

# Curriculum as a space of opportunities: adaptations and understanding of Mathematics teachers about inclusive education

Lana Thaís Santos Silva<sup>1</sup>

Veleida Anahi Cápuia Silva Charlot<sup>2</sup>

João Paulo Attie<sup>3</sup>

**Abstract:** This article presents a bibliographical research, of a qualitative nature, which aimed to: a) identify the main curricular adaptations in the teaching of Mathematics to serve students from the perspective of inclusive education; b) analyze how teachers recognize themselves in the curriculum production process, respecting the specificities of students. Data collection was carried out by reading selected works that address the theme of inclusive mathematics teaching. Regarding the examination of the data, we opted for Content Analysis. As a result, we can point out that flexibility in the curriculum is fundamental within the process of school inclusion, and in the teaching of mathematics, adaptations in games, problem solving, as well as contextualization and socialization are indicators that collaborate in the learning process of students, with or without disabilities.

**Keywords:** Resume. Inclusive Education. Mathematics Teachers.


## El currículo como espacio de oportunidades: adaptaciones y comprensión de docentes de Matemáticas sobre la educación inclusiva


**Resumen:** Este artículo presenta una investigación bibliográfica, de carácter cualitativo, que tuvo como objetivo: a) identificar las principales adaptaciones curriculares en la enseñanza de las Matemáticas para atender a los estudiantes desde la perspectiva de la educación inclusiva; b) analizar cómo los docentes se reconocen en el proceso de producción curricular, respetando las especificidades de los estudiantes. La recolección de datos se realizó a partir de la lectura de obras seleccionadas que abordan el tema de la enseñanza inclusiva de las matemáticas. En cuanto al examen de los datos, optamos por el Análisis de Contenido. Como resultado, podemos señalar que la flexibilidad en el currículo es fundamental dentro del proceso de inclusión escolar, y en la enseñanza de las matemáticas, las adaptaciones en los juegos, la resolución de problemas, así como la contextualización y socialización son indicadores que colaboran en el proceso de aprendizaje de estudiantes, con o sin discapacidad.


**Palabras clave:** Reanudar. Educación Inclusiva. Profesores de Matemáticas.

## Currículo enquanto espaço de oportunidades: adaptações e compreensão de professores de Matemática acerca do ensino inclusivo

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<sup>1</sup> Master's student in Teaching Science and Mathematics at the Federal University of Sergipe (UFS). School teacher Municipal Dr. Lourival Baptista. Sergipe, Brasil. ✉ [lanathais167@gmail.com](mailto:lanathais167@gmail.com)  <https://orcid.org/0000-0001-7971-4265>.

<sup>2</sup> Doctor in Educational Sciences. Teacher of the Graduate Program in Teaching Science and Mathematics at the Federal University of Sergipe (UFS). Sergipe, Brasil. ✉ [veleida@academico.ufs.br](mailto:veleida@academico.ufs.br)  <https://orcid.org/0000-0002-0920-5884>.

<sup>3</sup> Doctor in Education. Teacher of the Graduate Program in Teaching Science and Mathematics at the Federal University of Sergipe (UFS). Sergipe, Brasil. ✉ [jpattie@mat.ufs.br](mailto:jpattie@mat.ufs.br)  <http://orcid.org/0000-0001-8411-4168>.

**Resumo:** Este artigo apresenta uma pesquisa bibliográfica, de natureza qualitativa, que teve como objetivos: a) identificar as principais adaptações curriculares no ensino de Matemática para atender a estudantes sob a ótica do ensino inclusivo; b) analisar como professores se reconhecem no processo de produção curricular respeitando as especificidades dos alunos. A coleta dos dados foi realizada através da leitura de trabalhos selecionados que abordam a temática do ensino inclusivo da matemática. Em relação ao exame dos dados, optou-se pela Análise de Conteúdo. Como resultados, pode-se apontar que a flexibilidade no currículo é fundamental dentro do processo de inclusão escolar e no ensino de matemática; as adaptações em jogos, resoluções de problemas, assim como a contextualização e a socialização, são indicadores que colaboram no processo de aprendizagem dos estudantes com ou sem deficiência.

**Palavras-chave:** Currículo. Educação Inclusiva. Professores de Matemática.

## 1 Introduction

The school space is full of elements that guide and direct the work, inside and outside the classroom, and one aspect that has gained prominence on discussions is the curriculum, mainly due to the implementation of the new Common National Curriculum Basis (Base Nacional Comum Curricular — BNCC) and the new curricula of states and municipalities.

Kreuz and Leite (2020) point out that recent research has been based on reflecting teachers' understanding of the curriculum, mainly with the aim of comprising how these professionals recognize themselves in curriculum construction. From this perspective, the present study joins this theme, seeking to reflect on the curricular interfaces in inclusive education, in which we proposed to investigate the school curriculum aimed on this educational focus, from the perspective of teaching mathematics, with the objective of identifying the main curricular adaptations in the teaching of Mathematics to serve our students, respecting their singularities in order to ensure that individuals participate in school activities and in the process of adapting to society. In addition, we aim to discuss how teachers recognize themselves in this production process.

Thus, this article presents this question: what are the main adaptations that have been proposed in the formation of a curriculum in the teaching of Mathematics that encourages the exercise of citizenship, with the effective participation of students with some type of disability?

We justify the use of this theme by the fact that educational activities must be aligned with the purpose of assuring access, permanence and cognitive and physical

development of all students, with or without special educational needs, in order to allow both learning in terms of their citizenship training.

We believe that this study is necessary because, when we analyze the history of inclusive education in Brazil, we are faced with a period of silencing in relation to the curriculum, in a process in which schools contributed to the exclusion of students. Xavier (2008) shows that, during discussions about a multicultural curriculum, there is an attempt to address issues that go beyond inserting different identities into the school space, because they are presented as a challenge to recognize their particularities and the creation of school experiences that can promote the development of students respecting their subjectivities.

From the Declaration of Salamanca in 1994, discussions spread around inclusive education as a right for all and, consequently, access and permanence in regular education for students who have a disability, since the document maintains that schools regular students have the potential to build an inclusive society that welcomes and respects their cultural, physical and psychological specificities.

In this scenario, we consider that including a student based on the principles of inclusive education does not only mean placing him in the regular classroom, but also inserting him as part of the school community, respecting his specificities. And, to meet the inclusion process, Oliveira (2016) emphasizes the importance of curriculum adaptations in educational context, aimed at assisting students with a disability, considering the contents to be taught, respecting the difficulties and seeking ways for these students to achieve autonomy in the your learning process.

The work is structured in such a way that, after this introduction, we present a section dedicated to a brief history of inclusive education in Brazil, and then we bring the section that addresses curricular interfaces in inclusive education. Then follows the methodological approach of the research and, later, we address the results and discussions to finally present some considerations and references.

## **2 Inclusive Education in Brazil**

Since the 1970s, Brazil has been undergoing changes in its laws in order to promote inclusive education practices. These modifications involve updating the official documents, which establish the guidelines for the implementation of inclusive education with the aim of spreading this look as a right and a productive practice for

all students with or without disabilities. These transformations contributed to greater attention in relation to the restructuring and implementation of practices related to teaching with this specificity.

Thus, progressively, it was working out the need rethink the practices of special education in order to develop an inclusive education, since only the coexistence of students with disabilities with others in the same school environment does not guarantee true inclusion. Thus, numerous policies and documents guiding practices aimed at special education and, later, at inclusion were idealized. Let us observe, in Chart 1, some of the milestones in the trajectory of inclusive education in the country based on official international documents and also constant in Brazil (1957, 1988, 1994, 1996, 1999, 2001, 2007, 2009, 2015, 2020).

Chart 1: Milestones in the trajectory of inclusive education.

Year of publication	Policies and documents dedicated to inclusive education	Purpose(s) related to inclusive education
1854	Creation of the Imperial Institute of Blind Boys ( <i>Instituto Imperial dos Meninos Cegos</i> ), current Benjamin Constant Institute.	Provide basic and professional education to visually impaired students. The Institute proposed two courses: "Literary Instruction", which addressed reading and writing based on the Luiz Braille method, Portuguese grammar, arithmetic, notions of natural history, Portuguese and French languages, notions of general and Brazilian history, geography, arithmetic, geometry, notions of trigonometry, cosmography and practical mechanics, physical sciences, natural history, moral and civic instruction and elements of pedagogy; and "Professional Practical Instruction", which covered the complete study of music, vocal and instrumental; typography; binding; needlework for the students; and appropriate gymnastics for the blind of both sexes.
1856	Creation of the National College for the Deaf and Mute ( <i>Colégio Nacional para Surdos-Mudos</i> ), of both sexes, current National Institute of Education for the Deaf ( <i>Instituto Nacional de Educação de Surdos</i> ). In 1857, by law n. 939, of September 26, the imperial government began to grant subsidy to the college.	Offer education for the deaf in Brazil. The proposal contained the disciplines of Portuguese Language, Arithmetic, Geography, History of Brazil, Mercantile Bookkeeping, Articulated Language, Christian Doctrine and Reading on the Lips.
1954	Creation of APAE – Association of Parents and Friends of the Handicapped ( <i>Associação de Pais e Amigos dos Excepcionais</i> ).	Promote and articulate actions for the defense of rights, prevention, guidance, provision of services, support for the family, aimed at improving the quality of life of people with disabilities and building a fair and supportive society.
1971	Promulgation of the LDB, Law n <sup>o</sup>	Ensure that students with physical or mental

	5.692/71, which establishes "special treatment".	disabilities, those who are considerably behind the regular enrollment age and the gifted can receive special treatment, in accordance with the rules established by the competent Boards of Education.
1988	Promulgation of the Federal Constitution.	Arts. 206 and 208 establish the duty of the State to provide specialized educational assistance to people with disabilities, preferably in the regular education network, based on principles such as equal conditions for access and permanence in school.
1990	Creation of the Child and Adolescent Statute ( <i>Estatuto da Criança e do Adolescente – ECA</i> ) – Law nº 8.069/90.	Guarantee full protection rights for children and adolescents, including strengthening the rights to specialized educational assistance for people with disabilities.
1990	World Declaration on Education for All.	Satisfy basic learning needs, with the aim of universalizing access to education and promoting equity, expanding the means and range of action of basic education and providing an adequate environment for learning. Affirm that it is fundamental to take measures that guarantee equal access to education for people with any and all types of disabilities as an integral part of the educational system.
1994	Salamanca Declaration.	Guide government policies and actions, international organizations or national aid agencies, non-governmental organizations and other institutions in the implementation of a statement of principles, policy and practice in Special Education.
1994	Creation of the National Policy on Special Education.	Guide the process of "instructional integration" that conditions access to regular training classes for those students who manage to follow and develop programmed curricular activities of common education at the same pace as the so-called "normal" students.
1996	Promulgation of LDB nº 9.394/96.	Article 59 determines that education systems must provide students with specific conditions to meet their needs.
1999	Publication of Decree No. 3.298.	Provides for the National Policy for the Integration of Persons with Disabilities, defining special education as a transversal modality at all levels and modalities of education.
2001	Publication of CNE/CEB Resolution No. 2/2001.	Article 2 directs that education systems must enroll all students, and it is the responsibility of schools to organize themselves to serve students with special educational needs, ensuring the necessary conditions for a quality education for all.
2001	Creation of the National Education Plan ( <i>Plano Nacional de Educação – PNE</i> ) – Law nº 10.172/2001.	Its objectives, aimed at inclusive education, are to organize programs aimed at expanding appropriate educational interaction for children with special educational needs in specialized or regular educational institutions, with the help of resources adaptable to each student's

		particularity.
2003	Creation of the Inclusive Education Program: the right to diversity, with the aim of transforming education systems into inclusive educational systems.	Guarantee the right of access for all to schooling, the organization of specialized educational services and the promotion of accessibility.
2006	Launch of the National Plan for Education in Human Rights. Establish axes that address the accessibility of school buildings, teacher training and multifunctional resource rooms.	Promote inclusive themes, such as access to and permanence in Higher Education.
2007	Launch of the Education Development Plan ( <i>Plano de Desenvolvimento da Educação – PDE</i> ).	Establish axes that address the accessibility of school buildings, teacher training and multifunctional resource rooms.
2007	Decree nº 6.094/07 – deals with the implementation of the Plan of Goals Commitment All for Education of the MEC.	Highlight attention to the special educational needs of students with disabilities and reinforce their inclusion in the public education system.
2008	National Policy on Special Education from the Perspective of Inclusive Education.	Support “public policies that promote quality education for all students”.
2008	Decree No. 6.571.	Provides for specialized educational assistance ( <i>Atendimento Educacional Especializado – AEE</i> ) in Basic Education and defines it as “the set of activities, accessibility and pedagogical resources organized institutionally, provided in a complementary or supplementary way to the training of students in regular education”. The decree obliges the Union to provide technical and financial support to public education systems in offering the modality. In addition, it reinforces that the AEE must be integrated into the school's pedagogical project.
2009	Resolution No. 4 CNE/CEB.	Guide the establishment of specialized educational services ( <i>Atendimento Educacional Especializado – AEE</i> ) in Basic Education.
2011	Decree nº 7.611 – revokes Decree nº 6.571 of 2008.	Establish new guidelines for the State's duty with the Education of the target public of Special Education.
2012	Law No. 12.764.	Establish a national policy to protect the rights of people with Autism Spectrum Disorder.
2014	National Education Plan ( <i>Plano Nacional de Educação – PNE</i> ).	To generalize, in ten years, the attendance of students with special needs in Kindergarten and Elementary School, including through consortiums between Municipalities.
2015	Law No. 13.146, of July 6, 2015.	Ensure and promote, under equal conditions, the exercise of fundamental rights and freedoms by people with disabilities, aiming at their social inclusion and citizenship.

2019	Decree No. 9.465.	Create the Secretariat for Specialized Education Modalities, extinguishing SECADI, composed of three fronts: Directorate of Accessibility, Mobility, Inclusion and Support for People with Disabilities; Directorate of Bilingual Education Policies for the Deaf; and Directorate of Policies for Specialized Modalities of Education and Brazilian Cultural Traditions.
2020	Decree nº10.502 – National Policy on Special Education, institutes the so-called National Policy on Special Education: Equitable, Inclusive and with Lifelong Learning.	<p>I - guarantee the constitutional rights of education and specialized educational assistance to students with disabilities, global developmental disorders and high abilities or giftedness;</p> <p>II - to promote teaching of excellence to special education students, in all stages, levels and modalities of education, in an equitable, inclusive educational system with lifelong learning, without the practice of any form of discrimination or prejudice;</p> <p>III – ensure specialized educational assistance as a constitutional guideline, in addition to institutionalizing times and spaces reserved for complementary or supplementary activities;</p> <p>IV - ensure that special education students have access to adequate support systems, considering their singularities and specificities;</p> <p>V – ensure that education professionals receive equitable, inclusive professional training with lifelong learning, with a view to effective performance in common or specialized spaces;</p> <p>VI - value special education as a process that contributes to the autonomy and development of the person and also to their effective participation in the development of society, in the context of culture, science, arts and other areas of life; and</p> <p>VII – ensure that students with disabilities, global developmental disorders and high skills or giftedness have opportunities for education and lifelong learning, in a sustainable manner compatible with local and cultural diversities.</p>

Source: Prepared by the authors, 2022.

As we can observe from the data in Chart 1, the history of inclusive education in Brazil, in recent decades, has been influenced by international documents, which inspired the creation of Brazilian laws. As we have already emphasized, the main one of these documents was the Salamanca Declaration, published in 1994, in which issues such as principles, policies and practices in special education were highlighted (UNESCO, 1994). This statement postulates an inclusive school in which students should share knowledge and learn together.

Therefore, in line with the direction that Brazilian public policies have been showing and that we point out in Chart 1, we defend that schools should direct their

work respecting the individual diversities of students, observing the learning rhythms and guaranteeing a quality education for all, through appropriate curriculum, teaching methods, use of resources and collaboration with communities.

### 3 Curricular interfaces in inclusive education

Law No. 12.796, of April 4, 2013, which amends Law No. 9.394, of December 20, 1996, determines in its art. 4, item III, which

the State's duty with public school education will be carried out by guaranteeing: [...] III- free specialized educational assistance to students with disabilities, global developmental disorders and high abilities or giftedness, transversal to all levels, stages and modalities, preferably in the regular education network (BRASIL, 2013).

Therefore, we can observe that education must promote and guarantee access, permanence and the teaching process of students with disabilities within regular schools in all modalities.

In this context, it is important that regular schools are concerned with providing a space that favors school inclusion, adhering, when necessary, to changes in their curricular and physical structure and in their pedagogical practices. In addition, it is essential to build a project with your team and think about new postures in the face of diversity, so that there is an understanding that inclusion is not to deny differences, but to recognize, understand the other and thus seek to insert him in the process of development of society (BERTOLDE; LARCHER, 2021).

An inclusive education is not only concerned with students with disabilities and those with learning difficulties, but with all students who are part of its school team. Xavier states that the inclusion

is the product of a democratic and transgressive education and the student of an inclusive school is not a student of an identity fixed in ideal models, within a dichotomous order of beautiful and ugly, normal and abnormal, productive and unproductive, strong and weak, useful and useless or the same and different. It is a student who is a subject, who belongs to different cultures, who presents social, economic, racial, physical differences, but which do not make them inferior (2008, p. 69).

In order to build an inclusive school, some curricular adaptations are necessary, so that pedagogical actions are thought out with the aim of adjusting the curriculum to meet the specificities of students in the school context. So,



the purpose of the adaptations is to provide all students with access to the curricular contents, thus most of these actions are carried out in the classroom, requiring the teacher's sensitivity to carry them out. These modifications are considered small, where the teacher, in his planning, will seek to create conditions for the participation of the student with disability during the class, favoring the interaction of this student with the people with whom he lives in the school environment and the participation during the activities available during class (BRASIL, 2000 apud BERTOLDE; LARCHER, 2021, p. 5).

Adaptations within the curriculum can occur in different areas of knowledge, and, in this work, we will address some curricular adaptations in the teaching of Mathematics reported in academic works. We seek to present and reflect on which ways and curricular interfaces are present in inclusive education in the teaching of Mathematics and how teachers recognize themselves in the process of formulating activities, evaluations and didactic procedures to provide an inclusive teaching.

Educational challenges from the perspective of inclusive education are the most adverse. Menezes *et al* (2016) present some reports, pointing to the fact that teachers have doubts about how to assist students with some type of disability in the middle of regular education. The same authors point out that

in order to be successful in the educational processes involving students with Special Educational Needs, it is necessary that managers and the school community have an inclusive educational policy vision, going beyond the walls of the concept of inclusion, that is, with a looking at the student, not just with the concern of "being inserted in the physical space, add". It is necessary to think of a political pedagogical project that goes beyond the limitations of the compensatory assistance vision. Thus, it is necessary to create spaces that value the formation and exercise of citizenship, the development of skills and competences, participation and socialization within the community and respect for differences and specific educational needs so that significant learning occurs for the subjects involved. in this educational process (MENEZES et al., 2016, p. 8).

In line with these arguments, we can see that the National Common Curricular Base (*Base Nacional Comum Curricular* — BNCC) points out that

Brazil, throughout its history, naturalized educational inequalities in relation to access to school, the permanence of students and their learning. The huge inequalities between groups of students defined by race, sex and socioeconomic status of their families are widely known. In view of this situation, the curricular and didactic-pedagogical decisions of the government Departments of Education, the planning of the annual work of school institutions and the routines and events of everyday school life must take into account the need to overcome these inequalities. For this, education systems and networks and school institutions **must be planned with a clear focus on equity, which presupposes recognizing that students' needs are different**. In particular, planning with a focus on equity also requires a clear commitment to reversing the situation of historical exclusion that marginalizes groups — such as original indigenous peoples and populations of the

remaining communities of quilombos<sup>4</sup> and other Afro-descendants – and people who were unable to study or complete their schooling at their own age. Likewise, it requires **a commitment to students with disabilities, recognizing the need for inclusive pedagogical practices and curriculum differentiation**, as established in the Brazilian Law for the Inclusion of People with Disabilities (Law No. 13.146/2015) (BRASIL, 2017, p. 15- 16, emphasis added).

In this context, we consider it essential that adaptations in the curriculum be made with a focus on equity and with a commitment to guarantee inclusive education within regular education. We believe that, only in this way, will we see the curriculum as a space of opportunities that enables the citizenship formation of all students with or without disabilities.

#### 4 Methodological Approach

To support the work, a qualitative research was carried out considering that studies of this nature allow us to analyze the interaction of certain variables and understand a certain phenomenon (RICHARDSON, 2017).

Thus, seeking to achieve the objectives, we carried out a bibliographical research, which is characterized by gathering and analyzing texts published to support the study in question. As stated by Lakatos and Marconi (2003), this is not a repetition of what was previously mentioned, but it is a work that aims at a reflection from a new perspective, with new approaches that can provide new conclusions.

The data collection procedure was carried out through an electronic search carried out in the Google Scholar and Scientific Electronic Library Online (SciELO) databases and in the Capes<sup>5</sup> Periodicals Portal. The investigation was based on the analysis of the articles cited in Chart 2, which were selected based on the following cut criteria: publications with a time span of up to ten years and that had as their theme the topics “curricular adaptations”, “practices of teachers” about “Inclusive Mathematics Education”. We consider reports and perceptions of Mathematics teachers against the background of how teachers recognize themselves in the process of producing a curriculum aimed at inclusive teaching.

The examination of the data was carried out based on Content Analysis, following Bardin's guidelines, which is characterized by being

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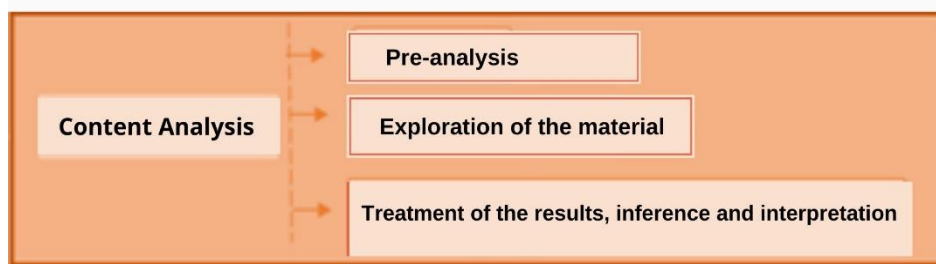
<sup>4</sup> Communities formed mostly by remnants of fugitives from slavery in Brazil.

<sup>5</sup> Higher Education Personnel Improvement Coordination (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* — CAPES)

a set of communications analysis techniques aimed at obtaining, through systematic procedures and objective description of the content of messages, indicators (quantitative or not) that allow the inference of knowledge regarding the conditions of production/reception (inferred variables) of these messages (2011, p. 42).

In the study in question, within the set of techniques mentioned by the author, we used categorical analysis, which is produced around three phases, according to the scheme shown in Figure 1: pre-analysis, exploration of the material and treatment of the results, inference and interpretation.

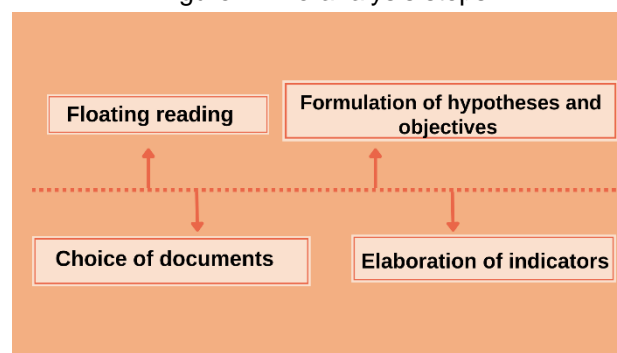
Figure 1: Phases of Content Analysis



Source: Adapted from Bardin (2011).

The pre-analysis consists of the initial phase and is responsible for choosing the documents to be submitted for analysis and for organizing the collected data, consisting of four stages, as shown in Figure 2.

Figure 2: Pre-analysis steps



Source: Adapted from Bardin (2011).

Based on the work of Bardin (2006 *apud* MOZZATO; GRZYBOVSKI, 2011), floating reading consists of knowing the collected material; the choice of documents demarcates what will be analyzed; the formulation of hypotheses and objectives is characterized by previous analyses; and the referencing of the indices and the elaboration of indicators involve the demarcation of indicators through text clippings in the analysis documents.

After the pre-analysis, we started exploring the material, which consists of

formulating the categories, carried out after collecting the data. It is in this phase that coding, classification and categorization are carried out. For this to happen, it was necessary to identify the record units and context units in the documents. The first is a unit corresponding to the content segment to be considered as a base unit, aiming at categorization and frequency counting, and the second unit refers to the exact meaning of the registration unit (BARDIN, 2006 *apud* MOZZATO; GRZYBOVSKI, 2011).

The third phase, the treatment of results, inference and interpretation, is responsible for the refinement of the elements already characterized and aims to show the interpretations of the analyzed facts (inferences), so that it is possible to reflect on their meanings when making a reflective and critical analysis (BARDIN, 2006 *apud* MOZZATO; GRZYBOVSKI, 2011).

## 5 Results and Discussion

Chart 2 summarizes the data that were presented by the articles included for the analysis of this study.

Chart 2: List of articles selected for analysis

Authors	Article Title	Aim	Year
Canassa and Borges	Conceptions of Autistic Spectrum Disorder ( <i>Transtorno do Espectro Autista – TEA</i> ): an analysis of academic works from the perspective of teaching and learning Mathematics.	Identify and analyze the conceptions about ASD present in research on teaching and learning Mathematics for these students.	2021
Costa, Silva and Noronha	Initial Formation of Mathematics Teachers from the Perspective of Inclusive Education. ..	Discuss the perception of mathematics teachers in relation to their own professional training with an emphasis on the inclusion of people with disabilities.	2021
Rolim, Lima and Lagares	Teaching activity in an inclusive context: a look at mathematics teaching.	To investigate the teaching activity in the context of educational specificities, considering the proposal of special education from an inclusive perspective in the teaching of mathematics.	2017
Barbosa and Camargo	Attention Deficit Hyperactivity Disorder ( <i>Transtorno do Déficit de Atenção com Hiperatividade – TDAH</i> ) and Mathematics: implications for school practice.	To describe activities carried out with students who have TDAH characteristics and who are lacking in basic Mathematics content.	2016
Menezes <i>et al.</i>	Perceptions of basic education teachers about the concept of inclusion.	Investigate teachers' perceptions about the concept of inclusion.	2016

Rosa and Baraldi	The use of (auto) biographical narratives as a possibility to research the practice of teachers about Inclusive (Mathematics) Education.	Present some discussions about the use of (auto) biographical narratives about Inclusive Mathematics Education.	2015
Viginheski <i>et al.</i>	The Braille system and the teaching of Mathematics for blind people.	Reference the Braille system as one of the Mathematics learning resources for blind students.	2014
Nogueira and Borges	An analysis of math classes for deaf students included in a 9th grade elementary school class.	To identify whether the school routine is significantly altered by the presence of two deaf students and a Sign Language Interpreter in the classroom, as to whether this situation of linguistic difference allows students to experience inclusive school situations.	2012

Source: Prepared by the authors, 2022.

After collecting the data, we observed a predominance of articles that addressed aspects of teaching exclusively among Elementary School teachers, with five of the eight works (62.5%), while two others investigated the teaching practice of Elementary and High School teachers (25%), while only one of the articles (12.5%) dealt with academic research in relation to inclusive teaching practice.

Next, we chose two categories of analysis: a) curricular adaptations from an inclusive perspective in mathematics teaching and b) Mathematics teachers' understanding of inclusive teaching.

Rosa and Baraldi (2015, p. 951), based on excerpts from memorials analyzed in their work, show the “approach of teachers with projects related to the creation of materials adapted for teaching Mathematics, as well as their preparation for application in your teaching practice” dedicated to inclusive education, but point out that this is not a reality throughout Brazil. In view of the works that emerged for the first category, we cite Barbosa and Camargo (2016), who point out how games and problem solving enable infinite applications, regardless of content, as the use of these approaches can contribute to the union of concrete with the ludic, in order to increase the potential of students within inclusive education.

Another work that can be placed in this category is that of Rolim, Lima and Lagares (2017, p. 237), who, based on the vision of Vygotsky (1997), present that “educating in the context of specificities is an inclusive construction that is effective only when signified socially”. Thus, the authors conclude that it is clear that didactic activities should encourage socialization in groups that invest in issues with the

intention of working on interaction with the environment in which students are inserted. Canassa and Borges (2021), in their work focusing on autistic students, show that social relationships, developed in groups, can help in the learning process and in the development of mathematical concepts for these students. In addition to socializations, Viginheski *et al.* (2014) also emphasize the importance of proposing situations outside the school context so that students can relate to their experiences at school and in the environment in which they live.

Based on the data obtained, we were able to infer how the process of socialization, contextualization with the environment and some methodological approaches are fundamental for teaching Mathematics in an inclusive way. But Nogueira and Borges (2012) add that, in addition to these guidelines, communication is of short importance. The focus of the study of these authors fell on a class with deaf students, and, in their explanations, they present the work of a teacher who uses the tools mentioned in this work, but who, due to the difficulties of communication between deaf and other hearing subjects, had as a result that the learning of deaf students was unsatisfactory in Mathematics classes. Thus, the importance of communication and the use of appropriate languages in the development of any activities carried out in the teaching process are emphasized.

With regard to the category of curricular adaptations in the inclusive perspective in mathematics teaching, we have that they do not advocate the creation of a new curriculum, but the adaptation of activities and the use of manipulative didactic materials that can contribute to the students' learning process with or without special needs.

Regarding the understanding of mathematics teachers about inclusive teaching, it was possible to see that teachers emphasize the importance of a flexible curriculum because they believe in the need for essential adaptations to the students' learning process. An important piece of data is related to the anguish of teachers facing the process of building inclusive education, as they feel alone, in addition to being unprepared due to a fragile preparation with the subject. In the work by Rolim, Lima and Lagares, the authors point out that

the speeches of professors who teach mathematics in common classrooms denounce a sometimes solitary search involving the inclusive context and explaining weaknesses that reside in the teacher's training process, evidencing the need for investments in training, both in the initial and in the continuing one, as well as in the structuring of the educational context (2017,

p. 236).

Among the reports presented in the work by Menezes *et al.*, a research participant expressed that

the main difficulty that I identify in the process of inclusion in teaching not only Science and Mathematics is the teacher's lack of preparation and knowledge. The students are arriving at the schools, after which the teachers go looking for alternatives to work with that student. Another difficulty is that many schools do not have specialized professionals to support the disabled student and the teachers who work with that student (2016, p. 10).

Based on this report and the arguments highlighted by Rolim, Lima and Lagares (2017), we are able to perceive that, in the search for an inclusive teaching and society, teachers experience difficulties even in their construction process as educators. We evidenced the fact that, regardless of the challenges, it is possible to perceive the efforts of the teachers in fulfilling the teaching process.

Costa, Silva and Noronha (2021) indicate that a possibility of confrontation with this reality would be provided by planning mathematical activities and adapting materials from the perspective of developing inclusive pedagogical practices throughout initial training, so that teachers could understand increasingly better the specificities and needs for adaptations that will need to be offered during their pedagogical practice.

## 6 Final Considerations

According to the objectives of this research — to identify the main curricular adaptations in the teaching of Mathematics and to discuss how teachers recognize themselves in this production process —, we consider that, from the analysis of the works, the results indicate that we can verify that a flexible curriculum can offer adaptations that are necessary within the process of constituting the teaching of Mathematics in an inclusive way. Thus, we consider that the curriculum, as a space of opportunities, must be linked to the adaptation process, with a focus on seeking to meet the specificities of each school, each class and, above all, each student.

The understanding of flexibility within the curriculum comes from the recognition of the specificities of each student, as it seems evident that teaching Mathematics from the perspective of inclusive education requires more than the mastery of mathematical contents, since the existing pluralities in the school community they need looks that

seek socialization with the environment and adapted communication, which respects the particularities of each individual inserted in the school.

In this study, it was evident that teachers understand some of the facets present in inclusive education, but that they feel helpless due to their training, public policies and even the perspective that society has in relation to inclusive education. With this, we consider it essential that there be new incentives in continuing education, aimed at Inclusive Education, as well as more spaces for this theme within Mathematics degree courses.

Finally, it should be noted that the path of teaching Mathematics in an inclusive way is being marked by major challenges, which most teachers are tackling, in order to build, from their practices, the new tomorrow.

## References

BARBOSA, M. J. F.; CAMARGO, J. A. TDAH e Matemática: Implicações na Prática Escolar. *In: XII Encontro Nacional de Educação Matemática, 2016, São Paulo. Anais eletrônicos do XII ENEM: Educação Matemática na Contemporaneidade: desafios e possibilidades.* São Paulo: UNICSUL, 2016, p. 1-12.

BARDIN, L. **Análise de conteúdo.** Lisboa: Edições 70, 2011.

BERTOLDE, F. Z.; LARCHERT, J. M. Pensando as adaptações curriculares na perspectiva da educação especial. *In: CASTRO, P. A. de. (Org.). Educação como (re)Existência: mudanças, conscientização e conhecimentos.* Campina Grande: Realize, 2021, p. 1312-1329.

BRASIL. **Decreto nº 1.428, de 12 de setembro de 1854.** Cria Instituto denominado Imperial Instituto dos meninos cegos. Rio de Janeiro: Diário Oficial da União, 12 dez.1854.

BRASIL. **Lei nº 3.198 de 06 de julho de 1957.** Denomina Instituto Nacional de Educação de Surdos (INES) o atual instituto nacional de surdos-mudos. Instituto de surdos mudos criado pela lei imperial 939. Rio de Janeiro: Diário Oficial da União, 6 de jul. 1957.

BRASIL. **Lei nº 5.692, DE 11 de agosto de 1971.** Fixa Diretrizes e Bases para o ensino de 1º e 2º graus. Brasília: Diário Oficial da União, 20 ago. 1971.

BRASIL. **Constituição da República Federativa do Brasil de 1988.** Estabelece a Constituição da República Federativa do Brasil. Brasília: Diário Oficial da União, 5 de out. 1988.

BRASIL. **Lei nº 8.069, DE 13 de julho de 1990.** Dispõe sobre o Estatuto da Criança e do Adolescente. Brasília: Diário Oficial da União, 13 jul. 1990.

BRASIL. Ministério da Educação, Secretaria de Educação Especial. **Política Nacional**



**de Educação Especial.** Brasília: MEC/SEESP, 1994.

BRASIL. **Lei nº 9.394, de 20 de dezembro de 1996.** Estabelece as Diretrizes e Bases da Educação Nacional. Brasília: Diário Oficial da União, 20 de dez. 1996.

BRASIL. **Decreto Nº 3.298, de 20 de dezembro de 1999.** Regulamenta a Lei no 7.853, de 24 de outubro de 1989, dispõe sobre a Política Nacional para a Integração da Pessoa Portadora de Deficiência, consolida as normas de proteção, e dá outras providências. Brasília: Diário Oficial da União, 21 de dez. 1999.

BRASIL. Conselho Nacional de Educação. Câmara de Educação Básica. **Resolução CNE/CEB nº 2 de 11 de setembro de 2001.** Institui Diretrizes Nacionais para a Educação Especial na Educação Básica. Brasília: Diário Oficial da União, 14 set. 2001.

BRASIL. **Lei nº 10.172 de 9 de janeiro de 2001.** Estabelece o Plano Nacional de Educação. Brasília: Diário Oficial da União, 9 de jan. 2001.

BRASIL. Ministério da Educação. Secretaria de Educação Especial. **Programa Educação Inclusiva: Direito à Diversidade.** Brasília: MEC/SES, 2006.

BRASIL. **Decreto nº 6.094/07, de 24 de abril de 2007.** Dispõe sobre a implementação do Plano de Metas Compromisso Todos pela Educação, pela União Federal, em regime de colaboração com Municípios, Distrito Federal e Estados, e a participação das famílias e da comunidade, mediante programas e ações de assistência técnica e financeira, visando a mobilização social pela melhoria da qualidade da educação básica. Brasília: Diário Oficial da União, 25 de abr. 2007.

BRASIL. Ministério da Educação. **Plano de Desenvolvimento da Educação:** Plano de Desenvolvimento da Educação razões, princípios e programas. Brasília: MEC, 2007.

BRASIL. **Decreto nº 6.571, de 17 de setembro de 2008.** Dispõe sobre o atendimento educacional especializado, regulamenta o parágrafo único do art. 60 da Lei nº 9.394, de 20 de dezembro de 1996, e acrescenta dispositivo ao Decreto nº 6.253, de 13 de novembro de 2007. Brasília: Diário Oficial da União, 17 de set. 2008.

BRASIL. **Resolução nº 4, de 2 de outubro de 2009.** Institui Diretrizes Operacionais para o Atendimento Educacional Especializado na Educação Básica, modalidade Educação Especial. Brasília: MEC, 2009.

BRASIL. **Decreto nº 7.611, de 17 de novembro de 2011.** Dispõe sobre a educação especial, o atendimento educacional especializado. Brasília: Diário Oficial da União, 18 de nov. 2011.

BRASIL. **Lei nº 12.764, de 27 de dezembro de 2012.** Institui a Política Nacional de Proteção dos Direitos da Pessoa com Transtorno do Espectro Autista. Brasília: Diário Oficial da União, 27 de dez. 2012.

BRASIL. **Lei n. 12.976, de 4 de abril de 2013.** Altera a lei nº 9.394, de 20 de dezembro de 1996, que estabelece as diretrizes e bases da educação nacional, para dispor sobre a formação dos profissionais da educação e dar outras providências. Brasília,

2013.

BRASIL. **Lei nº 13.146, de 6 de julho de 2015**. Institui a Lei Brasileira de Inclusão da Pessoa com Deficiência. Brasília: Diário Oficial da União, 6 de jul. 2015.

BRASIL. Ministério da Educação. **Base Nacional Comum Curricular**. Brasília: MEC, 2017.

BRASIL. **Decreto nº 9.465, de 2 de janeiro de 2019**. Aprova a estrutura regimental e quadro demonstrativo dos cargos em comissão e das funções de confiança do ministério da educação e transforma cargos em comissão do grupo direção e assessoramento superiores. Brasília: Diário Oficial da União, 02 de jan. 2019.

BRASIL. **Decreto nº 10.502, de 30 de setembro de 2020**. Política Nacional de Educação Especial, institui a chamada a Política Nacional de Educação Especial: Equitativa, Inclusiva e com Aprendizado ao Longo da Vida. Brasília: Diário Oficial da União, 30 de set. 2020.

CANASSA, V.; BORGES, F. Concepções do Transtorno do Espectro Autista - TEA: uma análise de trabalhos acadêmicos na perspectiva do ensino e da aprendizagem de Matemática. **Revista de Ensino de Ciências e Matemática**, v. 12, n. 6, p. 1-21, 29 dez. 2021.

COSTA, P. K. A.; SILVA, S. C. R.; NORONHA, A. M. Formação Inicial de Professores de Matemática na Perspectiva da Educação Inclusiva. **REMATEC**, v. 16, n. 38, p. 1-18, 2021.

KREUZ, K. K.; LEITE, F. de A. Compreensões de Professores de Ciências acerca de Currículo Escolar: uma Revisão Bibliográfica. **Revista Prática Docente**, v. 5, n. 2, p. 1211-1233, 2020.

LAKATOS, E. M.; MARCONI, M. A. **Fundamentos de Metodologia Científica**. São Paulo, SP: Atlas 2003.

MENEZES, A. L. dos S.; BARTELMEBS, R. C.; RAMOS, MAURIVAN G.; LAHM, R. A. Percepções de professores da educação básica acerca do conceito de inclusão. **Vidya**, Santa Maria, v. 36, n. 1, p. 1-13, jan./jun. 2016.

MOZZATO, A. R.; GRZYBOVSKI, D. Análise de Conteúdo como Técnica de Análise de Dados Qualitativos no Campo da Administração: Potencial e Desafios. **RAC**, Curitiba, v. 15, n. 4, p. 731-747, jul./ago. 2011.

NOGUEIRA, C. M. I.; BORGES, F. A. Uma análise das aulas de matemática para alunos surdos inclusos em uma turma do 9º ano do Ensino Fundamental. **Revista Educação e Linguagens**, Campo Mourão, v. 1, n. 1, p. 99-118, ago./dez. 2012.

OLIVEIRA, A. P. de. **Adaptação curricular para autistas no ensino fundamental I: um enfoque na legislação educacional**. 2016. 29 f. Trabalho de Conclusão de Curso (Bacharelado em Psicopedagogia) — Centro de Educação da Universidade Federal da Paraíba. João Pessoa

RICHARDSON, R. J. **Pesquisa social: métodos e técnicas**. São Paulo: Atlas, 2017.

ROLIM, C. L. A.; LIMA, S. M. A.; LAGARES, R. Atividade docente em contexto inclusivo: um olhar sobre o ensino de matemática. **Holos**, v. 2, p. 229-238, ago. 2017.

ROSA, F. M. C.; BARALDI, I. M. O uso de narrativas (auto)biográficas como uma possibilidade de pesquisa da prática de professores acerca da Educação (Matemática) Inclusiva. **Bolema**, v. 29, n. 53, 2015.

UNESCO. **Declaração mundial sobre educação para todos** e plano de ação para satisfazer as necessidades básicas de aprendizagem. Jomtien, Tailândia: UNESCO, 1990.

UNESCO. **Declaração de Salamanca e Linha de Ação sobre Necessidades Educativas Especiais**. Brasília: Corde, 1994.

VIGINHESKI, L. V. M.; FRASSON, A. C; SILVA, S. C. R.; SHIMAZAKI, E. M; O sistema Braille e o ensino da Matemática para pessoas cegas. **Ciência & Educação**, Bauru, v. 20, n. 4, p. 903-916, 2014.

VYGOTSKY, L. S. **Fundamentos de defectologia**. Obras escogidas: Vol. 5. Madrid: Visor, 1997.

XAVIER, G. C. **O currículo e a educação inclusiva**: a prática curricular e suas implicações na inclusão escolar de alunos com necessidades educacionais especiais. 2008. 197f. Dissertação (Mestrado em Educação) — Faculdade de Educação. Pontifícia Universidade Católica de Minas Gerais. Belo Horizonte.