

HOW MATHEMATICS IS TAUGHT IN INCLUSIVE CLASSROOMS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

This research examines teaching mathematics in inclusive classrooms through the PRISMA method with a focus on approaches, strategies, and challenges in creating inclusive learning. Inclusive education aims to integrate students with various needs, including students with special needs, into regular classes. Strategies used include collaborative teaching, curriculum adaptation, differentiation of learning, and utilization of interactive technologies such as Geogebra and Microsoft PowerPoint, which effectively explain abstract mathematical concepts concretely. Collaboration between teachers, parents, and the community is also a key element. However, various challenges include limited training teachers, lack of resources, and discrimination that can hinder student participation. Overcoming this requires continuous training for teachers in implementing inclusive strategies and assistive technology, education policy reforms that encourage greater collaboration, and individual ability-based evaluation for fairer assessment. This research emphasizes the importance of a systemic approach in overcoming social and economic barriers in inclusive education. By creating adaptive learning environments, teaching mathematics in inclusive classrooms can increase student engagement, create equity and support success regardless of background or special needs. These strategies can build effective and sustainable inclusive education, strengthening the foundation of equity in the education system.

Keywords: *Inclusive Education, Mathematics Teaching, Mathematics Education, Inclusive class.*

ABSTRAK

Penelitian ini mengkaji pengajaran matematika di kelas inklusif melalui metode PRISMA dengan fokus pada pendekatan, strategi, dan tantangan dalam menciptakan pembelajaran inklusif. Pendidikan inklusif bertujuan untuk mengintegrasikan siswa dengan berbagai kebutuhan, termasuk siswa berkebutuhan khusus, ke dalam kelas reguler. Strategi yang digunakan meliputi pengajaran kolaboratif, adaptasi kurikulum, diferensiasi pembelajaran, dan pemanfaatan teknologi interaktif seperti Geogebra dan Microsoft PowerPoint, yang secara efektif menjelaskan konsep matematika abstrak secara konkret. Kolaborasi antara guru, orang tua, dan masyarakat juga merupakan elemen kunci. Namun, berbagai tantangan meliputi pelatihan guru yang terbatas, kurangnya sumber daya, dan diskriminasi yang dapat menghambat partisipasi siswa. Mengatasi hal ini membutuhkan pelatihan berkelanjutan bagi guru dalam menerapkan strategi inklusif dan teknologi bantu, reformasi kebijakan pendidikan yang mendorong kolaborasi yang lebih besar, dan evaluasi berbasis kemampuan individu untuk penilaian yang lebih adil. Penelitian ini menekankan pentingnya pendekatan sistemik dalam mengatasi hambatan sosial dan ekonomi dalam pendidikan inklusif. Dengan menciptakan lingkungan belajar

yang adaptif, pengajaran matematika di kelas inklusif dapat meningkatkan keterlibatan siswa, menciptakan kesetaraan, dan mendukung keberhasilan tanpa memandang latar belakang atau kebutuhan khusus. Strategi-strategi ini dapat membangun pendidikan inklusif yang efektif dan berkelanjutan, memperkuat fondasi kesetaraan dalam sistem pendidikan.

Kata Kunci: *Pendidikan Inklusif, Pengajaran Matematika, Pendidikan Matematika, Kelas Inklusif.*

INTRODUCTION

This systematic literature review focuses on how mathematics is taught in inclusive classrooms. Mathematics learning in inclusive classrooms includes approaches, strategies, and practices that enable all students, regardless of their different abilities or educational needs, to actively participate in learning (Florian & Pantić, 2017). Inclusive education is an educational approach that aims to integrate all children, including children with special needs, into the mainstream school environment in order to create a system that accepts and values diversity (Stainback, 1996). The focus here is on dismantling impediments to education and promoting wider engagement among all learners, especially those on the periphery (Booth & Ainscow, 2002). Inclusive education guarantees all learners, irrespective of their differences, equitable access to high-quality schooling (UNESCO.) 2009. This process involves providing specialized support within the general education environment (Efthymiou & Kington, 2017), Developing schools capable of adjusting to the diverse needs of their student body (Mittler, 2012).

The philosophy of inclusive education supports shared learning for all children, viewing individual differences as a positive value (Sapon-Shevin, 2007). In addition, inclusive education is a systemic effort that ensures all children learn in regular schools without discrimination (Mitchell, 2014 ; D'Alessio, 2012). This approach also underscores the importance of educating all children in the same environment with adequate support (Boyle et al., 2020) And creating learning communities that support the diverse abilities and backgrounds of students (Loreman et al., 2005). Issues in inclusive education are complex when viewed from multiple perspectives. One of the most prominent issues in inclusive education involves the black race and their often-unfulfilled rights. Racial discrimination is a main factor hindering the effectiveness of mathematics teaching in inclusive classrooms. The unequal treatment of students based on race affects their opportunities to develop and learn to their full potential, hindering the goal of true

inclusion (Noor et al., 2008). The research on mathematics education is criticized for portraying Black children as intellectually and culturally inferior, and as less capable math learners. This perspective reinforces racial hierarchies by employing various methods of racial power.

this goal is not questioned despite the fact that there is much evidence that mathematics is not for everyone and so this is only an ideal without real application (Straehler-Pohl et al., 2016). Research on mathematics learning has this dimension as a key issue. It is argued that mathematical tasks with low cognitive demands can inhibit tasks that have the potential to build deeper understanding (Neumann et al., 2021). Learning mathematics in inclusive classrooms focuses on applying adaptive approaches to meet the needs of diverse students, both students with learning disabilities and those who need additional challenges. Inclusive mathematics education recognizes that every student has the potential to learn mathematics, regardless of their background or special needs.

To foster active student engagement, educators should employ diverse pedagogical strategies, including project-based learning, mathematical tools, and assistive technologie (Mitchell, 2014). By providing a variety of learning methods, teachers can help students with different learning styles to achieve better understanding. Collaborative strategies between teachers, parents and other professionals are also very important in inclusive math education. These support teams can help teachers design lesson plans that suit students' needs, including curriculum adaptations, the use of learning aids, and the provision of extra time to complete math tasks (Florian & Black-Hawkins, 2011). This collaboration ensures that students get the support they need to succeed. In inclusive mathematics education, creating a welcoming and supportive classroom environment is important. Teachers should encourage students to work together in heterogeneous groups, so that they can learn from and support each other. This approach not only improves mathematical understanding but also develops students' social skills and empathy (UNESCO. 2009). The role of assessment in inclusive mathematics education is significant. Utilizing varied assessment forms like observation, portfolios, and formative evaluations allows teachers to gauge student progress. Flexible assessment

practices empower educators to discern students' unique needs and adjust teaching methods to suit them (Graham, 2020).

Interactive software, math apps, and talking calculators are among the technological tools that significantly aid students with special needs, facilitating comprehension through engaging visual and interactive methods (Chambers & Forlin, 2020). In addition, *differentiated instruction* strategies help teachers tailor learning based on individual needs, by providing tasks that are appropriate in difficulty and structures that support student engagement and development (Tomlinson, 2014). Technology can be a very useful tool in inclusive mathematics education. Tools such as interactive learning software, math apps and adaptive devices can help students understand difficult concepts in a more visual and interactive way. Technology also allows students with special needs to learn independently at their own pace (Rose & Meyer, 2002). An inclusive social environment is also a key element. Teachers encourage cooperation and group discussions to build mutual respect, increase empathy, and strengthen students' social skills, contributing to successful inclusive learning (Florian & Black-Hawkins, 2011). In addition, inclusive mathematics education requires adequate teacher training. Teachers need to be equipped with knowledge about special needs, inclusive teaching strategies, and the use of assistive technology. This training ensures that they can create inclusive and compelling learning experiences for all students (Mitchell, 2014).

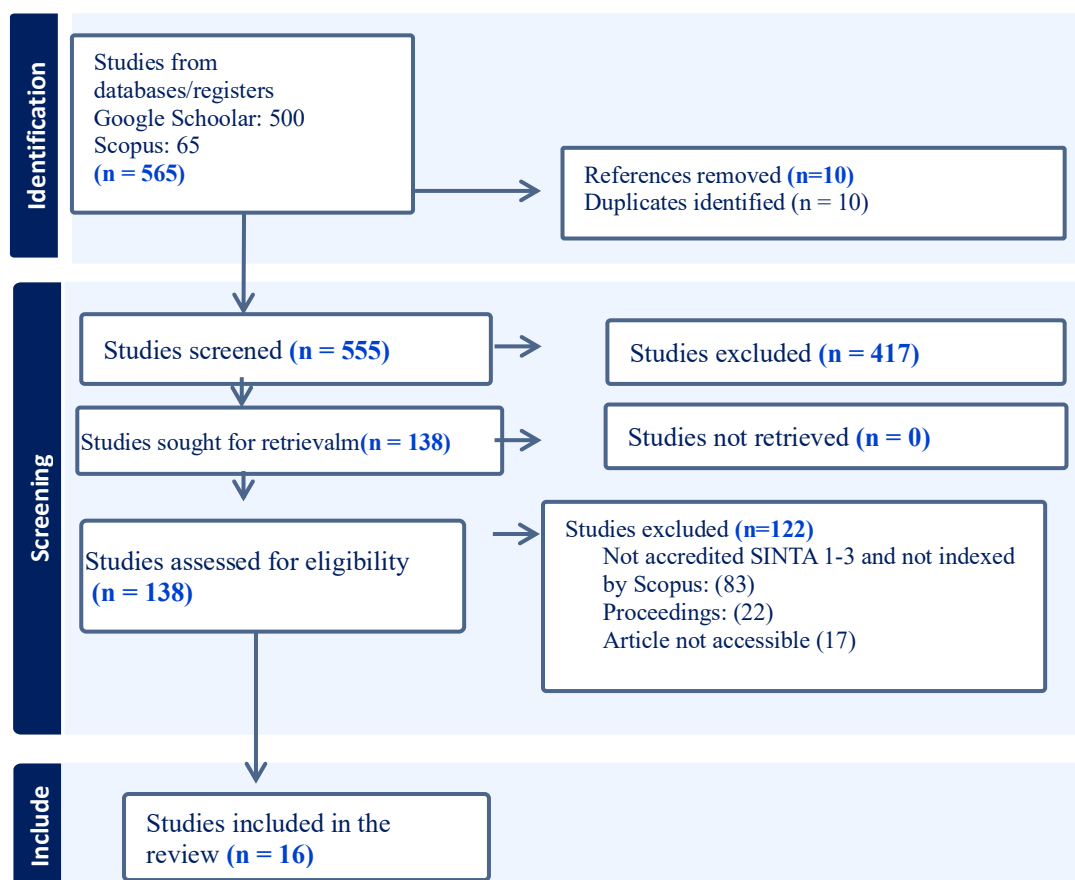
Student motivation and confidence are also essential aspects of inclusive math education. Teachers need to provide positive feedback and encourage students to try and learn from their mistakes. By creating a classroom culture that rewards effort and perseverance, teachers can help students feel more confident in learning mathematics (Florian & Black-Hawkins, 2011). Challenges in inclusive mathematics education, such as limited resources, time and support, need to be addressed with creative and collaborative approaches. For example, teachers can work with communities or organizations to get additional support, such as volunteer mentors or donations of learning aids. (Graham, 2020).

METHODS

The review adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, as accessed on December 6, 2024, via <http://prisma-statement.org>. Further steps were guided by the process described in (Pope et al., 2007), which includes systematic steps such as determination of focus, formulation of review questions, identification of relevant articles or studies, selection of data to be extracted, and final outcome decision. This study specifically focuses on how mathematics is taught in inclusive classrooms. It also describes the various problems and barriers that students face during the process of learning mathematics in an inclusive context. This approach aims to provide a thorough insight into optimal teaching practices as well as solutions to existing challenges. An in-depth search using publish on Perish with databases from Google Scholar and Scopus, Google Scholar focuses on research conducted in Indonesia and indexed in Scopus aims to obtain articles with an international scope of research.

IDENTIFICATION

Article searches were conducted using the Publish or Perish feature with two databases, namely Google Scholar and Scopus. On Google Scholar, the search used the keywords: "mathematics education," "inclusive education," and "mathematics education in inclusive classes," which was limited to 2019-2024. From this search, 500 titles of articles related to research in Indonesia were found. Furthermore, a similar search was conducted on Scopus with English keywords: "mathematics education," "inclusive education," and "mathematics education in inclusive classrooms," with the same time limit (2019-2024), resulting in 65 article titles. The total number of article titles collected from both databases was 565. After screening to identify duplicates, 10 duplicate titles were found, so the final number used for analysis was 555 article titles. This process ensured the accuracy and relevance of the articles used in the study.



Picture 1. Prisma 2020 Flow Diagram

SCREENING

In the article screening process, the authors identified the titles and abstracts to determine articles relevant to the research focus, namely "how mathematics is taught in inclusive classrooms." The selected articles included discussions on teachers' teaching practices, learning methods, students' ways of thinking in inclusive classrooms, and barriers experienced by students and teachers during the learning process. Of the 550 titles identified, after initial analysis of the titles and abstracts, 138 articles were selected for further reading and evaluated based on the following inclusion and exclusion criteria.

- ❖ Inclusion Criteria: Research related to mathematics teaching in inclusive classrooms, Scopus indexed or SINTA accredited articles 1-3, An empirical study.
- ❖ Exclusion Criteria: Research that is not relevant to teaching mathematics in inclusive classrooms, Articles published in journals that are not indexed by Scopus or not accredited by SINTA 1-3.

After screening against the established criteria, 122 articles were deemed ineligible and placed in the exclusion group. This left 16 articles that were suitable for further analysis in accordance with the focus of this study. Applying inclusion and exclusion criteria to screen articles is vital for confirming the pertinence and caliber of analyzed research, particularly concerning inclusive education in mathematics instruction within inclusive settings. Inclusion criteria included relevant empirical research, published in reputable journals such as those indexed by Scopus or accredited by SINTA 1-3, and focusing on teaching and learning practices in inclusive classrooms. In contrast, the exclusion criteria eliminated irrelevant articles, such as those not directly related to the topic or published in journals with low reputation. This approach ensured that only high-quality studies were analyzed, providing evidence-based data on the challenges and strategies of mathematics teaching in inclusive classrooms, and supporting reliable systematic literature research (Gardesten & Palmér, 2023 ;Tan, 2005) ; ymms et al., 2023))

ANALYSIS

This literature review was conducted through a comprehensive synthesis of the data that had been screened in the initial screening process. The data were then analyzed in depth and categorized into several key definitions to facilitate the identification of the research focus. These categories helped the authors to understand the various dimensions of the research conducted, especially in the context of teaching mathematics in inclusive classrooms. The first category includes research that focuses on students with special needs or disabilities. Research in this category highlights learning challenges and strategies for students with special needs, including children with special needs (ANK), students with autism spectrum disorder (ASD), visual impairment, mild intellectual disability (MID), and slow learners. For example, research by (Bernardo, 2022) shows that students with visual impairments need access to teaching materials in appropriate formats, such as Braille, to support their academic success. In addition, research by (Nikolić et al., 2020) revealed that students with mild intellectual disabilities benefit greatly from small group teaching and specific task customization to support their understanding. Meanwhile, (Hasibuan et al., 2020) highlight the importance of repetition of material and curriculum adjustments to help students with learning delays understand

mathematical concepts. Other proposed solutions, such as interactive technology and manipulative materials, were also found to be effective in bridging the learning gap.

The second category highlights the need for teachers to teach mathematics in inclusive classrooms. Research in this category includes teacher training in inclusive teaching strategies, the use of educational technology and the management of heterogeneous learning groups. For example, research by (Kuhl et al., 2022) emphasizes that professional development focused on differentiated teaching strategies can help teachers manage diversity in inclusive classrooms more effectively. In addition, Dilson Ferreira notes that collaboration between teachers through co-teaching models enables the utilization of collective expertise to meet the needs of students with diverse abilities.

The third category includes research that addresses racial issues, the impact of government policies, and solutions to problems in teaching mathematics in inclusive classrooms. For example, (Valoyes-Chávez & Darragh, 2024) highlights how racial hierarchies in perceptions of mathematical ability often marginalize black immigrant students, creating significant barriers to their inclusion. This research shows the importance of reforms in teaching practices to eliminate racial bias in the classroom. In addition, (Ainscow, 2020) highlights the need for education policies that are inclusive and involve all stakeholders, including students, in the decision-making process to create a more equitable and supportive education system. By categorizing the research into these dimensions, the literature review provides a clear picture of the different aspects that need to be considered in teaching mathematics in inclusive classrooms. This approach also facilitates the identification of research gaps and relevant solutions to improve the effectiveness of inclusive education.

Table 1. Inclusion Data

Author Name	Year	Title	Journal	Study Design	Methods
cristina andiara de souza and henrique guilherme gomes da silva.	2019	Digital tools for education provide benefits beyond social interaction in mathematics for autistic learners.	bolema: mathematics education bulletin	<ul style="list-style-type: none"> The study concentrated on learners with autism spectrum disorder. aimed to understand 	Qualitative

				<p>digital technologies' contributions to mathematical learning.</p> <ul style="list-style-type: none"> • The study's in-depth investigation was facilitated by a case study methodology. • Data was collected from weekly meetings with two students to gather insights into their experiences and progress. 	
dilson ferreira and isabel machado de lara.	2023	the teaching of mathematics to students with cerebral palsy	rev. bras. ed. esp	<ul style="list-style-type: none"> • the study involved 13 math teachers and 11 students with cp. • Data were collected through semi-structured interviews and textual analysis. • focused on inclusive teaching strategies for students with cerebral palsy. • emphasized the importance of communication and adaptation in teaching. • utilized manipulatives and technology to enhance learning experiences. 	qualitative

elena naftaliev and marita barabash.	2024	Enhancing teacher expertise in integrating hands-on math and interactive tools classroom-wide.	zdm mathematics education	-	<ul style="list-style-type: none"> • Focusing on experimental mathematics, the study explores teacher professional development initiatives. • it utilizes a threefold theoretical framework for design and research. • the framework combines experimental mathematics, interactive resources, and instrumental orchestration. • The data includes teacher documents and workshop reflections over nine months. • The workshops involved group work, individual tasks, and collaborative design activities. 	qualitative
garcia fábio bernardo.	2022	Exploring how students with visual impairments encounter, perceive, and conceptualize mathematics learning.	bolema: mathematics education bulletin	-	-	Qualitative
malin gardesten.	2023	Exploring co-teaching's role in fostering mathematics education inclusion: a systematic review.	education science	-	<ul style="list-style-type: none"> • the study design involved a systematic literature review. 	Qualitative

				<ul style="list-style-type: none"> • A narrative synthesis of 15 articles was included. • the review followed prisma guidelines for reporting. • Data extraction was determined based on specified review questions. 	
Gordana Nikolić, Marija Cvijetić, Nataša Branković, Dejan Đorđić, and Christopher Johnstone.	2019	Challenges remain: insights from Serbia's path toward inclusion.	Journal focusing on disability, development, and education.	<ul style="list-style-type: none"> • This study's focus was on comparing students' math achievement. • A total of 249 students with mild intellectual disabilities participated. • students were matched by ability based on assessments. • the study focused on fifth and sixth graders. • it analyzed the differences between special and regular schools. 	Quantitative
haya fikriya, mazza safana, nurul izzah, and adi ningsih .	2020	A study of how mathematics is taught to children with disabilities at SMP Negeri 15 Yogyakarta.	journal of mathematics learning development (jppm)	<ul style="list-style-type: none"> • A qualitative descriptive design characterizes the study. • The subject selection uses purposive sampling technique. 	Qualitative

				<ul style="list-style-type: none"> • Interviews and documentary evidence formed the basis for data collection. • The data analysis employs Miles and Huberman's interactive model. 	
helena roos.	2023	Exploring students' views regarding inclusion in math education..	Research in math education	<ul style="list-style-type: none"> • The study's scope is special educational needs students within the field of mathematics. • it employs discourse analysis to examine students' voices. • three students from different grades were selected for the study. • the research aims to understand inclusion in mathematics education. • Research data was gathered via interviews and classroom observations. 	qualitative
Yunilda, Syamsuri, Anwar, Santosa, and Pamungkas are the researchers credited.	2020	A study on mathematics learning profiles for slow learner students in inclusive SMP Garuda Cendekia Jakarta.	Journal of Medives: A Mathematics Education Journal from IKIP Veteran Semarang.	<ul style="list-style-type: none"> • A qualitative framework guides this study. • The research employs a case study approach. • Data was gathered via semi-structured interviews. 	Qualitative

				<ul style="list-style-type: none"> • participants include teachers and school administrators . • the research focuses on slow learners in inclusive classrooms. 	
ikhlasul amaliah and eyus sudihartinih .	2019	development of teaching materials for the concept of multimedia-assisted fractions	journal	<ul style="list-style-type: none"> • the study focuses on multimedia teaching materials for fraction concepts. • it aims to enhance mathematical understanding in inclusive schools. • the research involves developing educational materials using powerpoint and geogebra. • it targets students with diverse needs in inclusive education settings. • the study follows a development model for educational material creation. 	Qualitative
Jan Kuhl, Susanne Prediger, Sarah Schulze, Claudia Wittich, and Imke Pulz.	2021	inclusive mathematikunterricht in der sekundarstufe - eine pilotstudie zur prozentrechnung	unterrichtswis s	<ul style="list-style-type: none"> • The study utilized a pre-post control group design. • it involved 259 learners in the 7th grade. • linear hierarchical regression analyses were 	qualitative

				<p>conducted to assess intervention effects.</p> <ul style="list-style-type: none"> the intervention aimed to improve understanding of percentage calculations. 	
lena lindenskov and bent lindhardt .	2019	Researching inclusive approaches to mathematics teaching in Denmark's public school system.	The journal presents academic findings in mathematics education.	<ul style="list-style-type: none"> the study utilized cobb's design project features for collaboration. It tackles demanding issues in equitable mathematics instruction. teachers influenced all phases of the project. Data was collected through interviews, observations, and discussions. the project included three phases with joint seminars. emergent themes were identified and discussed among participants. 	Qualitative
luz valoyes-chávez and lisa darragh .	2024	Examining equity in reformed math classrooms for Black immigrant students.	Studies on math learning	<ul style="list-style-type: none"> the study examines classroom practices for black immigrant students. it focuses on a third-grade teacher's instructional changes. 	qualitative

				<ul style="list-style-type: none"> • Analysis of classroom videos and teacher interviews revealed technologies of race-power, specifically invisibilization and singling out. • Employing Hall's discursive lens, this study examines race. 	
malin gardesten and hanna palmér.	2023	students' participation in mathematics in inclusive classrooms	mathematical thinking and learning	<ul style="list-style-type: none"> • the study utilized a longitudinal design. • Data collection included observations, interviews, and questionnaires. • Video-recorded observations were conducted every two weeks. • The analysis focused on teachers' mathematical and relational knowing. 	Qualitative
mel ainscow .	2020	Learning from global practices to foster educational inclusion and equity.	nordic journal of studies in educational policy	<ul style="list-style-type: none"> • the study focuses on inclusive and equitable education practices. • it emphasizes the need for policy and practice changes. • evidence collection is crucial for 	Qualitative

				monitoring educational progress. <ul style="list-style-type: none"> • the framework centers on local mainstream schools' capacity. • it involves discussions among teachers and students for inclusivity. 	
susana labuem.	2019	the thought process of slow learners in inclusive classrooms in solving math problems	j u p i t e k journal of mathematics education	<ul style="list-style-type: none"> • the study employs a qualitative case study design. • it interprets and describes the thinking process of a slow learner. • the research focuses on problem-solving in mathematics. 	Qualitative

RESULT AND DISCUSSION

Focusing on student diversity and inclusive teaching methods, this research investigates the application of inclusion within mathematics education. Two main divisions of inclusion exist: one for students possessing different abilities and another for all learners, integrating them spatially, socially, and didactically. The articles highlight the importance of technology, such as interactive tools and multimedia teaching materials, in improving the understanding of students with special educational needs (SEM). To accommodate diverse students, including those with communication challenges, educational frameworks often categorize differences as learning, behavioral, or intellectual disabilities, or autism, necessitating curriculum modifications and tailored teaching methods. However, the main challenges faced in realizing inclusion include limited resources, lack of teacher training, and social and economic barriers. While digital technologies offer potential benefits for special needs learners, their improved efficacy in inclusion hinges on evidence-based policy changes and coordinated

stakeholder efforts. A systemic strategy is crucial for fostering an inclusive educational setting that caters to every student's requirements.

RQ1: What learning methods are used in teaching mathematics in inclusive classrooms, and how do they impact students?

Research on mathematics learning in inclusive classrooms shows that the methods used vary depending on the needs of the students and the challenges faced. Digital education technology has become one of the main approaches used to support inclusive learning. Tools such as Microsoft PowerPoint, Geogebra and other interactive platforms help students with (SEM), such as students with autism spectrum disorder (ASD), visual impairment or learning delays, to understand abstract mathematical concepts in a more concrete and engaging way. (Florian & Pantić, 2017) (Sarama & Clements, 2009) mentioned that tools such as Geogebra and Microsoft PowerPoint enable students with special needs, including students with autism spectrum disorder, to understand abstract mathematical concepts through interactive visualizations (McCray et al., 2014) who noted that interactive technologies help improve ASD students' understanding of complex material. (Madaus & Dukes, 2023) ; (Robinson et al., 2019) Digital tools enhance participation for physically disabled students in learning. (Sangster, 2015) emphasizes the importance of technology as a bridge to make mathematics learning more inclusive and collaborative. As such, digital educational technologies play an important role in strengthening the understanding of students with a range of special educational needs, making mathematics more accessible and engaging for all students. Therefore, the use of technology is key in creating an inclusive learning environment where every student, regardless of their challenges, can actively and effectively engage in the mathematics learning process.

Collaborative teaching models such as co-teaching play an important role in creating effective inclusive classrooms. In co-teaching, two or more teachers work together to design and implement lessons, allowing them to complement their skills and experiences to meet the needs of diverse students (Risko & Bromley, 2020) . This model allows for more flexible teaching, where one teacher can focus on direct instruction while the other provides individualized or small group support, ensuring that students with a range of needs receive adequate attention (McCray et al, 2014) In addition, differentiated

teaching strategies such as small group teaching, group discussions, and project-based approaches allow students to learn at their own pace and style, which supports deeper understanding and active participation in the learning process (Tomlinson, 2014) This approach not only increases student engagement, but also provides room for teachers to customize instruction according to the individual needs of students in inclusive classrooms (Wong et al., 2011) Fair and flexible evaluation methods are essential in supporting inclusive learning, allowing teachers to assess students' understanding more accurately and according to their abilities. Individual ability-based evaluation ensures that each student can be evaluated according to their level of understanding and pace of learning, without being burdened by standards that are irrelevant to their needs. This gives teachers the opportunity to provide constructive feedback that is more focused on individual student development (Tomlinson & Strickland, 2005) ; (Weiner et al., 2012)

Curriculum adjustments also play a very important role in this process. With adjustments, students with intellectual disabilities, communication disorders or other special needs can engage in learning more effectively, as learning materials are tailored to their individual abilities and needs (Khine, 2022) ; (Ainscow, 2020) For example, students with visual impairments may require materials in Braille format or assistive technology, while students with autism spectrum disorder (ASD) may be helped more by visual and interactive approaches to learning (Chambers & Forlin, 2020) Thus, curriculum customization and individual ability-based evaluation ensure that every student, regardless of their background or needs, can engage maximally in the learning process.

RQ2: What are the challenges faced by teachers and students in teaching mathematics in inclusive classrooms, and what solutions are proposed in the research to overcome these challenges?

In an effort to realize inclusive mathematics education, several significant challenges are faced by teachers and students, which include limited teacher training, access to adequate resources, and students' difficulties in actively participating in learning. (Ainscow, 2020) emphasizes the importance of continuous professional development for teachers to improve their competence in managing student diversity in inclusive classrooms. Well-trained teachers can more effectively use educational

technology and inclusive teaching strategies, which are much needed in heterogeneous classroom environments. (Florian & Pantić, 2017) also highlights that educational technology, although it has great potential to support the learning of students with special needs, requires adequate understanding and skills from educators to be properly integrated with daily teaching.

In addition, the provision of adequate resources is also an important aspect of supporting the success of students with special needs. (Elliott et al., 2018) suggests that access to teaching materials in accessible formats, such as Braille for students with visual impairments, is essential to ensure that all students have an equal opportunity to understand learning materials. It is also (Christou et al., 2022) use of interactive technologies and manipulative materials not only makes it easier for students with visual or cognitive impairments to understand mathematical concepts but also creates a more engaging and accessible learning experience for all students, regardless of their special needs.

On the policy side, reforms that support inclusion are crucial to creating an equitable and sustainable education system. (Ainscow, 2020) education policies based on collaboration between various stakeholders, such as teachers, students, parents and policymakers, are a key step in creating policies that are relevant to local needs and students. This approach can ensure that inclusive policies are not only top-down but also cover practical needs on the ground. (Munir Yusuf, 2023) policies that encourage flexibility in curriculum and evaluation can create an environment that is more inclusive and responsive to the needs of diverse students.

Collaboration between schools and sharing best practices is essential in creating a sustainable inclusive culture. By sharing resources, experiences and successful strategies, schools can overcome challenges related to student diversity and create a more inclusive learning environment. (Mercer et al., 2019) This collaboration not only strengthens the capacity of schools to face the challenges of inclusion but also ensures that the implementation of inclusive policies is consistent across educational institutions. With a comprehensive approach that includes teacher training, provision of adequate resources, and policy reforms that support inclusion and collaboration between schools, inclusive mathematics education can create equal opportunities for all students to develop,

overcome their difficulties, and reach their full potential in an inclusive educational environment.

CONCLUSIONS

Learning mathematics in inclusive classrooms presents complex challenges that include students' special educational needs and racial issues that affect equity of access as well as participation. The use of educational technology, such as Geogebra and Microsoft PowerPoint, provides concrete support for students with various special needs to understand abstract mathematical concepts. Collaborative teaching models, such as co-teaching and differentiated approaches, help to create flexible and adaptive learning environments, while individual ability-based evaluation ensures that students are assessed fairly according to their pace and capacity. However, racial issues, such as negative stereotypes and low expectations of students from minority backgrounds, remain significant barriers to creating truly inclusive learning.

The solution to this challenge involves ongoing teacher training to increase awareness of bias and the ability to implement culturally responsive teaching approaches. Education policy reforms that encourage collaboration between schools, the provision of adequate resources, and inclusive curricula can ensure that the cultural and social diversity and needs of students are properly accommodated. Through the concerted efforts of teachers, policymakers, communities and families, mathematics education in inclusive classrooms can be a means to strengthen equity, empower students from all backgrounds and create inclusive and meaningful learning experiences.

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