor that hinders the educational process. Although it was not possible to assess the specific type of support mentioned by the teachers, the lack of such support is concerning, as it compromises the expected results in the educational context, which depend on integrated action between the school, family, and community for the benefit of the student.

Support from school management (question 7) also showed mixed results. Half of the teachers (40%, 2 out of 5) reported receiving good support, while 40% (2 out of 5) indicated little support and 20% (1 out of 5) said they received excellent support. However, all participants (100%) reported that their schools do not offer after-school programs for students with ASD (question 8), highlighting structural gaps in school support.

In question 9 (“In which areas do you find it most difficult to work with autistic students?”), 60% (3 out of 5) of teachers reported difficulties in the area of “Learning,” while 40% (2 out of 5) pointed to challenges related to “Communication.” These data reinforce the need for targeted educational strategies to address these issues.

With regard to communication with autistic students (question 10), all teachers (100% or 5 out of 5) stated that they use speech as their main means of interaction. In addition, 40% (2 out of 5) use gestures, 20% (1 out of 5) resort to writing, and the other 20% (1 out of 5) combine speech with signs, indicating the adoption of multiple strategies to facilitate communication. In the open-ended questions, teachers were asked about the pedagogical strategies they used (question 11), resulting in a variety of approaches, as summarized in Table 7 that follows.

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Table 7 – Teaching strategies used by science teachers – middle school

Teacher	Description
1	Counseling with a psychologist and educator during after-school hours, but the school does not offer this service.
2	Illustrative content to grab attention.
3	Fun and varied activities.
4	The ideal solution would be an after-school room, but the school does not have one.
5	Conversational lessons, quick activities, typing exercises, and textbooks.

Source: prepared by the researcher (2023).

The information presented in Table 7 brings together various notes from teachers about their teaching practices, albeit with varying levels of detail. Teacher 1 highlighted the support provided by psychologists and educators during after-school hours as a support measure, although she pointed out the absence of this structure in the school. Teacher 2 mentioned the use of illustrative content to capture students' attention, while teacher 3 emphasized the implementation of playful and diverse activities.

Teacher 4 expressed the need for an after-school room, indicating the search for more suitable environments, while teacher 5 adopted an approach that combines dialogue-based lessons, quick activities, typing exercises, and the use of textbooks. Although not all responses explicitly describe teaching strategies aimed at serving students with ASD, the reports indicate efforts to adjust teaching to the conditions of the school and the reality of the students. The presence of structural limitations, such as the lack of support spaces, reinforces the importance of investments that ensure better conditions for the implementation of more inclusive practices.

This finding confirms the observations of Vygotsky and Luria (1996), who considered that the process of student development occurs through mediation and social interactions. The lack of after-school programs and institutional support compromises these mediation opportunities, hindering the progress of students with ASD in their educational journey.

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In this sense, the teachers' responses reveal signs of concern about adapting their practices to the reality of students with ASD, even if in a sporadic manner and sometimes limited by institutional conditions. Thus, it appears that the responses of these teachers confirm the findings of Menezes (2012), highlighting that a deeper understanding of the pedagogical approaches adopted by teachers is fundamental to the advancement of inclusion.

However, it should be noted that, in most responses, these approaches are not fully systematized or based on specific theoretical frameworks. Instead, they emerge as practical and situated responses, shaped by everyday experience, by attempts to meet the immediate demands of the classroom, and by the real possibilities offered by the school.

This finding reinforces the importance of expanding opportunities for continuing education and institutional support, allowing teachers not only to adapt their actions but also to intentionally develop more conscious and consistent teaching practices that are aligned with the needs of students with autism.

Subsequently, the activities applied in pedagogical practice (question 12) also vary widely, including educational games, sensory activities, use of assistive technology, among others, as shown in Table 8.

Table 8 − Activities carried out by science teachers in middle school

Teacher	Description
1	Does not teach autistic students.
2	Activities with drawings, etc.
3	Printable coloring activities and educational games.
4	Active methodologies and memory games.
5	Reading, conversation circle, multiplication table bingo, group activities, and printed activities.

Source: prepared by researchers based on survey data (2023).

It should be noted that teacher 1 indicated that she was not teaching students with ASD at that time. Nevertheless, she participated in the survey by answering the other

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questions, which reflects her previous classroom experience and her institutional position on the subject. The other participants, who work directly with autistic students, described activities that seek to accommodate different learning styles, showing concern for meeting the specific needs of the target audience for special education.

The activities described can be understood as instruments of cultural mediation, as pointed out by Vygotsky and Luria (1996), insofar as they promote the construction of meaning and the development of social and cognitive skills through shared experiences. Furthermore, it echoes Facci and Barroco (2004) in highlighting that the lack of after-school programs and institutional support compromises these opportunities for mediation, hindering the progress of students with ASD in their school careers.

When asked about the challenges they faced as teachers (question 13), the teachers described various situations, which were compiled in Table 9.

Table 9 − Challenges reported by teachers working in middle school

Teacher	Description
1	Overcrowded classrooms and a lack of assistants to help students with activities.
2	Lack of support and training, lack of interest among students, etc.
3	Lack of time, materials, and adequate space. Difficulty communicating with students.
4	Lack of materials, infrastructure, and support staff. Lack of technology in schools, infrastructure, and training.
5	Lack of dialog with the non-verbal student.

Source: prepared by the researchers based on survey data (2023).

The challenges mentioned include overcrowded classrooms, lack of support, lack of technology in schools, lack of time and materials, and difficulties in communicating with students. In view of this, we return to Sousa's (2017) point about the need for teachers to overcome the difficulties inherent in teaching and seek ways to ensure that their autistic students receive a quality education.

Furthermore, aspects such as lack of training, behavior management, and the need for constant adaptation and understanding of the individual needs of each student with autism are

consistent with Mantoan's (2018) assertion that teaching professionals need to have adequate training and rely on appropriate curricular adaptations aimed at meeting the individual needs of autistic students.

This is because the results of this questionnaire administered to middle school teachers highlight the need for additional training for teachers in relation to autism. They also show that most professionals face challenges in areas such as communication and the availability of adapted materials. The adequacy of school facilities and the level of support vary widely.

These findings highlight the need for strategies that strengthen teacher training, improve infrastructure, and ensure the necessary support for the adequate care of students with ASD in middle school. The teachers' perceptions highlight the importance of a collective effort between educational administrators and teachers to overcome the challenges faced in everyday school life, promoting inclusive education that values the needs and potential of each student. The creation of more specific educational policies and investment in material and human resources are fundamental to achieving this goal.

4 Conclusions

Conducting this research provided a deeper understanding of the challenges and practices in teaching science to students with Autism Spectrum Disorder (ASD) in public schools in Monte Negro (RO). The use of a flexible and adaptable methodology was essential to capture the nuances and particularities of the educational context of the schools investigated.

Through the questionnaires, it was possible to capture the individual perceptions and experiences of the teachers. The observations made during the school visits helped to contextualize the school environment and provide a broader understanding of the structural and institutional conditions involved in serving students with ASD.

Furthermore, content analysis made it possible to identify emerging categories and themes, highlighting the main challenges faced by the teachers participating in this study

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in the process of including students with ASD. The results indicated that, despite the existence of policies and guidelines that guide inclusive education, there is a pressing need for continuing education for teachers, adequate resources, and institutional support.

Although institutional documents and observations made during the research supported this understanding, the analysis presented focused primarily on data produced by the research subjects themselves. Thus, the findings directly reflect the voices of the participating teachers, highlighting key aspects of inclusion in science education.

The research also highlighted the importance of a welcoming school environment adapted to the needs of autistic students, highlighting successful practices that can serve as a model for other schools. In this context, the results reaffirm the importance of an inclusive and adapted approach to science teaching for students with autism in middle school.

The diversity of teaching strategies and the need for adequate resources highlight the commitment of the teachers interviewed to meeting the specific needs of these students, even in the face of the structural and training limitations identified. The research also revealed that continuing education for teachers is essential to ensure the quality of inclusive education. The demand for greater training and support reflects the need for public policies that strengthen educators' preparation to deal with diversity in the classroom.

The challenges faced by schools, such as the lack of adapted materials and adequate infrastructure, coupled with the need for greater professional and family support, point to the importance of a collective effort. Thus, integration between school, family, and community is essential to create a more welcoming and efficient educational environment for autistic students.

The research sought to encourage this reflection, aiming at constant improvement in the provision of special and inclusive education. It is essential that schools, in partnership with educational managers, continue to invest in training, resources, and support to ensure quality education for all students, including those with ASD. The ethical and professional commitment of educators is essential to transforming inclusion into an effective and

meaningful reality, contributing to the advancement of knowledge and pedagogical practice in the field of special education.

Finally, it is hoped that the results of this research will contribute to advancing knowledge in the field of inclusive education and serve as a basis for future research and educational interventions. The dissemination of findings among teachers and administrators at the schools investigated aims to promote constructive and collaborative dialogue, focused on improving teaching practices and the effective inclusion of students with ASD in the educational system.

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