

Building Numeracy and Adapted Instruction: Sped Teachers' Perspectives on Development

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ABSTRACT

This qualitative study employed a phenomenological research design to explore the lived experiences and perceptions of math, general and special education teachers in two SPED classes at John Adams Academy, California, during the School Year 2024–2025. Grounded in the phenomenological approach, the research sought to understand how teachers experience and make meaning of their role in building numeracy among students with special needs. In-depth, semi-structured interviews served as the primary data collection method, allowing participants to share their personal narratives, teaching practices, and professional insights. Findings indicated that teachers employed a wide range of instructional strategies to address diverse learning needs. These included differentiated instruction, the use of manipulatives and visual aids, real-life applications, multi-sensory approaches, and assistive technology. Beyond academic support, teachers also promoted routines, patience, and positive reinforcement to reduce math anxiety and build student confidence. Four central themes emerged from the data: (1) adaptability and innovation in teaching strategies, (2) emotional sensitivity and confidence-building, (3) collaboration among stakeholders, and (4) a strong commitment to continuous professional development. These themes affirmed that effective SPED math instruction required not only pedagogical expertise but also empathy, flexibility, and a collaborative mindset. Insights from the teachers' narratives pointed to the need for a holistic, individualized approach in teaching math to students with special needs, supported by responsive leadership and consistent professional training. In response, the study presented an Action Plan for Strengthening Numeracy and Adapted Instruction. It included targeted professional development, integration of multi-sensory tools, stakeholder collaboration, data-informed practices, and a repository of SPED math resources. This study contributed to the understanding of inclusive math education by highlighting the voices of SPED teachers and offering practical recommendations to enhance numeracy instruction for students with special needs.

Keywords: adapted instruction, collaboration, differentiated strategies, numeracy, special education

THE PROBLEM AND ITS BACKGROUND

Introduction

Both schools in general and mathematics classrooms specifically mirrored the diversity and inequalities present in society, while also holding the potential to challenge and change these conditions.

Across America, teachers reported that as many as 40 percent of their students were performing below grade level in math. While students with math disabilities might lag even further behind, overall math scores for all students remained poor for years, indicating that math instruction required greater focus and improvement. Furthermore, parents and experts argued that school districts continued to overlook students with math disabilities like dyscalculia, which impacted as many as 7 percent of the population and frequently occurred alongside dyslexia (Mader, 2023).

Numerous studies highlighted those American students consistently performed at lower levels in mathematics compared to their peers in many other countries. International assessments, such as the Programme for

International Student Assessment (PISA), often showed that U.S. students lagged in key areas like problem-solving, numerical reasoning, and application of mathematical concepts (DeSilver, 2017, as cited in Gang, 2022).

Additionally, students with learning disabilities had a higher dropout rate compared to their peers without disabilities.

According to the 2022 National Assessment of Educational Progress, the achievement gaps in reading and math between students with and without disabilities in grades 4 and 8 had slightly narrowed. This occurred as scores for students with disabilities remained mostly steady or showed slight decline compared to 2019 levels. The most significant drop was observed in 8th grade math, where the average score fell from 247 in 2019 to 243 in 2022. In 4th grade, math scores decreased by 2 points, from 214 to 212, and reading scores dropped by 1 point, from 184 to 183. Meanwhile, the average 8th grade reading score remained unchanged at 229. Several states reported significant changes in academic performance among students with disabilities. For instance, in Alabama, the average math score for 4th grade students with disabilities rose by 15 points, increasing from 196 in 2019 to 211 in 2022. In California, 8th grade students with disabilities improved in reading, with scores rising from 221 in 2019 to 226 in 2022, a gain of 5 points. On the other hand, some states experienced declines. Idaho's 4th grade students with disabilities saw their average reading score drop by 11 points, from 172 in 2019 to 161 in 2022. Similarly, in West Virginia, the average 8th grade math score for students with disabilities decreased by 6 points, falling from 232 to 226 over the same period. (Arundel, 2022).

Like all children, students with special needs possessed diverse and complex individual characteristics that made each student unique. They varied widely in their abilities, interests, and learning styles. However, their potential was often misunderstood or overlooked, especially when their disabilities were more visible or challenging. Mahmoud (2021) highlighted that some students with special needs had exceptional intellectual capacities, but these strengths were frequently overshadowed by their learning difficulties or behavioral challenges. As a result, their true abilities might go unrecognized in traditional educational settings, underscoring the need for more personalized, strength-based approaches that focused on what these students could do, rather than solely on their limitations.

Students with special needs frequently encountered unique learning conditions that differed from those of their typically developing peers, often requiring specialized support, adapted materials, and modified teaching strategies to succeed academically. These differences might stem from cognitive, emotional, sensory, or physical challenges that affected how they engaged with and processed information. Despite these challenges, mathematics teachers had a professional and ethical responsibility to ensure that students with special needs were given access to the same core mathematical content and learning opportunities as their regular classmates. This meant providing differentiated instruction, using inclusive practices, and creating supportive learning environments that promoted equity, allowing all students to reach their full potential in mathematics (Avramidis et al., 2000, as cited in Ediyanto et al., 2023).

In recent decades, both science and mathematics education, along with professional organizations, raised academic expectations by promoting learning strategies that encouraged students to take an active and independent role in their education. This shift focused on developing critical thinking, problem-solving, and self-directed learning skills rather than relying solely on passive instruction. At the same time, the rise of inclusive education had led to the integration of students with special needs into general education classrooms (Ediyanto et al., 2023).

According to Sukinah and Triadi (2022), this inclusive approach not only placed these students alongside their typically developing peers but also expected them to engage meaningfully with the same curriculum particularly in subjects like mathematics. As a result, teachers were challenged to create supportive and adaptable learning environments where all students, regardless of ability, were actively involved and given equitable opportunities to succeed.

Competency in numeracy skills was a strong predictor of future success in mathematics for students with special educational needs (SEN). A solid foundation in basic concepts such as number sense, counting, operations, and understanding mathematical relationships was essential for progressing to more complex math tasks in later

grades. However, many students with SEN often struggled to build this foundational knowledge due to various factors like cognitive delays, language processing difficulties, or insufficient access to specialized instruction. Without targeted and supportive interventions early on, these gaps in numeracy could widen over time, leading to continued academic difficulties, lower confidence, and reduced opportunities for success in both school and daily life. Therefore, early and consistent support in developing numeracy skills was crucial for improving long-term outcomes for students with SEN (Sari, Gokdag & Pursun, 2024).

In special education settings, there was a pressing need to investigate how teaching approaches, classroom environments, and support systems influenced the development of foundational mathematical concepts among students with disabilities. Addressing this issue was essential to ensure equitable learning outcomes and empower these students to function effectively in academic and real-life contexts.

Evaluating and assessing mathematics skills was crucial, particularly for students with special educational needs, as it provided a clear understanding of their current level of knowledge, strengths, and specific areas of difficulty. Many of these students showed limited or uneven progress in mathematics, which might not always be evident without targeted assessment tools. Through careful evaluation, teachers could identify gaps in understanding, misconceptions, and learning barriers that hindered mathematical development. This information was essential for designing effective, individualized education programs (IEPs) that were tailored to meet each student's unique needs and learning style, ensuring that instruction was both meaningful and accessible (Mercer & Pullen, 2009, as cited in Özdemir & Kılıç, 2023).

Developing numeracy skills among students with special needs presented a complex and multifaceted challenge in today's inclusive educational landscape. While mathematics was foundational to daily functioning and academic success, students with special educational needs (SEN) often struggled with numeracy due to cognitive, behavioral, and emotional barriers. Teachers in special education settings were tasked with adapting instruction to meet these diverse needs, yet their insights, experiences, and challenges were often underrepresented in research. Understanding how special education (SPED) teachers perceived and implemented adapted instruction was essential in identifying effective strategies and improving learning outcomes.

Although quantitative assessments often highlighted the challenges that students with special needs faced in developing numeracy skills, there was a notable lack of qualitative research that captured the lived experiences, perceptions, and classroom realities of these students and their teachers. Little was known about how students with special needs engaged with mathematical concepts, the instructional strategies that resonated with them, and the contextual barriers or enablers that influenced their learning within charter school environments like John Adams Academy. This gap hindered the development of responsive, experience-based practices that could meaningfully support numeracy growth in special education settings.

Thus, the purpose of this study was to explore the lived experiences and perceptions of teachers in two special education classes at John Adams Academy, California, during the School Year 2024–2025, focusing on the factors that contributed to the difficulties in mathematical literacy and numeracy development among students with special needs as observed by teachers, as well as to explore effective strategies and support systems that could enhance students learning outcomes. The research also aimed to provide insights that would guide future educational practices, policies, and interventions aimed at improving the mathematical learning experiences of students with special needs.

Theoretical Lens

The following theoretical lenses offer valuable frameworks for examining how adapted instruction can effectively support numeracy development among students with special needs.

Universal Design for Learning (UDL) Framework

The UDL framework, rooted in cognitive neuroscience, promotes the design of flexible learning environments that accommodate individual learning differences.

Universal Design for Learning (UDL) is a flexible and inclusive educational framework that helps teachers proactively design lessons to accommodate the diverse needs, strengths, and interests of all students, including those with special needs. Rooted in research from the learning sciences, UDL encourages the use of multiple means of representation, expression, and engagement to ensure that every student can access, participate in, and make progress in the curriculum. By anticipating learning barriers and providing various options for learning and assessment, UDL promotes equity, fosters student independence, and enhances overall learning outcomes in diverse classrooms (CAST, 2018, as cited in Han & Lei, 2024).

The primary goal of Universal Design for Learning (UDL) is to ensure equal access to education by guiding teachers to present information in multiple ways, allow students to express their understanding through various methods, and engage students using strategies that reflect their diverse interests, needs, and motivations (CAST, 2022).

It also empowers teachers to create and deliver a flexible, accessible curriculum that reduces learning barriers, ensuring that all students, including those with special needs, can actively participate and succeed in the educational process (Florian, 2021).

This lens is directly aligned with the study's findings on the need for multi-sensory strategies, assistive technology, and inclusive instructional practices. UDL provides a theoretical foundation for proactive planning that removes barriers to learning and supports engagement, representation, and expression for all students, particularly those with special educational needs.

Vygotsky's Sociocultural Theory

Vygotsky's theory emphasizes the role of social interaction, scaffolding, and cultural tools in learning.

Sociocultural theory emphasizes that learning is fundamentally a social process. According to this perspective, individuals construct knowledge through repeated interactions within meaningful cultural contexts, such as classrooms, peer collaborations, family environments, and professional learning communities, which shape cognitive development and understanding (Lantolf et al., 2015, as cited in Jeong et al., 2022).

Aligned with the concept of the Zone of Proximal Development (ZPD), a core element of Sociocultural Theory, Vygotsky stated that students achieve deeper understanding when they engage in collaborative learning with more knowledgeable peers or receive guided support from teachers. This scaffolding allows students to perform tasks they could not accomplish independently, thus promoting cognitive growth within a supportive social context (Hiltrimartin et al., 2024).

This lens supports the use of differentiated instruction and collaborative learning strategies in SPED classrooms, where teachers scaffold mathematical concepts to help students move through their Zone of Proximal Development (ZPD). It also underlines the value of teacher-student and peer interactions in building conceptual understanding, especially through guided practice, visual aids, and hands-on learning.

Statement of the Problem

This study aimed to explore the real-world classroom experiences of SPED teachers as they worked to build numeracy skills, aiming to inform future practices and contribute to the broader conversation on inclusive mathematics education.

Specifically, the study sought to answer the following questions:

1. What are the stories of Special Education teachers on building mathematical literacy among students with special needs?
2. What strategies do teachers use to address and overcome the challenges of building mathematical literacy among students with special needs?

3. What are the themes that emerge from the responses of the participants?
4. What insights can be derived from the responses of the participants?
5. What can be created based on the significant stories of the co-participants?

Scope and Delimitation of the Study

This study focused on the development of mathematical literacy among students with special needs as observed by teachers in inclusive education settings. The primary emphasis was on understanding the challenges faced by students with disabilities in learning mathematics and exploring the teaching strategies, resources, and instructional practices that could effectively support their mathematical development. The study involved mathematics teachers, special and general education teachers working in inclusive classrooms, and it considered 2 special education classes in John Adams Academy California, for SY 2024-2025. The research also examined both the barriers and the successful approaches to teaching mathematical concepts to students with special needs, as well as how these strategies impacted students' learning outcomes in mathematics.

While this study aimed to provide a comprehensive understanding of the challenges and strategies involved in teaching mathematics to students with special needs, it was limited to one educational institution that practiced inclusive education which might limit the generalizability of the findings to other schools, regions or countries with different educational systems and policies. The study primarily focused on mathematics teachers, special and general education teachers. Other educational staff, such as school counselors and administrators, were not included in the study. The research was conducted over a set period, limiting the ability to observe long-term outcomes of the strategies or interventions used in the study. The findings were based on the data collected during this period and did not capture trends over extended timespans. Moreover, the study focused on primary education level and did not extend to early childhood education, secondary and higher education settings. As such, the findings were not applicable to younger or older age groups.

Significance of this Study

This study was significant as it shed light on the experiences and perspectives of special education (SPED) teachers in adapting instruction to support numeracy development among students with special needs.

SPED teachers. The study offered a platform to voice the challenges they faced and the innovative techniques they employed to address diverse learning needs. It also provided opportunities for reflection and professional growth, as shared insights might inspire new ways of approaching adapted instruction.

General education teachers working in inclusive settings. The findings of this study could promote greater awareness and collaboration, encouraging the adoption of differentiated instructional strategies that supported the diverse needs of all students.

Students with Special Needs. The findings of this study could lead to more tailored and effective instructional approaches in numeracy, ultimately enhancing their mathematical understanding, confidence, and overall academic achievement.

School Leaders and Administrators. The findings of this study could inform decisions on professional development, curriculum planning, and resource allocation to better support adapted instruction and inclusive practices in numeracy education for students with special needs.

Parents and Guardians. The findings of this study could offer a deeper understanding of the challenges their children faced in numeracy development, while also highlighting effective instructional strategies and support systems that could be reinforced at home to enhance learning outcomes.

Curriculum Developers. The findings of this study could provide valuable insights into designing inclusive and flexible numeracy curricula that accommodated diverse learning needs, promoted differentiated instruction, and aligned with the educational goals of students with special needs.

Future Researchers. This study provided a foundational perspective on the role of adapted instruction in developing numeracy skills among students with special needs, serving as a basis for further investigation, comparative studies, and the advancement of inclusive and evidence-based educational practices.

Definition of Terms

To ensure clarity and consistency in the understanding of key concepts used in this study, the following terms were operationally defined:

Educational Equity. This meant ensuring all students, including those with special needs, received the support and resources needed to succeed in mathematics alongside their peers.

Inclusive Education. This was a teaching approach where all students, including those with special needs, learned together in the same classrooms with appropriate support and accommodations.

Individualized Education Plan (IEP). This was a legal document that outlined specific goals, accommodations, and services for students with special needs, ensuring tailored support in mathematics to enhance their learning outcomes.

Learning Barriers. These were factors that hindered academic progress, and in this study, they referred to challenges in mathematical literacy and numeracy development, including cognitive limitations, lack of resources, untrained teachers, and ineffective teaching methods.

Mathematical Literacy. This referred to students' ability, particularly those with special needs, to apply mathematical knowledge and skills to real-world problems, reason quantitatively, and communicate mathematical ideas in inclusive education settings.

Multisensory Learning. This was an instructional approach that used multiple senses, visual, auditory, and tactile, to help students with special needs grasp mathematical concepts through various sensory activities.

Numeracy Development. This referred to the acquisition and enhancement of foundational numeracy skills, such as counting, number recognition, and problem-solving, particularly for students with special education needs (SEN).

Special Education Settings. These were environments designed to support students with special needs, including inclusive classrooms, resource rooms, and self-contained classrooms, where students with learning difficulties received mathematics instruction.

Special Educational Needs (SEN). These were students who required extra support due to physical, cognitive, emotional, or learning disabilities, with this study focusing on those who faced challenges in numeracy.

Teaching Strategies. These were instructional methods and techniques employed by teachers to support learning, with this study focusing on practices like differentiated instruction, visual aids, manipulatives, and technology to improve mathematical understanding for students with special needs.

REVIEW OF RELATED LITERATURE AND STUDIES

This section presented a comprehensive review of literature and previous studies related to the development of mathematical literacy and numeracy in special education settings.

Inclusive Education and Equity in Math Instruction

This section discussed how inclusive education policies impacted mathematics instruction for students with disabilities. It examined the role of equity, accessibility, and the integration of students with special needs into mainstream classrooms, while emphasizing the importance of providing equal learning opportunities and accommodations in math education.

Samuel A. Kirk was the first to introduce the term “learning disabilities” during a conference held in Chicago in 1963. Six years later, the U.S. Congress enacted the Children with Specific Learning Disabilities Act, which became part of the Education of the Handicapped Act of 1970 (PL 91-230). This legislation marked the first time that federal law required schools to provide support services specifically for students with learning disabilities. In 1975, the Education for All Handicapped Children Act (PL 94-142) was passed, guaranteeing free and appropriate public education for all students with disabilities. This law was renamed the Individuals with Disabilities Education Act (IDEA) in 1990, replacing the term “handicapped” with “child with a disability” in its legal language. The updated legislation also introduced mandatory transition services and added autism and traumatic brain injury to the list of qualifying conditions. In 2004, IDEA was reauthorized once again, aligning with the No Child Left Behind Act, which expanded the authority of school personnel in making special education placement decisions (TreeHozz, 2020).

In the United States, the No Child Left Behind (NCLB) Act placed a major emphasis on accountability through standardized testing, particularly in reading and mathematics. This legislation aimed to close achievement gaps and ensured that all students, including those from disadvantaged backgrounds, reached academic proficiency. As a result, schools were required to regularly assess student performance using standardized tests, and the outcomes of these tests were used to evaluate school effectiveness, guide funding decisions, and determine necessary interventions. While the intent was to improve educational outcomes, critics argued that the intense focus on testing sometimes narrowed the curriculum and put pressure on teachers and students alike (Husband & Hunt, 2015, as cited in Alam & Mohanty, 2023).

There were various types of learning disabilities, and one significant type was Mathematical Disability (MD). Among the different forms of learning difficulties, MD had emerged as a growing area of focus. Commonly referred to as dyscalculia, this condition involved persistent challenges in grasping arithmetic concepts. Students with MD often struggled to understand numbers, perform basic mathematical operations, and retain math-related facts. These difficulties were not simply due to a lack of effort or instruction but were rooted in cognitive processing challenges. Research estimates that about 7% of school-aged students were affected by a math-related learning disability, underscoring the need for early identification, targeted support, and effective intervention strategies (Geary et al., 2012, as cited in Gang, 2022).

According to human rights and social models, inclusive education was based on the principle that the education system must adapt to meet the needs of all students, rather than expecting students to adapt to a rigid system. This perspective emphasized the right of every student to access quality education in a supportive and accommodating environment. In this context, student development could be effectively supported through the presence of a special assistant teacher, who played a crucial role in providing individualized attention, modifying instructional strategies, and ensuring that students with disabilities were fully included in classroom activities. These assistants helped bridge the gap between general education and special needs support, promoting equal opportunities for learning and participation (Thomas & Bacon, 2013, as cited in Danuri et al., 2023).

Inclusive classrooms were made up of students with a wide range of academic abilities, including those with special educational needs (SEN). Because of this diversity, schools often required additional resources to meet the varying needs of their students. One common way to address this was through the allocation of special education teacher support. This support could be assigned directly based on the individual needs of specific students, ensuring personal assistance. Alternatively, it could be distributed more generally, such as through a lump sum given to schools based on the number of enrolled students with SEN. This flexible approach allowed schools to plan and allocate resources effectively, helping create a more supportive and equitable learning environment for all students (Schnepel, Dessemontet & Opitz, 2022).

In inclusive classrooms, the primary focus tended to be on academic achievement, aligning with the standard curriculum followed by all students. This approach placed greater emphasis on developing students’ cognitive and subject-specific skills such as reading, writing, and mathematics rather than prioritizing life skills or daily living abilities, which were often emphasized in special school settings. According to Klang et al. (2020), teachers in inclusive settings generally held higher academic expectations for their students, including those with special educational needs (SEN), compared to their counterparts in special schools. This elevated expectation reflected a belief in the potential of all students to succeed academically when provided with the appropriate

support. It also fostered a learning environment where students with SEN were encouraged to meet the same academic standards as their peers, promoting a more inclusive and aspirational educational culture.

In many educational settings, students with special needs still faced low expectations, discrimination, and exclusion, which reflected a broader lack of respect for and understanding of their rights. These students were often underestimated in terms of their learning potential, leading to fewer opportunities to engage in challenging and meaningful academic experiences. Furthermore, some teachers and institutions might unintentionally or intentionally exclude these students from fully participating in classroom activities or school communities. This could foster a sense of isolation and limit their academic and social development. Addressing these issues required a shift in mindset, one that recognized the capabilities of all students, promotes inclusive practices, and upheld every student's right to quality education regardless of ability (MacKenzie et al., 2020).

In mathematics teaching and learning, the concept of inclusion was grounded in equity. This went beyond simply involving diverse groups. It emphasized creating environments that promoted collaboration in achieving shared educational and learning objectives. Research on inclusion highlighted a clear recognition of both the physical and discursive spaces within math education that could limit access. At the same time, it underscored the potential to establish inclusive, welcoming spaces where individuals or groups could contribute their knowledge and receive support from others (Abtahi & Planas, 2024).

Numeracy, the ability to comprehend, interpret, and apply mathematical concepts in everyday contexts, was a critical foundational skill that extended far beyond the classroom. It was essential not only for academic achievement but also for informed decision-making in personal, social, and professional settings. As the world became more data-driven and reliant on technology, individuals must be able to analyze numerical information, manage finances, interpret statistics, and solve real-world problems. It was emphasized that numeracy empowered individuals to actively participate in society, access opportunities, and make logical, evidence-based choices. Without strong numeracy skills, students might struggle to keep pace with modern demands, reinforcing the need for effective numeracy instruction, especially for students with learning challenges (Manire et al., 2023).

Cole et al. (2021) found that students with various types of special educational needs (SEN), including those with mild intellectual disabilities (ID), showed significantly better academic performance, particularly in reading and mathematics, when they spent at least 80% of their school week in inclusive classrooms. This finding suggested that greater exposure to inclusive settings, where students learn alongside their typically developing peers, could have a positive impact on academic outcomes. The benefits of inclusive education in this context might be attributed to several factors, such as higher teacher expectations, increased access to the general curriculum, more opportunities for peer modeling, and enhanced social interactions. Being in an inclusive environment might also provide students with more consistent instructional time and reduce the stigma often associated with segregation in special education classrooms. Overall, the study underscored the value of inclusive education in promoting academic growth for students with SEN.

Challenges in Mathematics Learning for Students with Special Needs

This section explored the cognitive, behavioral, emotional, and instructional challenges that students with disabilities faced in learning mathematics. It included difficulties in understanding abstract concepts, problem-solving, memory retention, language processing, and motor coordination, as well as systemic issues like lack of tailored instruction and teacher preparedness.

Despite the growing emphasis on inclusive education, many students with special needs continued to face significant challenges in acquiring mathematical literacy and numeracy skills.

Mathematics education played a crucial role in shaping students' intellectual growth by enhancing critical thinking, fostering problem-solving abilities, and supporting overall cognitive development. It helped students analyze information, make logical connections, and approach real-world problems with structured reasoning. However, as Das (2021) pointed out, the inherent complexity of mathematical concepts, such as abstract reasoning, multi-step processes, and symbolic representation, could pose significant challenges for students with diverse learning needs. These students might struggle with memory retention, processing speed, attention, or

conceptual understanding, making it difficult for them to fully engage with standard math instruction. As a result, there was a pressing need for differentiated teaching strategies, scaffolded support, and inclusive practices that could make mathematical learning more accessible and meaningful for all students, regardless of their cognitive or learning profiles.

At present, a noticeable educational gap existed between students with disabilities and their non-disabled peers. This disparity was evident in academic performance, access to quality instruction, availability of support services, and participation in standardized assessments. Students with disabilities often faced additional challenges such as lack of appropriate accommodations, insufficiently trained teachers, and limited access to inclusive and differentiated learning strategies. These barriers could hinder their academic progress, particularly in subjects like mathematics, where individualized support was crucial. Addressing this gap required systemic efforts to create equitable learning environments that met the diverse needs of all students (Luo et al., 2020).

Students with disabilities often lacked access to cognitively challenging mathematics tasks, limiting their opportunities for deeper understanding and higher-order thinking. Rather than being exposed to complex problem-solving activities or critical thinking exercises, they were frequently given simplified or repetitive tasks that did not promote meaningful engagement or academic growth. This could result from low expectations, inadequate instructional support, or a lack of appropriate resources and training for teachers. Consequently, these students might fall further behind their peers, missing out on the chance to develop confidence and competence in mathematics. Promoting equity in math instruction meant ensuring that all students, including those with disabilities, had access to rich, intellectually stimulating mathematical experiences (Tan & Padilla, 2019, as cited in Danuri et al., 2023).

Several factors contributed to math disabilities receiving less attention than reading disabilities. Many elementary teachers experienced higher levels of anxiety about teaching math, which could make it more difficult to support students who were struggling. In addition, advocacy efforts for math disabilities had not been as prominent or widespread as those for reading challenges. A long-standing societal belief that math ability was innate also played a role, reinforcing the idea that some individuals were simply not good at math (Mader, 2023).

Students with disabilities, much like their typically developing peers, often faced challenges in learning foundational mathematics concepts such as number sense, operations, patterns, and spatial awareness. However, these difficulties could be more pronounced due to cognitive, behavioral, sensory, or emotional factors that affected how they processed information, retained knowledge, and applied mathematical concepts in different contexts. Struggles might also emerge in transferring classroom learning to real-life problem-solving situations, where abstract thinking and flexible reasoning were required. These challenges highlighted the importance of specialized instructional strategies, individualized support, and inclusive teaching practices to help all students regardless of ability develop a strong mathematical foundation and confidence in their numeracy skills (Özdemir & Kılıç, 2023).

There were multiple factors contributing to why students with disabilities often struggle or fail in mathematics classes. While the type and severity of the disability did play a significant role, a major underlying issue was the lack of appropriate and individualized educational support. Many of these students were not provided with effective, tailored instruction that addressed their specific learning needs. Contributing factors included poor instructional strategies, difficulties in verbal communication, cognitive processing challenges, limited reading abilities, and emotional or motivational barriers. Additionally, deficits in visual perception, short attention spans, and underdeveloped motor skills further hindered their ability to engage with and understand mathematical content. These interconnected factors highlighted the importance of creating inclusive, responsive, and well-structured learning environments to support their success in mathematics (Bryant et al., 2008, as cited in Özdemir & Kılıç, 2023).

Teachers of students with special needs often encountered significant challenges in the learning process, including difficulties in engagement, limited resources, and diverse learning abilities within the classroom. These obstacles could make it hard to maintain students' interest and effectively deliver instruction. To overcome these barriers, joyful learning, an approach that incorporates fun, creativity, and meaningful experiences, was essential. This method not only helped reduce anxiety and frustration but also encouraged literacy development and

imaginative mathematical thinking among students with special needs. By creating a positive, stimulating environment, teachers could better support these students in understanding abstract concepts and applying them in real-life contexts, thereby making learning more effective and inclusive (Sugiman et al., 2020).

Teachers in inclusive schools often encountered significant obstacles when trying to develop students' mathematical literacy due to their limited understanding of what mathematical literacy truly encompassed. Many teachers were unfamiliar with established frameworks that defined and guided the development of these skills. In addition, a lack of exposure to effective instructional strategies, appropriate technological tools, and meaningful assessment methods further hampered their ability to support students, especially those with special needs, in building strong mathematical foundations. As a result, efforts to foster numeracy often fell short, highlighting the urgent need for professional development and targeted support to equip teachers with the knowledge and tools they needed (Kurniastuti et al., 2023).

Teachers frequently struggled to meet the needs of students with diverse characteristics and abilities because they lacked adequate training and knowledge in inclusive education strategies. This gap made it difficult for them to adapt instruction, provide appropriate accommodations, and use differentiated teaching methods that could address the unique learning styles and challenges of each student particularly those with disabilities or learning difficulties. As a result, these students might not receive the level of support needed to fully engage in learning and reach their academic potential (Risdiyanti et al., 2024).

In Turkey, Kırmızıgül (2022) found that secondary school mathematics teachers encountered significant challenges when teaching students in inclusive education settings. These difficulties largely stemmed from their limited understanding of special education principles and inclusive education practices. Despite the recognized importance of mathematics as a core subject, many teachers reported feeling unprepared to effectively address the diverse needs of students with disabilities. The study also highlighted gaps in pedagogical skills and training, indicating that teachers often lacked the necessary tools and strategies to adapt instruction, differentiate tasks, and create accessible learning environments for all students. This pointed to a pressing need for professional development and support systems that could better equip teachers to succeed in inclusive classrooms.

In India, Asmaveedu (2022) identified a range of challenges that teachers faced when working with students in inclusive education settings. These challenges included the lack of appropriate teaching materials tailored to diverse learning needs and a rigid curriculum structure that limited flexibility in instruction. Teachers also reported struggling with time constraints, which made it difficult to provide individualized support. Additionally, high parental expectations could add pressure on both teachers and students. Behavioral issues, low student motivation, difficulties in building self-esteem, and emotional problems among students further complicated the teaching and learning process. These factors collectively hindered effective instruction and highlighted the need for systemic support, training, and resources to empower teachers in inclusive classrooms.

In Finland, a study by Ekstam, Korhonen, Linnanmaki, and Aunio (2017, as cited in Baog et al., 2024) found that special education teachers had higher efficacy beliefs in teaching mathematics to low-performing students, particularly those with moderate mathematical knowledge, compared to general mathematics teachers who considered themselves to have high pedagogical knowledge. This suggested that special education teachers, due to their specialized training and focus on individualized support, felt more confident in their ability to engage and help students who struggle with math. In contrast, general mathematics teachers, despite their strong pedagogical skills, might feel less equipped to address the unique needs of low-performing students in mathematics. This finding emphasized the importance of tailored training and support for teachers working with students with learning difficulties, as it could enhance their confidence and effectiveness in the classroom.

In Namibia, Mungunda (2023) highlighted that Mathematics teachers could effectively address the challenges of teaching in inclusive settings by maximizing the use of available resources, participating in in-service training, and engaging in curriculum development at the school level. The study emphasized that these strategies empowered teachers to adapt their instructional methods to better meet the diverse needs of students, including those with special educational needs. By being actively involved in shaping the curriculum and continuously improving their professional skills, teachers were better equipped to deliver inclusive and effective mathematics instruction, ultimately enhancing student learning outcomes.

In the Philippines, there had been growing attention on enhancing mathematics education for students with special needs. A national study by Cabañero (2023) explored the implementation of inclusive education policies across various schools in the country. The research indicated that while progress had been made in integrating students with special needs into inclusive classrooms, significant challenges remained. One of the key issues identified was the need for improved teacher preparation, particularly in areas like specialized training and the allocation of resources. These aspects were crucial in effectively supporting special education programs and ensuring that students with disabilities received the necessary tools and instruction to succeed in mathematics. The study emphasized the importance of continuous development and investment in teacher capabilities and educational resources to foster an inclusive learning environment.

In Quezon Province, a study by Cularaja and Cularaja (2023) identified three significant challenges in inclusive education. The first challenge was the lack of training in Alternative Sign Language (ASL), which was essential for communication with students who were deaf or hard of hearing. The second challenge was the insufficient personalization in teaching methods, which limited the ability to address the diverse learning needs of students in inclusive settings. Finally, the study highlighted the need for teacher competency upskilling, as teachers required ongoing professional development to effectively manage the demands of inclusive classrooms. The research emphasized the importance of continuous learning and collaboration among teachers and school administrators to improve the quality of education and provide effective support for all students, particularly those with special needs. This collaborative approach was vital to overcome the identified challenges and ensure better educational outcomes in inclusive education settings.

In Cebu City, a study by Gonzaga et al. (2024) explored teachers' preparedness for implementing inclusive education, shedding light on several challenges they faced. One major issue identified was the lack of practical skills, particularly in adapting teaching methods to cater to the diverse needs of students with disabilities. Additionally, the study pointed out shortages in resources, which hindered teachers' ability to effectively support inclusive classrooms. The research also emphasized the importance of having qualified teachers who were equipped with the necessary knowledge and skills to implement inclusive practices successfully. Access to sufficient resources, including teaching materials and training opportunities, was identified as a critical factor in ensuring that inclusive education was implemented effectively. The findings underscored the need for targeted support and professional development for teachers to enhance their readiness and capacity to meet the needs of all students in an inclusive setting.

Furthermore, in the USA, particularly in Florida, Allsopp, Lovin, Green, and Savage-Davis (2003, as cited in Baog et al., 2024) found that many teachers struggled with implementing effective strategies to support students with special needs in mathematics classrooms. A significant issue lay in the disconnect between instructional practices and the content presented in mathematics textbooks, which often failed to consider the learning needs of diverse students. This lack of alignment led to instructional gaps and missed opportunities for engagement and understanding, resulting in limited academic success for students with disabilities. The study highlighted the urgent need for targeted teacher training and inclusive curriculum development to ensure all students could access and succeed in mathematics learning.

Role of Teachers and School Leaders in Special Education Mathematics

This section discussed how collaboration among teachers, specialists and support services for students with disabilities shaped the delivery of math instruction.

The Special Education Regulation of the Ministry of Education (2006, as cited in Özdemir & Kılıç, 2023) defined students with disabilities as individuals who demonstrated significant differences from the expected developmental and educational benchmarks of their peers. These differences might arise due to a range of factors, cognitive, emotional, physical, or sensory, which affected their personal characteristics and educational competencies. This definition acknowledged that disability was not solely a medical condition but a multifaceted experience that impacted how students learn, interact, and participate in educational settings. By framing disability within the context of meaningful variation from typical development, the regulation emphasized the need for individualized educational support and inclusive practices that addressed each student's unique needs and potential.

Special schools served a diverse population of students with severe special educational needs, often resulting in lower academic performance. Special education teachers, sometimes supported by paraprofessionals, provided tailored instruction to meet each student's needs. These schools also integrated therapies, like speech, occupational, and physiotherapy, into the daily schedule, delivered individually by specialists. This combined educational and therapeutic approach supported students' academic and developmental growth holistically (Schnepel, Dessemontet & Opitz, 2022).

Special assistant teachers played a vital role in supporting the development and learning of students with disabilities, both inside and outside the classroom. They provided individualized assistance during lessons, helped adapt instructional materials, and ensured that students with disabilities could participate meaningfully in classroom activities. Beyond academic support, they also contributed to social and emotional development by fostering positive interactions and encouraging confidence. Importantly, their work was closely connected to the feedback and guidance of lead teachers. By collaborating with classroom teachers, special assistant teachers helped reinforce instructional goals and provided consistent, responsive support tailored to each student's unique needs, ultimately enhancing both learning outcomes and inclusion (Ku & Rhodes, 2020).

The teacher's feedback played a crucial role not only in guiding students' learning but also in shaping how effectively the teacher could engage others such as parents, special assistants, and fellow teachers in supporting the educational process. When feedback was clear, constructive, and focused on growth, it built trust and encouraged collaboration among stakeholders. This kind of communication demonstrated the teacher's awareness of each student's needs and progress, making it easier to rally additional support and resources. In special education settings, such feedback was especially important, as it helped create a shared understanding of goals and strategies, ultimately enhancing the learning experience for students with disabilities (Fritz, 2020).

Inclusive education teachers who were proactive and resourceful in seeking appropriate tools, support, and teaching strategies could significantly impact the lives of students with disabilities, especially in challenging or under-resourced environments. By demonstrating strong initiative and institutional knowledge, these teachers could provide tailored interventions and create adaptive learning environments that met diverse needs. This, in turn, helped students build resilience, develop self-confidence, and experience a sense of belonging and success in school. Even when facing unfavorable conditions, such as limited funding or support, these teachers played a key role in promoting students' emotional well-being, academic engagement, and long-term development (Michael et al., 2017, as cited in Danuri et al., 2023).

Tan, Pabilla, and Lambert (2022) emphasized the vital role that teachers played in promoting a more compassionate and inclusive approach to educating students with disabilities, particularly in mathematics. They highlighted how, despite the continued existence of dehumanizing practices, such as low expectations, exclusion, and lack of meaningful engagement, there was a growing movement among teachers to shift toward more humanizing strategies. These involved recognizing the dignity, potential, and individuality of students with disabilities, and intentionally designing mathematics instruction that was equitable, empowering, and tailored to diverse learning needs. Such efforts contributed not only to better academic outcomes but also to broader systemic change in how students with disabilities were perceived and supported in education.

Rouse (2008, as cited in Vodičková et al., 2023) emphasized the vital role that teachers had in fostering inclusion and addressing underachievement, particularly among students who were often labeled as having learning difficulties. Teachers were positioned at the forefront to ensure that all students were actively engaged and supported in their learning journey. However, Rouse also pointed out a significant challenge: many inclusive teachers felt underprepared and lacked the confidence to effectively teach students with diverse educational needs. Rather than viewing themselves as capable of meeting these challenges, they often deferred responsibility to specialists or external experts. This mindset could unintentionally reinforce exclusionary practices, as it separated students with learning differences from general classroom experience. Rouse argued for a shift in perception, encouraging mainstream teachers to see themselves as key agents in inclusive education, equipped to make a meaningful difference with the right support and professional development.

Kungelmass and Ainscow (2004, as cited in Vodičková et al., 2023) found through a comparative analysis of inclusive school case studies in the USA, England, and Portugal that effective leadership played a pivotal role

in fostering inclusive education. Their research concluded that one of the defining features of leadership in inclusive settings was the intentional creation of a collaborative atmosphere. This included encouraging open communication, shared decision-making, and mutual support among teachers, staff, families, and the wider school community. Such collaboration helped ensure that the diverse needs of all students, particularly those with disabilities, were met through collective responsibility and coordinated efforts, ultimately strengthening the school's capacity to be truly inclusive.

By gaining a deep understanding of the complexities involved in numeracy education and applying evidence-based teaching strategies, school leaders could significantly influence the development of a numerate school culture. This meant creating an environment where mathematics was valued, effectively taught, and meaningfully integrated across subject areas. School leaders who prioritized professional development, supported the use of inclusive instructional methods, and promoted collaboration among teachers helped ensure that all students, including those with special educational needs, received high-quality numeracy instruction. Through thoughtful leadership, they could address learning gaps, encouraged a positive mindset toward math, and built a school-wide commitment to mathematical success and equity (Cordova et al., 2024).

To ensure sustained improvement in students' mathematical literacy, it was essential to implement effective and research-based instructional strategies in mathematics. This involved not only identifying teaching approaches that supported deep understanding and problem-solving but also ensuring that instruction was responsive to the diverse needs of all students. Equally important was fostering collaboration among stakeholders at multiple levels within the classroom among teachers and students, across the school through professional learning communities, and at the school board level through supportive policies and resource allocation. When these levels of collaboration were aligned and consistently focused on enhancing mathematical instruction, schools could create a coherent and supportive learning environment that promoted long-term student success in mathematics (Vodičková et al., 2023).

Hubbard and Livy (2021) highlighted a common challenge faced by school principals, providing effective support to mathematics teachers in delivering differentiated instruction, particularly at the primary school level. Differentiated instruction required teachers to address diverse learning needs, abilities, and styles within one classroom, which could be complex and demanding. Principals, who might not always have a strong background in mathematics education, might struggle to guide teachers in tailoring their lessons appropriately. To address this gap, the study suggested involving external mathematics consultants and instructional coaches. These experts could offer targeted support, share evidence-based strategies, and collaborate with teachers in planning and refining differentiated lessons. This collaborative approach helped ensure that all students, including those with learning challenges or advanced abilities, received the appropriate level of instruction and engagement in math.

Despite growing recognition of numeracy as a foundational skill vital for lifelong learning and success, integrating it meaningfully into school curricula remained a complex challenge. Studies, such as those by Diano Jr. et al. (2023), revealed that several factors hindered its effective implementation. Many teachers felt unprepared to teach numeracy comprehensively, lacking both the pedagogical training and content knowledge necessary to go beyond rote procedures. Additionally, schools often faced resource limitations, such as outdated materials, limited access to technology, or large class sizes, that restricted opportunities for meaningful numeracy instruction. Compounding these issues was the tendency to emphasize procedural fluency (memorizing formulas or steps) rather than fostering a deep, conceptual understanding of mathematical ideas. To address these barriers, school leadership must take a proactive role by supporting ongoing teacher development, investing in appropriate instructional resources, and promoting pedagogical approaches that balanced skills and understanding ensuring that numeracy became a truly integrated part of holistic education.

Effective Teaching Strategies and Multi-Sensory Approaches

This theme focused on research-supported instructional strategies such as explicit instruction, visual aids, manipulatives, technology integration, and multi-sensory learning methods. It included differentiated instruction, scaffolding, and the use of interactive media that supported students' diverse learning needs and enhanced math comprehension.

In the United States, completing education coursework was a fundamental requirement for obtaining a teaching license. As part of this training, future teachers were exposed to lessons that emphasized the importance of multi-sensory learning, especially in diverse and inclusive classrooms. Engaging in these lessons allowed teacher candidates to experience firsthand how multi-sensory strategies could enhance student understanding and participation, particularly for students with different needs. This exposure not only encouraged the practical use of such approaches but also helped dispel common misconceptions about teaching and learning. By building a solid foundation of knowledge and skills, these courses prepared teachers to implement effective, inclusive strategies that supported all students in their future classrooms (Romaine, 2023).

Multi-sensory learning had become a foundational approach in classrooms that supported students with learning disabilities, as it actively engaged multiple senses, such as sight, sound, touch, and movement, to enhance understanding and retention. By involving various sensory pathways, this method helped students grasp abstract mathematical concepts more concretely and made learning more accessible for those who struggled with traditional, text-based instruction. It also catered to different learning styles, making lessons more engaging and effective for diverse students, particularly those with processing difficulties or attention challenges (Ho, 2001, as cited in Romaine, 2023).

Stimulating the senses and reinforcing memory through strategies like scaffolding and the use of interactive media devices could significantly benefit students with language or processing disorders. These tools helped break down complex tasks into manageable steps, making it easier for students to process information and build confidence. Interactive media such as audio-visual aids, educational apps, and tactile learning tools could strengthen speaking, reading, and writing skills by engaging students in dynamic, multi-sensory experiences. This not only supported academic growth but also fostered self-expression and emotional development, allowing students to better communicate their thoughts and feelings (Gkeka et al., 2020).

For students with profound intellectual and multiple disabilities (PIMD), the implementation of a multi-sensory teaching approach had been shown to significantly improve their sensory processing and ability to understand context. These students often faced severe challenges in cognitive functioning, communication, and physical abilities, which could limit their engagement in traditional learning methods. However, by providing rich sensory experiences, such as tactile materials, sound, visuals, and movement, multi-sensory instruction helped stimulate their awareness and interaction with their environment. This approach not only supported their learning but also promoted greater participation, responsiveness, and a deeper connection to the world around them (van der Putten et al., 2011, as cited in Romaine, 2023).

Employing multi-sensory teaching approaches such as using visual aids, hands-on manipulatives, auditory cues, and tactile activities could significantly enhance learning experiences for students with diverse learning needs. These methods engaged multiple senses at once, which helped reinforce understanding, retention, and recall of mathematical concepts. Additionally, incorporating movement into lessons, such as through kinesthetic activities or physical games related to math, helped capture students' attention and maintained their engagement. This was especially beneficial for students who struggled with attention and behavior regulation, as it reduced cognitive load by allowing them to process information in more manageable and interactive ways. By actively involving students in their learning through physical and sensory engagement, teachers could create more inclusive and effective classroom environments that supported better focus, comprehension, and academic success (Banerjee & Gautam, 2024).

Also, mathematics learning strategies must be thoughtfully designed to support students with special needs by providing clear, structured instruction and using appropriate educational media. Explicit teaching where concepts were broken down and clearly explained step by step could help make abstract mathematical ideas more accessible to these students. To ensure this support was effective, collaboration between special education teachers and mathematics teachers was essential. Special education teachers played a key role by sharing detailed insights about each student's academic developmental level, strengths, and areas of difficulty. This collaboration enabled math teachers to tailor their instruction, select suitable materials, and implement strategies that aligned with each student's individual needs, ultimately creating a more inclusive and effective learning environment (Ediyanto et al., 2023).

Fine (2016, as cited in Romaine, 2023) found that students with 504 plans or Individualized Education Programs (IEPs) showed notable improvements when provided with occupational therapy equipment like trampolines, squeeze machines, swings, and tactile boxes. These tools helped meet their sensory needs, allowing them to regulate their emotions and behavior more effectively. As a result, students experienced fewer behavioral outbursts and demonstrated increased focus and engagement in classroom activities. By creating a more supportive and responsive learning environment, the use of such equipment helped these students better access the curriculum and participate more meaningfully in their education.

In inclusive school settings, tailoring instruction to match students' cognitive levels was essential for effective teaching and learning especially in mathematics. When teachers aligned their lessons with how students think and process information, they could more accurately determine where to begin instruction and how to guide students through concepts progressively. This approach helped ensure that all students, including those with special needs, could build on their existing knowledge, engage meaningfully with the content, and develop a deeper understanding of mathematical ideas. It also supported differentiated instruction and promoted equity in learning outcomes (Wardani & Prahmana, 2021).

To effectively foster students' mathematical literacy in inclusive education settings, it was crucial that teachers were supported by a learning environment that combined both theoretical foundations and practical experience. Theoretical knowledge helped teachers understand key concepts, pedagogical strategies, and the diverse learning needs of students. Meanwhile, hands-on practice allowed them to apply this knowledge in real-world classroom scenarios, experiment with inclusive teaching strategies, and refine their instructional techniques. Such a balanced environment equipped teachers to better address the varying abilities of students and promote meaningful mathematical understanding for all students, including those with special educational needs (Zagona et al., 2021).

To ensure all students received a fair and supportive education, it was crucial to foster an inclusive classroom environment where every student felt respected, competent, and motivated to participate. The Mathematics Framework for California Public Schools offered direction for cultivating such a setting, one where students from all backgrounds were given equal chances to succeed in mathematics. This framework promoted an assets-based instructional approach, which focused on acknowledging and leveraging the unique strengths and life experiences students bring with them. It encouraged active learning through exploration and meaningful connections, while highlighting the importance of cultural and personal relevance. When students were engaged in this way, they began to view themselves as capable mathematicians, confident in their problem-solving skills and ability to relate math to real-world contexts (Great Minds, 2025).

Synthesis

The synthesis of the reviewed literature and studies aimed to consolidate key findings and insights related to mathematical literacy and numeracy development in special education settings. This section integrated various perspectives on the challenges, strategies, and outcomes associated with teaching students with special educational needs (SEN) in inclusive classrooms. By examining existing research, this synthesis highlighted effective practices, identified gaps in current approaches, and emphasized the importance of inclusive education for fostering numeracy skills among diverse students.

This study explored how inclusive education policies, such as IDEA and NCLB, had shaped math instruction for students with disabilities, promoting equity, accessibility, and integration into mainstream classrooms. It highlighted the importance of early identification and intervention for students with Mathematical Disability (MD) or dyscalculia, advocating for human rights-based, flexible educational approaches to meet diverse needs. Research showed that inclusive classrooms with personalized teacher support led to better academic outcomes, particularly in math, though challenges like low expectations and exclusion remain.

Students with special needs faced numerous barriers in math learning, including cognitive, behavioral, emotional, and instructional challenges, often exacerbated by systemic issues like inadequate individualized instruction and teacher training. Educational disparities persisted, and many students with disabilities were excluded from cognitively demanding tasks, limiting their engagement and opportunities for higher-order

thinking. To address these issues, differentiated teaching strategies and professional development for teachers were essential.

Collaboration among teachers, specialists, and support staff was crucial to meeting the diverse needs of students with disabilities in math instruction. Special education teachers, supported by paraprofessionals, delivered tailored instruction, while effective feedback and collaboration with parents and colleagues were key to fostering student success. Leadership in inclusive education was also important, as school leaders played a role in promoting professional development and creating collaborative environments that enhanced numeracy instruction for all students.

Research-supported strategies, including multi-sensory learning methods, explicit instruction, visual aids, manipulatives, and technology integration, were essential for improving math comprehension in students with special needs. Multi-sensory approaches engaged multiple senses, aiding abstract concept understanding, particularly for students with processing challenges. Teachers could enhance learning by using scaffolding, interactive media, and kinesthetic activities, helping students with attention or behavioral challenges, and fostering inclusive, effective learning environments. Collaboration between special education and math teachers further ensured instruction met students' individual needs. Additionally, aligning instruction with students' cognitive levels and incorporating culturally relevant, meaningful learning experiences fostered student confidence and problem-solving skills.

Thus, the present study aimed to address several research gaps identified in existing studies on adapted instruction for students with disabilities in mathematics. These gaps included the limited exploration of teacher collaboration in adapting math instruction, insufficient focus on the specific professional development needs of special education teachers in numeracy, and challenges in implementing inclusive education policies. Additionally, the study explores ways to increase student engagement and participation in math and examined the impact of teacher and leadership roles the delivery of inclusive math instruction. By addressing these gaps, the study sought to enhance understanding of how-to better support numeracy development for students with disabilities.

RESEARCH METHODOLOGY

The research methodology section outlined the approach and procedures used to investigate the research questions and objectives of the study. This section included research design, data generation, selection of co-participants, thematic reflection, literature comparison and ethical considerations employed in the study.

Research Design

This study employed a qualitative research design using phenomenological methodology to explore the lived experiences and perceptions of teachers in two special education classes at John Adams Academy, California, during the School Year 2024–2025. Phenomenology was particularly suited to this study as it focused on understanding how individuals experience and interpret phenomena, in this case, the challenges and strategies related to the development of mathematical literacy and numeracy in students with special needs.

The primary goal of this research was to understand the lived experiences of special education teachers, focusing on the factors that contributed to the challenges they faced in teaching mathematics to students with special needs. In addition, the study aimed to explore the strategies and support systems that teachers believed were effective in enhancing the mathematical learning outcomes of students. The insights gained from this research informed educational practices, policies, and interventions designed to improve the teaching and learning experiences of students with special needs in special education settings.

According to Larsen and Adu (2022), phenomenology did not adhere to a rigid or singular perspective, as individuals engaged with and interpreted it according to their distinct professional roles and personal experiences. This adaptability made phenomenology a versatile methodology, accessible from various viewpoints. Its lack of affiliation with any group enabled it to be explored across multiple fields and disciplines, fostering diverse perspectives and insights. This openness allowed researchers to derive rich, context-specific

understandings from a wide range of sources and experiences, ultimately deepening and broadening the relevance of the findings.

Data Generation

The data generation process began with careful preparation and planning to ensure that the research was conducted in an ethical, organized, and effective manner.

Before beginning data collection, permission was sought from relevant authorities within the school system, including school administrators, the special education department, and possibly district-level officials. This ensured that the study aligned with institutional guidelines, ethical standards, and any applicable laws or policies regarding research within educational settings. Formal letters of request were submitted, outlining the purpose of the study, the methods of data collection, and the expected outcomes. Additionally, consent was obtained from the parents or guardians of the students in the study, particularly because the research involves students with special needs.

The next step involved recruiting participants for the study. This was done through purposive sampling, where teachers from the selected special education classes at John Adams Academy, California were invited to participate. Criteria for selection were based on their direct involvement with students in the target special education classes. Invitations were sent out with clear instructions on how to participate and interested individuals were given the opportunity to ask questions or seek clarification about the study before agreeing to participate.

Once participants had agreed to participate, the researcher coordinated with school administrators to schedule convenient times for conducting the interviews. This might involve arranging specific times during school hours.

The researcher prepared all necessary materials for data collection. This included developing interview guides with semi-structured questions that aligned with the study's research objectives.

In this study, data was generated using semi-structured interviews, which was the most appropriate method for capturing the lived experiences and perceptions of teachers regarding mathematical literacy and numeracy development in special education settings.

These semi-structured interviews were conducted with math, general and special education teachers at John Adams Academy. These interviews allowed the researchers to gather detailed personal accounts of the teachers' experiences in teaching mathematics to students with special needs. The questions focused on the challenges they faced, such as difficulties in differentiating instruction, managing diverse learning needs, and the perceived impact of existing teaching methods and resources on student learning outcomes. Teachers were also asked to share their perspectives on effective strategies and support systems that helped improve student performance in mathematics.

To ensure accuracy, interviews were recorded with permission, and notes were taken throughout the process.

Thematic Analysis was used as the primary method for analyzing qualitative data, allowing for a systematic examination of participants' responses to uncover recurring themes and patterns. This approach involved several stages, including familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis.

Data was coded and categorized based on key themes that emerged, focusing on participants' attitudes toward inclusive education, the challenges they encountered, and their recommendations for improving inclusive practices.

Coding involved identifying meaningful units of text, grouping similar ideas, and refining categories to ensure that the analysis captured the depth and complexity of the participants' experiences. By organizing data in this

structured manner, the study provided valuable insights into the attitudes and perceptions of teachers and parents regarding inclusive education, highlighting areas for policy development and practical improvements.

Selection of Co-participants

The selection of co-participants in this study followed a purposive sampling method, ensuring that participants were specifically chosen based on their relevance to the research questions and the objectives of the study.

Purposive sampling was a non-random sampling technique where participants were chosen based on specific characteristics or qualities that were crucial to the research objectives.

For this study, the participants included eight (8) math, general and special education teachers from two classes at John Adams Academy, California, during the 2024–2025 school year. These teachers were selected because they directly interacted with students who had special needs, and their insights into the challenges and strategies related to mathematical literacy and numeracy provided valuable data for the research.

Teachers selected as co-participants met the following criteria:

Experience: Teachers who were actively involved in teaching special education classes at John Adams Academy and had substantial experience working with students with special needs. They had at least one year of experience in teaching special education students, preferably in a mathematics context, to provide relevant insights into the specific challenges students faced in mathematical literacy and numeracy development.

Subject Area: Teachers who were responsible for teaching mathematics or numeracy-based subjects to special education students. This ensured that the data collected from teachers was directly relevant to the focus of the study.

Willingness to Participate: Teachers who expressed a willingness to engage in interviews or classroom observations and contribute to the research process.

Thematic Reflection

The findings of this study generated rich thematic insights grounded in the lived experiences and professional reflections of math, general and special education teachers. Using a phenomenological approach, key themes emerged that illuminated the multifaceted nature of mathematical literacy and numeracy development among students with special needs. These themes provided a deep understanding of the underlying challenges and potential strategies that influenced mathematical learning in special education contexts.

One anticipated theme was "Barriers to Mathematical Understanding," which encompassed subthemes such as cognitive processing difficulties, gaps in foundational numeracy skills, and the impact of behavioral or emotional challenges on students' ability to engage with math content. Teachers described how these barriers manifested in classroom settings and how they varied across different types of learning disabilities.

Another key theme was "Instructional Adaptations and Differentiated Practices," highlighting the creative and individualized strategies teachers employed to make math instruction accessible. This included the use of manipulatives, visual aids, multi-sensory techniques, and technology to foster engagement and comprehension. Teachers' narratives reflected how these tools support students' conceptual understanding and confidence in math.

A third emergent theme centered around "Professional and Institutional Support," exploring the extent to which teachers felt prepared, supported, and equipped to deliver effective math instruction in special education settings. This revealed insights into the need for targeted professional development, access to appropriate teaching materials, and collaboration with specialists such as speech therapists or occupational therapists.

The theme of "Collaboration with Families and Stakeholders" also surfaced, especially in relation to how home-school partnerships contributed to or hindered student progress. Teachers reflected on how parental involvement,

communication, and consistency in learning support outside the classroom influence students' mathematical development.

Lastly, a forward-looking theme such as "Envisioning Inclusive and Responsive Math Education" reflected teachers' aspirations and recommendations for policy reforms, curriculum enhancements, and system-level changes. This theme captured teachers' hopes for creating more inclusive, equitable, and supportive environments that recognized the diverse needs of students with disabilities.

These thematic reflections not only provided a nuanced understanding of the complexities involved in teaching mathematics to students with special needs but also served as a foundation for shaping responsive educational practices and policies. By centering the voices of teachers, the study aimed to contribute meaningfully to ongoing dialogues around inclusive education and effective numeracy instruction in special education settings.

Literature Comparison

The present study sought to explore the lived experiences and perceptions of teachers regarding the mathematical literacy and numeracy development of students with special needs. This research aligned with and built upon existing literature while also presenting unique contributions through its context-specific and experience-based approach.

Several international studies echoed the themes of this research. For instance, Kırmızıgül (2022) in Turkey highlighted how mathematics teachers often struggled to address the needs of students with special educational needs (SEN) due to limited pedagogical training. This reflected the present study's emphasis on the crucial role of teacher preparation and the challenges faced in special education mathematics instruction.

Similarly, Cabañero (2023) in the Philippines discussed the implementation of inclusive education policies and emphasized the importance of resource allocation and teacher training, paralleling the current study's exploration of systemic and instructional supports needed for effective math learning in special education settings.

The study by Asmaveedu (2022) in India identified curriculum rigidity and time constraints as significant barriers, which resonated with this study's investigation of the structural and instructional challenges that impacted numeracy development among students with learning differences.

Meanwhile, Ekstam et al. (2017, as cited in Baog et al., 2024) in Finland explored the relationship between teacher efficacy and success in teaching students with low mathematical proficiency. This aligned with the present research's interest in how teacher perceptions and confidence influence instructional outcomes, particularly in a special education context.

A distinct contribution of the present study was its focus on integrated support systems, such as collaboration with therapists and specialists, which was less prominent in the above-mentioned studies. This research took a more holistic approach by examining not just instructional strategies but also therapeutic and systemic supports that influenced mathematical learning.

Furthermore, unlike studies such as Allsopp et al. (2003, as cited in Baog et al., 2024), which largely focused on segregated classrooms, the current study emphasized inclusive and integrated educational practices, highlighting the benefits and challenges of supporting students with SEN in more inclusive environments.

Lastly, while Mungunda (2023) from Namibia discussed the significance of resource availability and administrative involvement, the current research placed more focus on teacher voice and classroom-based experiences, making it more reflective of daily instructional realities and potentially more actionable for teachers and school leaders.

In summary, the present study complemented existing literature by confirming common challenges such as lack of teacher training, resource constraints, and curriculum inflexibility, while contributing uniquely by focusing on lived teacher experiences, therapeutic collaboration, and inclusive, classroom-based strategies specifically

aimed at enhancing mathematical literacy and numeracy in special education settings. This comparison strengthened the foundation for policy and practice improvements in special education mathematics instruction.

Ethical Considerations

Ethical approval was also sought from the institution. This was an important step to ensure that the study adhered to ethical research practices, including informed consent, confidentiality, and the protection of participants' rights. Informed consent forms were provided to both teachers, clearly explaining the study's aims, methods, potential risks, and the voluntary nature of participation.

Confidentiality of the participants' personal information was guaranteed, and all data collected was anonymized to protect the identity of participants.

RESULTS AND DISCUSSION

This chapter presented the findings of the study on building numeracy and adapted instruction, focusing on the perspectives of special education (SPED) teachers. It aimed to analyze how SPED teachers implement instructional strategies tailored to the diverse needs of students with special educational needs (LSENs) and how these strategies influenced numeracy development.

Vignettes of the Participants' Background

Participant 1 is a committed elementary special education teacher at John Adams Academy in California. With over eight years of teaching experience, she currently supports students with diverse learning needs in an inclusive classroom setting. At John Adams Academy, she integrates classical education principles with modern special education strategies, working closely with families and support staff to ensure her students thrive academically and socially. Her passion for teaching students with special needs stems from personal experience with a sibling on the autism spectrum, inspiring her to create classrooms where every student feels valued and capable.

Participant 2 is a seasoned mathematics teacher at John Adams Academy in California, with 11 years of teaching experience. Holding a Doctoral Degree in Education, she has devoted her entire career to teaching students with special educational needs (LSENs) in inclusive classroom settings. Known for her analytical mind and compassionate approach, she integrates differentiated instruction, visual aids, and hands-on strategies to make math accessible and engaging for all students. Her commitment to inclusive education is deeply rooted in her belief that every student, regardless of ability, can succeed in mathematics with the right support. Over the years, she has become a respected figure among her peers for her expertise in special education and her unwavering dedication to student growth.

Participant 3 is a 49-year-old female teacher, who brings a wealth of experience and dedication to her role as a teacher, particularly in the field of inclusive education. With 23 years of teaching experience, Lerma has spent majority of her career, 17 years, working with students with special educational needs (LSENs). Her commitment to inclusive teaching is evident in her ongoing pursuit of professional development, currently holding a masteral-level educational attainment. Her extensive background equips her with deep insights into the challenges and rewards of teaching diverse students. She is known among her peers for her patience, adaptability, and innovative teaching strategies tailored to meet the varied needs of her students. Her long-standing service reflects a strong passion for advocating for educational equity and supporting students in reaching their full potential regardless of their abilities.

Participant 4 is a 47-year-old male teacher with a strong academic background, currently holding a Certificate of Academic Requirements (CAR) for a master's degree in physical science. With 24 years of teaching experience, he brings a deep understanding of instructional methods and classroom management. For the past 6 years, he has focused on teaching Students with Special Educational Needs (LSENs), applying her science expertise in inclusive settings. His journey into special education has shaped his teaching philosophy, emphasizing adaptability, empathy, and differentiated instruction. He strives to make abstract scientific and

mathematical concepts more accessible using hands-on activities, visual aids, and scaffolded learning. Known among his peers for his dedication and patience, he continuously seeks professional development opportunities to better support diverse students. His experience reflects a blend of subject mastery and a growing commitment to inclusive education practices.

Participant 5 is a 35-year-old male teacher with a master's degree in special education, demonstrating his dedication to advancing inclusive teaching practices. With 6 years of teaching experience and 1 year specifically focused on teaching students with Special Educational Needs (SENs), Harold brings both foundational teaching skills and a growing specialization in special education. Though relatively new to the field of inclusive education, Harold's academic background equips him with a strong theoretical understanding of diverse learning needs. He is committed to applying his knowledge and adapted instruction, student-centered approaches, and inclusive classroom strategies. Known for his enthusiasm and reflective practice, Harold continues to seek opportunities for professional growth as he builds his expertise in supporting LSENs. His transition into special education reflects a sincere passion for making learning accessible and meaningful for all students.

Participant 6 is a dedicated female teacher who holds a Doctoral Degree, demonstrating a strong commitment to academic excellence and continuous professional growth. With 11 years of teaching experience, all of which have been spent working with students with Special Educational Needs (SENs), the participant has developed a deep understanding of inclusive education. Her extensive experience in teaching LSENs has equipped her with specialized strategies tailored to meet diverse learning needs. The participant is known for integrating evidence-based practices, individualized instruction, and supportive learning environments to help students thrive academically and emotionally. Her advanced academic background supports a research-driven approach to instruction, ensuring that teaching methods are both effective and inclusive. This blend of expertise and hands-on experience reflects a strong commitment to educational equity and student success.

Participant 7 is a 37-year-old female teacher with a masteral-level education, showcasing her commitment to academic and professional growth. With 10 years of teaching experience, including 7 years working with students with Special Educational Needs (SENs), she has developed a solid foundation in both general and inclusive education. Her extended experience in teaching LSENs has allowed her to refine her use of differentiated instruction, individualized learning plans, and inclusive classroom strategies. She is known for her empathy, patience, and adaptability, qualities that are essential in creating supportive learning environments. Drawing from her graduate-level training, she integrates research-based approaches and actively collaborates with families and specialists to meet her students' diverse needs. Her teaching practice reflects a strong dedication to equity, inclusion, and continuous improvement in education.

Participant 8 is a 40-year-old dedicated female teacher with 15 years of teaching experience, including six years working with students with special educational needs (SENs). With a strong academic background, having completed coursework for a master's degree in physical science (CAR – Candidate for Academic Requirements), she brings both subject-matter expertise and a growing specialization in inclusive education. Her journey into special education began when she was assigned to support a class that included students with diverse learning needs, and since then, she has developed a deep passion for adapting her instructional methods to meet the unique challenges these students face, particularly in mathematical literacy. She emphasizes the importance of multi-sensory instruction, real-world applications, and differentiated teaching strategies. Despite the demands of teaching in inclusive settings, she finds fulfillment in seeing her students gain confidence and make progress. Her experience reflects a balance of subject knowledge, empathy, and a continuous drive to grow professionally to better serve her students.

To guide this exploration, the following research questions were developed:

Problem 1: What are the stories of Special Education teachers on building mathematical literacy among students with special needs?

This section explores the experiences and narratives of Special Education teachers in fostering mathematical literacy among students with special needs. Their stories provide valuable insights into the strategies, challenges, and innovations that shape how students with diverse abilities engage with mathematics.

To begin with, the participants consistently emphasized the importance of individualized and differentiated instruction as the foundation for successful numeracy development. Strategies such as the use of manipulatives, visual supports, assistive technology, and interactive tools were highlighted as essential for making abstract concepts more concrete and accessible. Many underscored the need for structured interventions and consistent practice that allow students to reinforce skills and gain confidence. A recurring theme across responses was the creation of a supportive, positive, and low-pressure classroom environment that reduces math anxiety and builds resilience. Equally significant was the recognition of collaborative support systems involving teachers, specialists, administrators, and parents, which ensure continuity of learning and reinforcement beyond the classroom. Some participants also highlighted the role of skilled teachers, engaging curricula, regular assessments, and parental involvement in tailoring instruction to diverse learner needs. Collectively, these responses demonstrate a holistic, student-centered approach that integrates academic, emotional, and social dimensions in fostering numeracy development among students with special needs.

This aligns with Risdiyanti et al. (2024), when they noted that teachers often struggle to address the diverse characteristics and abilities of students due to limited training and insufficient knowledge of inclusive education strategies. This lack of preparation restricts their ability to adapt instruction, design appropriate accommodations, and apply differentiated methods to meet the unique needs of students, particularly those with disabilities or learning difficulties. Consequently, many students are deprived of the support necessary to actively engage in learning and achieve their academic potential.

As additional support, Hubbard and Livy (2021) highlighted the common challenge faced by school principals in providing effective guidance to mathematics teachers on differentiated instruction, particularly at the primary level. Since principals may lack a strong background in mathematics education, they sometimes struggle to assist teachers in adapting lessons to diverse students' needs. The study recommended involving external mathematics consultants and instructional coaches who can offer evidence-based strategies, collaborate with teachers, and refine instructional practices. This collaborative approach not only strengthens teacher capacity but also ensures that all students, including those with learning difficulties, are better engaged and supported in mathematics learning.

On the other hand, participants identified a wide range of barriers, both intrinsic and extrinsic. Cognitive challenges, such as limited working memory, attention deficits, language processing difficulties, and learning disabilities like dyscalculia, were frequently mentioned as major obstacles to mathematical literacy. Emotional factors like math anxiety, low confidence, and negative past experiences further complicate learning. Environmental and systemic issues, including rigid curricula, lack of differentiated instruction, insufficient instructional resources, and limited individualized support, were seen as compounding these difficulties. Several participants also pointed to teacher-related factors, such as inadequate training in special education strategies, which limit effective intervention. Broader social influences, such as socioeconomic status, family background, lack of home support, and negative attitudes from teachers or peers, were also noted as significant contributors to students' struggles. Altogether, these insights reflect the complex, multifaceted nature of the challenges, highlighting the urgent need for inclusive practices, well-trained teachers, flexible curricula, and comprehensive support systems to address both academic and non-academic barriers.

This aligns with Das (2021), who emphasized that the abstract and multi-layered nature of mathematics, such as symbolic representation, problem-solving steps, and reasoning skills, often creates barriers for students with diverse needs. Many of these students experience challenges related to memory, processing speed, attention, or conceptual understanding, which limit their ability to fully participate in conventional math instruction. Hence, adopting differentiated strategies, scaffolded guidance, and inclusive approaches is essential to make mathematical learning more accessible and meaningful for all students.

In addition, Luo et al. (2020) emphasized that a persistent educational gap exists between students with disabilities and their non-disabled peers, especially in academic performance, access to quality instruction, and participation in standardized assessments. The lack of adequate accommodations, insufficiently trained teachers, and limited inclusive practices further hinder the progress of students with disabilities in mathematics. This underscores the need for systemic and equitable learning environments that provide individualized support and ensure meaningful participation for all students.

Problem 2: What strategies do teachers use to address and overcome the challenges of building mathematical literacy among students with special needs?

To begin with, teachers consistently emphasized the use of hands-on, multi-sensory, and student-centered practices. Across responses, strategies such as manipulatives (e.g., counters, base-ten blocks), visual aids, and the Concrete-Representational-Abstract (CRA) model were highlighted as effective in making abstract mathematical ideas accessible. Moreover, step-by-step modeling, scaffolding, and repetition were commonly employed to support gradual skill development. Teachers also underscored the value of real-life applications, games, and technology-based tools in fostering engagement and relevance. Importantly, differentiation and flexible grouping were noted as ways to tailor instruction to students' readiness levels, while positive reinforcement and celebrating small wins promoted motivation and confidence. Taken together, these practices reveal a holistic instructional approach that balances skill mastery with emotional support, ensuring math learning remains both accessible and meaningful for diverse students.

This aligns with Romaine (2023) emphasis on teacher education coursework playing a critical role in preparing teachers to meet the needs of diverse students in the United States. Through this training, prospective teachers are exposed to the benefits of multi-sensory learning, particularly in inclusive classrooms. By experiencing how these strategies enhance student understanding and engagement, teachers become more equipped to apply them in practice. This preparation not only dispels misconceptions about teaching students with disabilities but also equips teachers with the necessary skills to implement effective and inclusive approaches, ultimately supporting the numeracy development of students with special needs.

As additional support, Banerjee and Gautam (2024) highlighted that employing multi-sensory teaching approaches—such as visual aids, manipulatives, auditory cues, and tactile activities—can significantly enrich learning for students with diverse needs. These strategies reinforce comprehension and memory by engaging multiple senses simultaneously. Furthermore, incorporating kinesthetic activities or physical games helps sustain attention and improve behavior regulation, making lessons more interactive and less cognitively demanding. By integrating sensory and movement-based learning, teachers are able to create inclusive and dynamic classroom environments that enhance focus, comprehension, and overall academic success for students with special needs.

In addition to instructional practices, participants consistently stressed that support systems are indispensable in enhancing mathematical learning for students with special needs. School administrators were described as critical in providing resources, professional development, and inclusive policies that empower teachers. Co-teachers and instructional aides contributed by delivering differentiated instruction and individualized support, while therapists (e.g., occupational and speech) addressed underlying developmental or behavioral barriers to learning. Parents also played a central role in reinforcing learning at home and offering valuable insights into students' unique needs. When these stakeholders collaborate effectively, students experience greater consistency, alignment of goals, and continuity between school and home. Thus, a team-based, systemic approach emerges as a cornerstone of successful math instruction for students with special needs.

Supporting this, Kırmızıgül (2022) found that secondary school mathematics teachers in Turkey faced significant challenges in inclusive education settings due to limited knowledge of special education principles and practices. Despite recognizing mathematics as a core subject, many teachers felt unprepared to address the diverse needs of students with disabilities. The study highlighted gaps in pedagogical skills and training, particularly in adapting instruction and differentiating tasks, which limited teachers' ability to create accessible learning environments. This reinforces the need for targeted professional development and institutional support systems that equip teachers with the tools necessary to make mathematics more inclusive and effective for all students.

Additionally, Asmaveedu (2022) highlighted that teachers encountered challenges such as the lack of appropriate teaching materials designed for diverse students and a rigid curriculum that restricted instructional flexibility. Teachers also struggled with time constraints, high parental expectations, and student-related issues such as low motivation, behavioral difficulties, and emotional challenges. These obstacles not only limited teachers' ability to provide tailored support but also added pressure that affected both teaching quality and student learning outcomes. The study underscored the importance of systemic support, including the provision of resources,

specialized training, and flexible curricular approaches, to enable teachers to effectively foster mathematical literacy in inclusive settings.

Finally, participants acknowledged that ongoing professional development is essential for improving mathematical literacy instruction. Teachers expressed strong interest in training focused on multi-sensory strategies, CRA, differentiated instruction, and Universal Design for Learning (UDL) to better accommodate diverse students. Additionally, workshops on assistive technology, data-driven instruction, and functional/life skills math were identified as valuable for making lessons both accessible and practical. Several also noted the importance of collaborative learning communities, coaching, and mentorship, which provide opportunities for sharing best practices and staying current with evidence-based strategies. By pursuing these growth opportunities, teachers aim to refine their ability to design inclusive, engaging, and research-informed math instruction. In this way, professional development functions as both a tool for teacher empowerment and a driver of equitable student success.

Problem 3: What are the themes that emerge from the responses of the participants?

Thematic Analysis: Building numeracy and adapted instruction: SPED teachers' perspectives on development

This analysis aimed to capture commonalities and differences in how SPED teachers support mathematical development among students with special needs by systematically coding interview responses and grouping them into recurring themes.

Table 1. Key Themes and Subthemes of Building Numeracy and Adapted Instruction: SPED Teachers' Perspectives on Development

Theme	Subtheme	Evidence
Learning Environment and Student Engagement	Creating a supportive, inclusive, and low-pressure classroom	“Positive Learning Environment: A safe, supportive classroom climate builds student confidence and reduces math anxiety” (Participant 2) “Stable and Nurturing Classroom Climate: Creating a consistent and positive environment that promotes student confidence and engagement.” (Participant 4)
	Building positive teacher-student relationships	“Another key factor is creating a supportive, low-pressure environment where students feel safe making mistakes.” (Participant 3) “Teachers should also focus on building positive relationships with students and fostering a sense of belonging, while collaborating with parents and other professionals to create a comprehensive support system.” (Participant 8)
	Fostering student confidence and a sense of belonging	“In addition, a supportive and positive learning environment that encourages exploration and reduces anxiety about making mistakes is crucial.” (Participant 6) “Teachers should also focus on building positive relationships with students and fostering a sense of belonging, while collaborating with parents and other professionals to create a comprehensive support system.” (Participant 8)
	Establishing routines and using positive reinforcement	“Specialized Academic Instruction (SAI) plays a vital role in developing numeracy skills by providing targeted, individualized support tailored to students' unique learning needs.” (Participant 1) “Positive Reinforcement and Consistency – Encouraging effort and progress while maintaining structured routines builds student confidence and persistence.” (Participant 7)

	Promoting peer collaboration and community	“Collaboration Among Teachers and Specialists: Co-teaching models, therapist support, and shared goal setting contribute to more comprehensive support.” (Participant 2) “Collaboration among e teachers, specialists, and parents helps create consistency in instruction and reinforcement of skills both at school and at home.” (Participant 6)
Challenges in Mathematical Literacy Development	Cognitive processing difficulties (e.g., memory, attention, processing speed)	“Special needs students struggle with mathematical literacy for a variety of reasons, including limited working memory, language processing problems, and difficulty understanding abstract concepts.” (Participant 1) “These include limited cognitive and processing abilities, poor memory retention, language difficulties, and attention-related concerns.” (Participant 6)
	Math anxiety and low self-confidence	“Math Anxiety: Past struggles and a fear of failure can hinder participation and confidence.” (Participant 2) “Inadequate early exposure to foundational math skills and limited home support can further widen the learning gap.” (Participant 3)
	Lack of specialized training and resources for teachers	“Deficits in basic skills and a lack of specialized training or individualized support can also hinder progress.” (Participant 1) “Insufficient Support: A lack of individualized support and resources, such as specialized teaching aids or adaptive technology, can impede learning.” (Participant 5)
	Learning disabilities	“Language Barriers: Math often involves complex language and vocabulary, which can be difficult for students with speech and language impairments.” (Participant 2) “Difficulty with Number Sense: Struggles with understanding numbers and their relationships. (Participant 5)
	Rigid curriculum and lack of scaffolding	“...a rigid or fast-paced curriculum that doesn't allow for scaffolded learning can be a barrier.” (Participant 3) “Rigid curriculum pacing and insufficient scaffolding” (Participant 7)
Instructional Strategies for Numeracy Development	Use of visual aids, manipulatives, and hands-on activities	“Concrete-Representational-Abstract (CRA) Approach: Starting with manipulatives, moving to visual models, and then to abstract symbols.” (Participant 2) “I use visual aids, manipulatives, and step-by-step instructions; incorporate hands-on activities; provide immediate feedback; and differentiate tasks to meet each student's needs, fostering engagement and understanding of mathematical concepts.” (Participant 4)
	Step-by-step modeling and scaffolded instruction	“Scaffolded Learning: Breaking tasks into manageable steps and providing support as needed.” (Participant 2)

		“Scaffolded learning involves breaking down mathematical concepts into smaller, more manageable pieces. This supports students as they build their understanding step-by-step.” (Participant 5)
	Differentiated instruction based on student profiles	“I also differentiate instruction and provide scaffolded support, including using math games and technology tools to engage students at their levels.” (Participant 1) “Differentiated Instruction: Tailoring tasks, materials, and assessments based on individual readiness levels.” (Participant 2)
	Integration of real-life problem-solving and functional math	“I often use hands-on activities, real-life applications, visual supports, and step-by-step guided instruction.” (Participant 6) “I also use math games, real-life problem-solving activities, and collaborative work to make learning both interactive and relevant.” (Participant 7)
	Multi-sensory approaches	“Use of Multi-Sensory Approaches - Engaging multiple senses can enhance understanding and retention of mathematical concepts.” (Participant 5) “I incorporate structured, multi-sensory instruction using tangible materials, visuals, and guided practice.” (Participant 7)
Support Systems and Collaboration	Parental involvement in reinforcing learning at home	“Parents/Caregivers: Reinforce learning at home and provide valuable insight into their students’ strengths and challenges.” (Participant 2) “Parents are also essential in reinforcing learning at home and maintaining communication with teachers, ensuring continuity across settings.” (Participant 7)
	Role of co-teachers and therapists in individualized interventions	“Co-Teachers: Offer subject-matter expertise and help deliver differentiated instruction in inclusive settings. Therapists (e.g., OT, Speech): Address underlying developmental challenges that affect learning, such as fine motor skills or language processing.” (Participant 2) “Co-teachers and instructional aides help provide individualized support during lessons. Therapists, especially occupational and speech therapists, often help students develop the foundational skills they need for math, like sequencing or understanding instructions.” (Participant 3)
	School administrators’ provision of training, materials, and support	“Parents support learning at home, co-teachers and therapists offer focused interventions, and school administrators supply materials and training.” (Participant 1) “School Administration: Provides necessary resources, professional development opportunities, and supports inclusive practices.” (Participant 2)
	Interdisciplinary collaboration among teachers, specialists, and families	“Collaboration among all these roles makes a big difference in the consistency and quality of learning students receive.” (Participant 3) “The collaboration between school administration, co-teachers, therapists, and parents is essential in creating a nurturing and effective learning environment for students with special educational needs.” (Participant 5)

	Consistency and communication across settings	“Consistency, tailored support, and a supportive learning environment are guaranteed when all stakeholders work together.” (Participant 1) “When these stakeholders work together, students receive the consistent support they need to succeed in numeracy.” (Participant 6)
Professional Development Needs	Training in differentiated and inclusive instruction	“Professional development focused on differentiated math instruction for students with special needs would be highly beneficial.” (Participant 3) “Training in differentiated instruction and inclusive teaching strategies would enhance my math instruction for students with diverse needs.” (Participant 4)
	Workshops on multi-sensory and functional math strategies	“Professional development in multi-sensory math strategies, differentiated instruction, and using assistive technology would help improve my math teaching.” (Participant 1) “Training in evidence-based strategies, such as the Concrete-Representational-Abstract (CRA) approach, universal design for learning (UDL), and multi-sensory techniques, can enhance instructional effectiveness.” (Participant 3)
	Understanding and applying Universal Design for Learning (UDL)	“Universal Design for Learning (UDL): To create lessons that are accessible and engaging for all students from the outset.” (Participant 2) “I would benefit from professional development in multi-sensory math instruction, Universal Design for Learning (UDL), and the effective use of assistive technology in math.” (Participant 7)
	Use of assistive technology in mathematics	“Assistive Technology in Math Education: Learning to use adaptive tools more effectively to support diverse students.” (Participant 2) “Workshops on math-specific assistive technology, formative assessment tools, and behavioral support strategies would also help in addressing diverse learning profiles.” (Participant 3)
	Data-driven instruction and assessment literacy	“Data-Driven Instruction: Enhancing my ability to collect, interpret, and use assessment data to inform instruction and track progress.” (Participant 2) “.... training on using data to guide instruction and practical workshops on teaching functional math skills would help me better serve students with varying needs and abilities.” (Participant 7)

The data analysis identifies key themes and subthemes that shed light on the perspectives of special education (SPED) teachers on building numeracy and adapted instruction. These themes encompass various aspects of teaching in such settings, with each subtheme providing deeper insight into the complexities involved, supported by participants' responses.

Theme 1: Learning Environment and Student Engagement.

The theme of **Learning Environment and Student Engagement** captures the importance of creating a supportive, inclusive, and emotionally safe classroom climate to enhance numeracy development among students with special needs.

- **Subtheme 1.1: Creating a supportive, inclusive, and low-pressure classroom** Participant 2 noted that “Positive Learning Environment: A safe, supportive classroom climate builds student confidence and reduces math anxiety”. This statement underscores the importance of emotional safety in the learning environment. By

reducing math anxiety, students are more likely to develop confidence and participate actively in numeracy tasks. Additionally, participant 4 stated that “Stable and Nurturing Classroom Climate: Creating a consistent and positive environment that promotes student confidence and engagement.” This highlights consistency and positivity as key elements in fostering student engagement. A nurturing classroom climate helps students feel supported, which enhances their willingness to take on mathematical challenges. In support, Cabañero (2023) emphasized that although strides have been made in implementing inclusive education policies, schools continue to face challenges in effectively supporting students with special needs. The study pointed out that gaps in teacher preparation, particularly in specialized training and access to adequate resources, often limit the success of inclusive programs. Addressing these gaps is essential in creating classrooms where students with disabilities can thrive, especially in mathematics. Strengthening teacher capacity and ensuring sufficient resources are provided were highlighted as critical steps toward fostering a supportive, inclusive, and low-pressure environment that promotes both equity and academic success.

• **Subtheme 1.2: Building positive teacher-student relationships** Participant 3 noted that “Another key factor is creating a supportive, low-pressure environment where students feel safe making mistakes.” This statement emphasizes the value of psychological safety in the classroom. A low-pressure environment encourages risk-taking and resilience, which are essential for learning mathematical concepts. Additionally, participant 8 stated that “Teachers should also focus on building positive relationships with students and fostering a sense of belonging, while collaborating with parents and other professionals to create a comprehensive support system.” This points to the significance of strong teacher-student relationships and a sense of belonging. Collaboration with families and professionals enhances the support network, contributing to a holistic and inclusive learning experience. According to Ku and Rhodes (2020), special assistant teachers serve a crucial function in advancing both the academic and personal growth of students with disabilities. They offer tailored assistance during instruction, modify materials to suit diverse needs, and ensure active participation in classroom activities. Their role extends beyond academics, as they also nurture social and emotional skills by fostering meaningful interactions and boosting students’ self-confidence. Working in close coordination with lead teachers, they align their support with instructional objectives, creating a consistent and responsive learning environment. This collaboration strengthens teacher-student relationships by ensuring that students receive individualized attention, encouragement, and guidance, thereby promoting both inclusion and positive educational outcomes

• **Subtheme 1.3: Fostering student confidence and a sense of belonging** Participant 6 noted that “In addition, a supportive and positive learning environment that encourages exploration and reduces anxiety about making mistakes is crucial.” This highlights the importance of creating a classroom atmosphere where students feel safe to explore mathematical ideas without fear. Reducing anxiety about mistakes fosters greater engagement and willingness to participate in learning activities. Additionally, participant 8 stated that “Teachers should also focus on building positive relationships with students and fostering a sense of belonging, while collaborating with parents and other professionals to create a comprehensive support system.” The statement underscores the need for nurturing relationships and a strong support network. It suggests that collaboration with families and professionals, alongside a sense of belonging, strengthens student outcomes in math and overall well-being. Research of Michael et al. (2017, as cited in Danuri et al., 2023) has shown that teachers who actively sought innovative strategies, resources, and support systems could greatly influence the success of students with disabilities, even in contexts with limited resources. By showing initiative and effectively applying their professional knowledge, these teachers were able to design adaptive learning environments and provide personalized interventions that met varied student needs. Such practices not only enhanced academic participation but also nurtured students’ resilience, self-confidence, and sense of belonging within the school community. Despite barriers like inadequate funding or institutional support, these teachers played a vital role in strengthening students’ emotional well-being and long-term development.

• **Subtheme 1.4: Establishing routines and using positive reinforcement** Participant 1 noted that “Specialized Academic Instruction (SAI) plays a vital role in developing numeracy skills by providing targeted, individualized support tailored to students' unique learning needs.” This statement emphasizes the effectiveness of Specialized Academic Instruction (SAI) in supporting numeracy development. By focusing on individualized strategies, SAI helps address the specific needs of students with special needs, promoting better math outcomes. Additionally, participant 7 stated that “Positive Reinforcement and Consistency – Encouraging effort and

progress while maintaining structured routines builds student confidence and persistence.” This indicates that the use of positive reinforcement and consistent routines is presented as essential for building students' confidence and persistence. This approach fosters a stable learning environment that encourages continuous effort and resilience in mathematical learning. According to Banerjee and Gautam (2024), integrating multi-sensory teaching strategies, such as visual supports, tactile activities, auditory cues, and hands-on manipulatives, proved highly effective in strengthening learning for students with diverse needs. These approaches simultaneously engaged multiple senses, enabling deeper comprehension, better retention, and improved recall of mathematical concepts. Moreover, incorporating kinesthetic activities and movement-based tasks within lessons not only sustained students' attention but also fostered positive behavior regulation. Such practices allowed students to process information in interactive and manageable ways, creating structured and engaging routines that promoted focus, motivation, and academic success.

• **Subtheme 1.5: Promoting peer collaboration and community** Participant 2 noted that “Collaboration Among Teachers and Specialists: Co-teaching models, therapist support, and shared goal setting contribute to more comprehensive support.” This statement highlights the importance of collaborative efforts among teachers, therapists, and specialists in providing well-rounded support for students with special needs. Co-teaching and shared goal setting ensure that instruction is aligned and responsive to individual learning needs. Additionally, participant 6 stated that “Collaboration among teachers, specialists, and parents helps create consistency in instruction and reinforcement of skills both at school and at home.” Emphasizing consistency, this response underscores the value of partnerships between school and home. Collaboration with teachers, specialists, and parents ensures that skills taught in the classroom are reinforced in other environments, promoting continuity and better learning outcomes. As emphasized by Ediyanto et al. (2023), effective mathematics learning for students with special needs requires carefully structured instruction and the use of appropriate educational tools. Breaking down concepts into clear, step-by-step explanations made abstract ideas more accessible, while explicit teaching strategies provided the clarity these students needed. Crucially, collaboration between special education and mathematics teachers strengthened this process. By sharing insights into students' developmental levels, strengths, and challenges, special education teachers helped their colleagues adapt lessons, choose suitable materials, and apply strategies that addressed individual needs. This cooperative approach not only supported academic growth but also fostered a more inclusive classroom community where students felt supported and engaged.

The theme of **Learning Environment and Student Engagement** highlights the importance of creating a supportive, inclusive, and low-pressure classroom to reduce anxiety and encourage risk-taking in learning. Positive teacher-student relationships and a strong sense of belonging are central to fostering student confidence and engagement. Establishing clear routines and using positive reinforcement helps maintain consistency and motivate students. Additionally, peer collaboration and a sense of classroom community contribute to a more interactive and emotionally safe learning environment for students with special needs.

Theme 2: Challenges in Mathematical Literacy Development

The theme of **Challenges in Mathematical Literacy Development** captures the various barriers that hinder the development of mathematical literacy among students with special needs.

• **Subtheme 2.1: Cognitive processing difficulties (e.g., memory, attention, processing speed)** Participant 1 noted that “Special needs students struggle with mathematical literacy for a variety of reasons, including limited working memory, language processing problems, and difficulty understanding abstract concepts.” This highlights the cognitive barriers that special needs students face, particularly in working memory, language processing, and abstract reasoning. These difficulties often hinder their ability to grasp and retain mathematical concepts, impacting overall numeracy development. Additionally, participant 6 stated that “These include limited cognitive and processing abilities, poor memory retention, language difficulties, and attention-related concerns.” This reinforces similar challenges, emphasizing cognitive and processing limitations, along with memory and attention issues. Such factors contribute significantly to the struggle of students with special needs experience in mathematical literacy acquisition. According to Geary et al. (2012, as cited in Gang, 2022), one significant form of learning disability is Mathematical Disability (MD), often referred to as dyscalculia. This condition is characterized by persistent difficulties in understanding numerical concepts, performing basic

operations, and retaining mathematical facts. Importantly, these challenges are not the result of poor instruction or lack of effort but are instead linked to underlying cognitive processing difficulties such as weaknesses in memory, attention, and processing speed. With an estimated 7% of school-aged children affected by math-related learning disabilities, the study highlights the importance of early identification, targeted interventions, and specialized strategies to address these processing-related barriers and support student success.

- Subtheme 2.2: Math anxiety and low self-confidence** Participant 2 noted that “Math Anxiety: Past struggles and a fear of failure can hinder participation and confidence.” This points out that math anxiety, stemming from previous difficulties and fear of failure, can lower student confidence and reduce active engagement in learning. This emotional barrier often leads to avoidance behaviors and a negative perception of math. Additionally, participant 3 stated that “Inadequate early exposure to foundational math skills and limited home support can further widen the learning gap.” This emphasizes the importance of early intervention and home support, suggesting that a lack of foundational math exposure at a young age can result in persistent learning gaps. This highlights the role of both early education and family involvement in shaping mathematical readiness. Sugiman et al. (2020) highlighted that teachers of students with special needs often faced difficulties in sustaining engagement due to limited resources and diverse learning abilities within the classroom. To address these challenges, they emphasized the use of joyful learning, which integrates fun, creativity, and meaningful activities into instruction. This approach helped alleviate students’ anxiety and frustration, fostering greater confidence while promoting literacy and imaginative mathematical thinking. By cultivating a positive and stimulating environment, teachers were able to support students in grasping abstract mathematical concepts, applying them to real-life situations, and reducing feelings of self-doubt.

- Subtheme 2.3: Lack of specialized training and resources for teachers** Participant 1 noted that “Deficits in basic skills and a lack of specialized training or individualized support can also hinder progress.” This highlights that students’ struggles with basic skills, compounded by the absence of specialized instruction, can significantly obstruct their mathematical development. This underscores the need for trained teachers who can tailor instruction to individual learning needs. Additionally, participant 5 stated that “Insufficient Support: A lack of individualized support and resources, such as specialized teaching aids or adaptive technology, can impede learning.” This stresses that limited access to individualized support and essential learning tools, such as adaptive technology, negatively affects students’ ability to grasp math concepts. This points to systemic resource gaps that can hinder effective instruction for students with special needs. Cabañero (2023) found that although strides had been made in implementing inclusive education policies and integrating students with special needs into mainstream classrooms, substantial challenges persisted. A central issue was the inadequate preparation of teachers, particularly in terms of specialized training and access to appropriate resources. These limitations hindered the effective delivery of instruction in mathematics and the overall success of special education programs. The study underscored the necessity of continuous professional development and greater investment in educational resources to strengthen teachers’ capacity and create more inclusive learning environments.

- Subtheme 2.4: Learning disabilities** Participant 2 noted that “Language Barriers: Math often involves complex language and vocabulary, which can be difficult for students with speech and language impairments.” This emphasizes that the linguistic demands of math, including specialized vocabulary and complex instructions, pose significant challenges for students with speech and language impairments. This highlights the need for simplified language and visual support in instruction. Additionally, participant 5 stated that “Difficulty with Number Sense: Struggles with understanding numbers and their relationships.” This points out that difficulties in developing number sense, as a foundational math skill, can hinder deeper mathematical understanding. This suggests the importance of early interventions and targeted support to build basic numeracy skills. According to Geary et al. (2012, as cited in Gang, 2022), mathematics-related learning disabilities are primarily linked to cognitive processing difficulties rather than a lack of effort or instruction. Approximately 7% of school-aged children are affected by these disabilities, underscoring the urgent need for early detection, tailored support, and effective intervention strategies to help students succeed in mathematics.

- Subtheme 2.5: Rigid curriculum and lack of scaffolding** Participant 3 noted that “...a rigid or fast-paced curriculum that doesn’t allow for scaffolded learning can be a barrier.” This highlights that a rigid or fast-paced curriculum can hinder students with special needs by not providing enough time for scaffolded, gradual learning.

This indicates a need for flexible pacing and tailored instruction to meet diverse students needs. Additionally, participant 7 stated that “Rigid curriculum pacing and insufficient scaffolding.” This reinforces the concern that strict pacing and lack of scaffolding limit students’ ability to grasp foundational concepts. Both statements emphasize that curriculum flexibility and intentional support structures are crucial for promoting mathematical understanding among students with special needs. Asmaveedu (2022) highlighted several obstacles teachers encountered in inclusive education, particularly the lack of instructional materials suited to diverse students and the inflexibility of rigid curricula. These constraints often prevented teachers from adapting lessons to meet individual needs or providing adequate scaffolding. Time limitations further restricted personalized instruction, while high parental expectations, behavioral challenges, low motivation, and emotional concerns among students compounded the difficulty. Collectively, these issues underscored the need for more flexible curriculum structures, as well as systemic training and resource support to help teachers effectively address diverse learning requirements.

The theme of **Challenges in Mathematical Literacy Development** reveals that multiple interrelated factors contribute to difficulties in mathematical literacy among students with special needs. Cognitive processing challenges such as poor memory, attention issues, and slow processing speed are major barriers, compounded by math anxiety and low self-confidence that hinder active participation. Additionally, a lack of specialized training and adaptive resources limits teachers' ability to meet diverse needs. Learning disabilities like dyscalculia further impact numeracy development, especially when paired with rigid curricula and insufficient scaffolding, which restrict opportunities for gradual, supportive learning.

Theme 3: Instructional Strategies for Numeracy Development

The theme of **Instructional Strategies for Numeracy Development** captures the varied and adaptive instructional strategies used by SPED teachers to support numeracy development.

- **Subtheme 3.1: Use of visual aids, manipulatives, and hands-on activities** Participant 2 noted that “Concrete-Representational-Abstract (CRA) Approach: Starting with manipulatives, moving to visual models, and then to abstract symbols.” This statement highlights that the CRA approaches scaffolds learning by progressing from tangible manipulatives to abstract symbols, making abstract mathematical concepts more accessible to students with special needs. This sequential method supports conceptual understanding and reduces cognitive overload by gradually building connections. Additionally, participant 4 stated that “I use visual aids, manipulatives, and step-by-step instructions; incorporate hands-on activities; provide immediate feedback; and differentiate tasks to meet each student's needs, fostering engagement and understanding of mathematical concepts.” This statement emphasizes that the multi-sensory, differentiated approach helps address diverse learning needs and reinforces comprehension through repetition, visuals, and hands-on engagement. Immediate feedback and task variation ensure students remain motivated and supported throughout the learning process. Banerjee and Gautam (2024) emphasized that multi-sensory teaching strategies, such as visual aids, manipulatives, and kinesthetic activities, enhance comprehension and retention of mathematical concepts. By engaging multiple senses, these methods sustain attention, reduce cognitive load, and create more inclusive learning environments that improve focus and academic success for students with diverse needs.

- **Subtheme 3.2: Step-by-step modeling and scaffolded instruction** Participant 2 noted that “Scaffolded Learning: Breaking tasks into manageable steps and providing support as needed.” This means that scaffolded learning allows students to approach complex tasks with greater confidence by simplifying the learning process. Support is gradually reduced as students gain independence and mastery. Additionally, participant 5 stated that “Scaffolded learning involves breaking down mathematical concepts into smaller, more manageable pieces. This supports students as they build their understanding step-by-step.” This statement emphasizes incremental learning, ensuring that each concept is fully understood before moving to the next. It is especially effective for students with special needs, as it reduces cognitive overload and builds foundational knowledge progressively. Das (2021) highlighted that the abstract nature of mathematics, involving symbolic representation, multi-step processes, and complex reasoning, often creates difficulties for students with diverse learning needs. Challenges such as limited memory retention, slower processing speed, and attention difficulties make traditional math instruction less effective for these students. To address this, differentiated instruction, scaffolded guidance, and

structured modeling are essential in breaking down concepts step by step, ensuring mathematical learning becomes more accessible and meaningful for all students.

- **Subtheme 3.3: Differentiated instruction based on student profiles** Participant 1 noted that “I also differentiate instruction and provide scaffolded support, including using math games and technology tools to engage students at their levels.” This statement highlights the importance of combining differentiated instruction with engaging tools like games and technology to meet students where they are. It emphasizes personalized learning that caters to varying abilities and learning styles. Additionally, participant 2 stated that “Differentiated Instruction: Tailoring tasks, materials, and assessments based on individual readiness levels.” This statement highlights that differentiated instruction ensures that students receive content that matches their current capabilities, promoting better comprehension and growth. It acknowledges diverse learning profiles and encourages inclusive teaching practices. Risdiyanti et al. (2024) emphasized that many teachers encounter difficulties in addressing the diverse needs of students due to insufficient training and limited knowledge of inclusive education practices. This lack of preparation often prevents them from effectively adapting lessons, providing necessary accommodations, and applying differentiated strategies suited to students’ varied learning styles and challenges, especially those with disabilities. Consequently, some students may not receive the individualized support required to actively participate in lessons and achieve their full academic potential.

- **Subtheme 3.4: Integration of real-life problem-solving and functional math** Participant 6 noted that “I often use hands-on activities, real-life applications, visual supports, and step-by-step guided instruction.” This emphasizes a multi-sensory, practical approach to instruction that makes abstract math concepts more accessible and meaningful. The use of real-life context and structured guidance supports students with diverse needs. Additionally, participant 7 stated that “I also use math games, real-life problem-solving activities, and collaborative work to make learning both interactive and relevant.” This means that the approach promotes student engagement and motivation by incorporating interactive and social elements into instruction. It also fosters deeper understanding by connecting math to everyday experiences and peer learning. Great Minds (2025) emphasized that inclusive mathematics instruction should adopt an assets-based approach, valuing students’ diverse strengths and experiences. By connecting math to meaningful, real-world contexts, the framework fosters active learning, builds confidence, and helps students see themselves as capable problem-solvers, thereby enhancing both engagement and functional understanding.

- **Subtheme 3.5: Multi-sensory approaches** Participant 5 noted that “Use of Multi-Sensory Approaches - Engaging multiple senses can enhance understanding and retention of mathematical concepts.” This highlights the value of using visual, tactile, and auditory input to support diverse learning styles. Multi-sensory instruction helps reinforce mathematical concepts and supports memory and comprehension. Additionally, participant 7 stated that “I incorporate structured, multi-sensory instruction using tangible materials, visuals, and guided practice.” This statement reflects an intentional and systematic use of multi-sensory methods tailored to students’ needs. It underscores the importance of using concrete materials and visual aids to build conceptual understanding through hands-on learning.

The theme of **Instructional Strategies for Numeracy Development** emphasizes adapted and student-centered instructional strategies to support mathematical learning for students with special needs. Teachers commonly use visual aids, manipulatives, and hands-on activities to make abstract concepts concrete, while step-by-step modeling and scaffolded instruction help break learning into manageable parts. Instruction is frequently differentiated based on students’ readiness, interests, and needs, ensuring accessibility. Additionally, real-life applications and functional math activities make learning relevant and practical, and multi-sensory approaches engage various senses to enhance understanding and retention.

Theme 4: Support Systems and Collaboration

The theme of **Support Systems and Collaboration** captures the critical role of collaboration among key stakeholders, such as school administrators, co-teachers, therapists, and parents, in supporting mathematical learning for students with special needs

• **Subtheme 4.1: Parental involvement in reinforcing learning at home** Participant 2 noted that “Parents/Caregivers: Reinforce learning at home and provide valuable insight into their student's strengths and challenges.” This statement highlights the crucial role parents play in extending learning beyond the classroom by reinforcing concepts at home. Their unique understanding of their student's needs allows for more personalized and effective support in collaboration with teachers. Additionally, participant 7 stated that “Parents are also essential in reinforcing learning at home and maintaining communication with teachers, ensuring continuity across settings.” This emphasizes the importance of strong parent-teacher communication in supporting consistent learning experiences. Parental involvement helps bridge the gap between school and home, fostering better academic outcomes for students with special needs. Kungelmass and Ainscow (2004, as cited in Vodičková et al., 2023) highlighted that effective inclusive education relies on collaborative leadership, which fosters strong partnerships among teachers, staff, and families. By promoting open communication and shared responsibility, parents become active partners in reinforcing learning at home, ensuring that students with diverse needs receive consistent support across school and home environments.

• **Subtheme 4.2: Role of co-teachers and therapists in individualized interventions** Participant 2 noted that “Co-Teachers: Offer subject-matter expertise and help deliver differentiated instruction in inclusive settings. Therapists (e.g., OT, Speech): Address underlying developmental challenges that affect learning, such as fine motor skills or language processing.” This highlights the collaborative role of co-teachers and therapists in addressing both academic and developmental needs. Their combined expertise ensures that students receive targeted instruction and support tailored to their individual challenges. Additionally, participant 3 stated that “Co-teachers and instructional aides help provide individualized support during lessons. Therapists, especially occupational and speech therapists, often help students develop the foundational skills they need for math, like sequencing or understanding instructions.” This statement reinforces the value of collaborative support during instruction and the critical role therapists play in building cognitive and language skills. It reflects a holistic approach that integrates instructional and developmental support to enhance mathematical learning. Thomas and Bacon (2013, as cited in Danuri et al., 2023) stressed that students’ right to quality education is best realized in environments where specialized support is available. The involvement of co-teachers and therapists, such as special assistant teachers, plays a vital role in delivering individualized interventions by adapting instructional strategies, addressing specific learning needs, and ensuring students with disabilities are actively engaged in classroom activities. Their collaboration with general teachers helps bridge instructional gaps, fosters inclusion, and provides equal opportunities for student growth and participation.

• **Subtheme 4.3: School administrators’ provision of training, materials, and support** Participant 1 noted that “Parents support learning at home, co-teachers and therapists offer focused interventions, and school administrators supply materials and training.” This statement emphasizes a multi-tiered support system where collaboration between home, specialized staff, and school leadership is essential for student success. Each stakeholder plays a distinct yet interconnected role in fostering meaningful numeracy development. Additionally, participant 2 stated that “School Administration: Provides necessary resources, professional development opportunities, and supports inclusive practices.” This statement highlights the foundational role of school leadership in promoting inclusive education. Administrative support ensures that teachers are equipped with tools and training needed to address diverse student needs effectively. Schnepel, Dessemontet, and Opitz (2022) highlighted that school administrators play a crucial role in fostering inclusive education by ensuring the provision of adequate support for students with special educational needs. This can be achieved through allocating resources such as special education teacher support, which may be tailored to the needs of individual students or distributed more broadly based on school enrollment figures. Such flexible allocation enables schools to strategically plan for teacher training, instructional materials, and student services, ultimately promoting a more equitable and supportive learning environment.

• **Subtheme 4.4: Interdisciplinary collaboration among teachers, specialists, and families** Participant 3 noted that “Collaboration among all these roles makes a big difference in the consistency and quality of learning students receive.” This statement underscores the importance of coordinated efforts among teachers, specialists, and families in ensuring stable and effective instruction. Consistent collaboration leads to more coherent support across settings, which benefits student learning outcomes. Additionally, participant 5 stated that “The collaboration between school administration, co-teachers, therapists, and parents is essential in creating a

nurturing and effective learning environment for students with special educational needs.” This highlights the collective responsibility of various stakeholders in fostering inclusive education. A well-coordinated team provides both academic and emotional support, helping meet the holistic needs of students with special needs. Kungelmass and Ainscow (2004, as cited in Vodičková et al., 2023) emphasized that strong leadership in inclusive schools is characterized by the deliberate establishment of a collaborative culture. This involves fostering open communication, shared decision-making, and mutual support among teachers, specialists, families, and the broader school community. Such interdisciplinary collaboration ensures that the varied needs of students, especially those with disabilities, are addressed through collective responsibility and coordinated actions, thereby enhancing the school’s overall capacity to deliver inclusive and equitable education.

- **Subtheme 4.5: Consistency and communication across settings** Participant 1 noted that “Consistency, tailored support, and a supportive learning environment are guaranteed when all stakeholders work together.” This statement emphasizes that collaboration among teachers, families, and support staff leads to individualized, stable, and encouraging educational experiences. Such alignment ensures students receive the interventions and reinforcement they need to thrive. Additionally, participant 6 stated that “When these stakeholders work together, students receive the consistent support they need to succeed in numeracy.” The participant highlights the crucial role of collaboration in building a strong foundation for numeracy. Consistent and unified efforts across stakeholders help bridge learning gaps and sustain student progress. Fritz (2020) highlighted that teacher feedback serves as a vital tool not only for directing student learning but also for fostering collaboration among parents, special assistants, and fellow teachers. When feedback is consistent, constructive, and growth-oriented, it builds trust and ensures that all stakeholders share a clear understanding of student progress and needs. In special education, this kind of communication is especially valuable, as it aligns goals and strategies across different settings, strengthens collective support, and enhances the overall learning experience for students with disabilities.

The theme of **Support Systems and Collaboration** highlights the importance of a collaborative support system in enhancing numeracy development for students with special needs. Parental involvement at home, the specialized interventions of co-teachers and therapists, and the resources and training provided by school administrators all contribute to a consistent, well-communicated, and student-centered learning environment. Interdisciplinary collaboration ensures alignment across school and home settings, fostering continuity, tailored support, and improved learning outcomes.

Theme 5: Professional Development Needs

The theme of **Professional Development Needs** captures the expressed need for continuous professional development to enhance teachers' capacity in delivering effective math instruction to students with special needs.

- **Subtheme 5.1: Training in differentiated and inclusive instruction** Participant 3 noted that “Professional development focused on differentiated math instruction for students with special needs would be highly beneficial.” This statement emphasizes the need for targeted professional development to equip teachers with strategies tailored to the unique learning needs of students with special needs. It suggests that enhancing teacher competence in differentiation is key to improving student outcomes in math. Additionally, participant 4 stated that “Training in differentiated instruction and inclusive teaching strategies would enhance my math instruction for students with diverse needs.” This highlights the teacher’s recognition that inclusive and differentiated approaches are crucial for addressing diverse learning profiles in the math classroom. It also reflects a proactive desire for continued learning to better support all students. Kurniastuti et al. (2023) emphasized that many initiatives to improve numeracy outcomes were unsuccessful due to teachers lacking adequate preparation in inclusive strategies. This underscored the urgent need for sustained professional development and targeted training to equip teachers with the skills, tools, and confidence required to implement differentiated instruction effectively and address the diverse learning needs of all students.

- **Subtheme 5.2: Workshops on multi-sensory and functional math strategies** Participant 1 noted that “Professional development in multi-sensory math strategies, differentiated instruction, and using assistive technology would help improve my math teaching.” This statement reflects a need for comprehensive training in various instructional approaches that cater to diverse learning styles and needs. It highlights the teacher's

awareness of how multi-sensory strategies and technology can enhance engagement and accessibility in math instruction. Additionally, participant 3 stated that “Training in evidence-based strategies, such as the Concrete-Representational-Abstract (CRA) approach, universal design for learning (UDL), and multi-sensory techniques, can enhance instructional effectiveness.” The statement underscores the importance of equipping teachers with proven methods to address learning differences effectively. It suggests that implementing structured, research-based approaches can lead to more inclusive and effective math instruction. Ho (2001, as cited in Romaine, 2023) highlighted that multi-sensory learning serves as a foundational approach in supporting students with learning disabilities, as it engages multiple senses, sight, sound, touch, and movement, to strengthen understanding and retention. This method not only makes abstract mathematical concepts more concrete and accessible but also accommodates diverse learning styles, particularly benefiting students with processing difficulties or attention challenges.

- **Subtheme 5.3: Understanding and applying Universal Design for Learning (UDL)** Participant 2 noted that “Universal Design for Learning (UDL): To create lessons that are accessible and engaging for all students from the outset.” This statement emphasizes the proactive design of inclusive lessons that accommodate a wide range of learning needs. UDL aims to remove barriers to learning by embedding flexibility and accessibility into instructional planning. Additionally, participant 7 stated that “I would benefit from professional development in multi-sensory math instruction, Universal Design for Learning (UDL), and the effective use of assistive technology in math.” The participant expresses a desire to enhance their instructional skills through targeted training in inclusive teaching methods. This highlights a recognition of the value of multi-modal strategies and UDL in supporting diverse students, especially in mathematical contexts. Florian (2021) emphasized that Universal Design for Learning (UDL) empowers teachers to design and implement flexible and accessible curricula that proactively reduce learning barriers. By doing so, UDL ensures that all students, including those with special needs, are provided equitable opportunities to participate meaningfully and achieve success in the educational process.

- **Subtheme 5.4: Use of assistive technology in mathematics** Participant 2 noted that “Assistive Technology in Math Education: Learning to use adaptive tools more effectively to support diverse students.” This statement emphasizes the importance of equipping teachers with the skills to effectively integrate assistive technology into math instruction. Such tools can help bridge learning gaps and provide accessible pathways for students with varied needs. Additionally, participant 3 stated that “Workshops on math-specific assistive technology, formative assessment tools, and behavioral support strategies would also help in addressing diverse learning profiles.” The participant highlights the need for comprehensive professional development that combines instructional technology with assessment and behavior management strategies. This holistic approach can empower teachers to tailor instruction and respond to individual learning challenges more effectively. Kurniastuti et al. (2023) highlighted that teachers in inclusive schools often faced challenges in fostering mathematical literacy due to limited knowledge of frameworks, strategies, and tools that guide its development. A lack of familiarity with effective instructional approaches, assistive technologies, and assessment methods made it difficult for them to support students with special needs in developing strong numeracy skills. This underscores the importance of professional development and capacity-building programs to help teachers effectively integrate appropriate technological tools that enhance mathematical learning and accessibility.

- **Subtheme 5.5: Data-driven instruction and assessment literacy** Participant 2 noted that “Data-Driven Instruction: Enhancing my ability to collect, interpret, and use assessment data to inform instruction and track progress.” This statement emphasizes the importance of developing teachers' capacity to use assessment data effectively to personalize instruction and monitor student growth. Data literacy supports informed decision-making and targeted interventions for students with diverse needs. Additionally, participant 7 stated that “.... training on using data to guide instruction and practical workshops on teaching functional math skills would help me better serve students with varying needs and abilities.” The participant underscores the value of professional development focused on both data-informed practices and the teaching of real-life math applications. Such training would enable teachers to address academic and functional learning goals tailored to individual student profiles. Manire et al. (2023) emphasized that numeracy is a fundamental life skill that extends well beyond the classroom, enabling individuals to comprehend, analyze, and apply mathematical concepts in real-world contexts. In today's data-driven society, the ability to interpret statistics, manage finances, and make evidence-

based decisions is crucial for active participation and success. For students with learning challenges, effective numeracy instruction requires data-informed teaching practices and strong assessment literacy among teachers. By using student performance data to identify gaps, adjust strategies, and provide targeted interventions, teachers can ensure that students develop the mathematical foundations necessary to thrive academically and socially.

The theme of **Professional Development Needs** highlights a strong need among teachers for professional development focused on inclusive and differentiated instruction, particularly in mathematics. Teachers expressed a desire for training in multi-sensory and functional math strategies, effective use of assistive technology, application of Universal Design for Learning (UDL), and data-driven instructional practices. These areas are seen as essential for addressing the diverse needs of students with special education needs and enhancing both student engagement and achievement.

Problem 4: What insights can be derived from the responses of the participants?

Findings

Based on the analysis of participant responses, the study revealed the following five key findings:

Inclusive Classroom Climate Enhances Learning

SPED teachers emphasized that establishing a supportive and low-pressure classroom environment significantly boosts students' confidence, reduces math anxiety, and increases active participation in numeracy tasks. As noted by Participant 2, a "Positive Learning Environment: A safe, supportive classroom climate builds student confidence and reduces math anxiety," a secure and encouraging atmosphere is a foundational element in engaging students with special needs. When students feel emotionally safe, they are more likely to take academic risks, express their ideas, and persist through mathematical challenges. This was further supported by Participant 4, who stated, "Stable and Nurturing Classroom Climate: Creating a consistent and positive environment that promotes student confidence and engagement," highlighting how emotional safety and consistency help reduce anxiety and promote a sense of belonging. Together, these statements underline the transformative impact of a classroom culture where students feel valued and supported, which is especially crucial for those who struggle with math-related anxiety or have a history of academic difficulties.

Adapted Instructional Practices Support Diverse Students

Teachers highlighted the importance of differentiated and adaptive instructional strategies tailored to the diverse needs of students with special educational needs. Techniques such as scaffolded instruction, visual aids, manipulatives, and real-life problem-solving make abstract mathematical concepts more accessible. Participant 7 stated, "I also use math games, real-life problem-solving activities, and collaborative work to make learning both interactive and relevant," emphasizing how interactive and meaningful tasks enhance student engagement and motivation. These practices not only support conceptual understanding but also foster collaborative skills and real-world application. This is reinforced by Participant 8, who remarked, "The factors that will contribute to successful numeracy development are a supportive and inclusive learning environment, individualized instruction, and the use of appropriate accommodations and assistive technology." When instruction is responsive and personalized, students with special needs are better able to access content, engage meaningfully, and demonstrate progress.

Interconnected Learning Barriers Require Holistic Approaches

Participants identified several interrelated challenges, such as cognitive processing difficulties, math anxiety, language barriers, and rigid curriculum pacing, that negatively affect numeracy development. Addressing these challenges requires a holistic, flexible teaching approach. For example, Participant 5 described the value of explicit instruction, which involves breaking down complex processes into manageable steps with clear objectives and detailed modeling: "Explicit instruction involves clear, direct teaching of mathematical concepts and procedures... provide detailed explanations and model processes explicitly." This helps mitigate cognitive overload and enhances clarity for students with processing or attention difficulties. Complementing this,

Participant 1 shared, “To support the development of mathematical concepts in elementary special education classes, I use hands-on activities with manipulatives like counters and base-ten blocks (Singapore Math) to build number sense.” These tactile, visual tools allow students to concretely explore mathematical relationships, supporting memory and comprehension through multi-sensory engagement. Together, these strategies provide scaffolding that addresses the complex and overlapping needs of students with special needs.

Collaboration Strengthens Numeracy Interventions

A strong theme that emerged was the vital role of interdisciplinary collaboration in supporting numeracy development for students with special needs. Teachers highlighted that alignment among stakeholders, parents, co-teachers, therapists, and administrators, ensures consistency and reinforces learning across contexts. Participant 2 emphasized this need: “Support systems play a crucial role in student success. Collaboration and communication among all stakeholders ensure that instruction is aligned, consistent, and holistic.” Consistent communication and shared goals across home and school environments foster a coherent support system tailored to each student’s unique needs. Echoing this, Participant 4 noted, “Support systems like school staff, therapists, and parents collaborate to create an inclusive environment, improving math outcomes for students with SEN.” These collaborations lead to the integration of specialized interventions and accommodations that support both academic growth and emotional development. A united approach ensures that instructional strategies are reinforced beyond the classroom, creating an ecosystem of support for students with special needs.

Continuous Professional Development is Essential

SPED teachers unanimously expressed the importance of ongoing professional development to enhance their instructional effectiveness in numeracy. Training in evidence-based practices such as Universal Design for Learning (UDL), multi-sensory math strategies, the use of assistive technologies, and data-driven instruction was identified as crucial. Participant 2 stated, “Participating in professional learning communities and ongoing mentorship or coaching would also help deepen my practice and stay current with research-based strategies,” suggesting that collaboration among professionals leads to sustained growth and innovation in teaching. In a complementary statement, Participant 8 remarked, “Professional development in multi-sensory math strategies, differentiated instruction, and using assistive technology would help improve my math teaching. Training on how to look at student data to guide instruction and learning new ways to make abstract concepts clear would also be helpful.” These perspectives underline the need for teachers to continuously refine their skills, integrate new tools, and use student data to make informed instructional decisions, ensuring that math instruction remains accessible, relevant, and responsive to diverse student profiles.

DISCUSSION

This discussion explores the key themes that emerged from the experiences of SPED teachers in supporting mathematical literacy among students with special needs. Drawing from their insights, it highlights the critical role of an inclusive classroom climate, the effectiveness of adapted instructional practices, the need for holistic approaches to learning barriers, the importance of collaboration among stakeholders, and the value of continuous professional development. These interconnected elements provide a comprehensive understanding of how to enhance numeracy outcomes in special education settings.

Special education (SPED) teachers highlighted the critical importance of cultivating a supportive and low-pressure learning environment to foster confidence and reduce math anxiety among students with special needs. When students feel safe, respected, and emotionally secure in their classroom, they are more inclined to participate actively in numeracy activities, take academic risks, and persist through difficult mathematical tasks. A nurturing and consistent classroom climate not only minimize stress and negative emotional responses to math but also promotes a strong sense of belonging. For students who have experienced past academic challenges or harbor a fear of mathematics, this kind of environment serves as a powerful foundation for renewed engagement and learning. Teachers reported that the stability and emotional safety embedded in such an environment are essential in building student self-esteem, which in turn improves their willingness to contribute, experiment with problem-solving strategies, and embrace learning setbacks as part of growth.

In addressing the varied learning needs of students with special needs, SPED teachers rely heavily on differentiated and adaptive instructional strategies. These include scaffolded instruction, visual representations, manipulatives, and context-based problem-solving activities that help make abstract mathematical ideas more understandable. By incorporating real-life scenarios, collaborative tasks, and interactive methods such as educational games, teachers enhance both the relevance and engagement of math lessons. Such strategies are particularly effective in bridging the gap between conceptual knowledge and practical application, helping students to better retain and use what they learn. Moreover, the integration of individualized instruction and tailored accommodations, including the use of assistive technologies, ensures that students have equitable access to the curriculum. These inclusive teaching practices empower students to build their numeracy skills at their own pace while remaining fully involved in the learning process.

SPED teachers also recognized that learning difficulties in mathematics rarely stem from a single cause. Rather, students with special needs often face a combination of cognitive processing difficulties, language barriers, math-related anxiety, and the limitations of a rigid curriculum structure. To effectively address these overlapping challenges, teachers adopt holistic and flexible instructional approaches. One such method is explicit instruction, where teachers set clear goals, provide step-by-step demonstrations, and model problem-solving techniques. This structured format helps students process and internalize mathematical procedures without becoming overwhelmed. Additionally, the use of tactile and visual learning tools, such as base-ten blocks, counters, and other manipulatives—enables students to explore mathematical concepts in concrete ways. These multi-sensory strategies reinforce learning by engaging different cognitive pathways, thus enhancing understanding and retention. By recognizing the interrelated nature of learning barriers, teachers are better equipped to tailor instruction in ways that accommodate multiple student profiles simultaneously.

Another key factor emphasized by SPED teachers was the importance of collaborative partnerships among teachers, parents, therapists, and school administrators in improving numeracy outcomes for students with special needs. A coordinated and consistent approach across home and school environments ensures that the interventions students receive are aligned and mutually reinforcing. Regular communication and joint planning between stakeholders help create continuity in the support provided to students, which is especially important for students who benefit from routine and structure. Collaboration fosters an inclusive learning culture where specialized supports, such as therapy goals, classroom accommodations, and home-based reinforcement strategies, work together seamlessly to meet the student's academic and emotional needs. Teachers observed that when all members of the support system share responsibility and insight, they can collectively design and implement interventions that are more targeted, holistic, and effective.

To remain responsive to the evolving needs of their students, SPED teachers acknowledged the vital role of continuous professional development. There is a strong demand for training in inclusive and research-based strategies, including Universal Design for Learning (UDL), multi-sensory instructional methods, differentiated teaching approaches, and the effective integration of assistive technologies. Equally important is the ability to analyze and use student performance data to guide instructional decisions and adapt lessons to better meet individual learning goals. Participation in professional learning communities, mentorship programs, and collaborative planning sessions were seen as valuable avenues for sharing expertise, reflecting on practice, and staying current with advancements in special education. By continuously building their capacity in these areas, teachers can provide more personalized, accessible, and engaging numeracy instruction that truly meets the diverse needs of their students.

Problem 5: What can be created based on the significant stories of the co-participants?

Title: Strengthening Numeracy and Adapted Instruction: A Roadmap for SPED Success

Introduction

Developing numeracy skills is essential for students with special needs, as it supports critical thinking, problem-solving, and practical life skills. However, many face persistent challenges such as cognitive difficulties, math anxiety, and inadequate instructional practices that fail to address diverse learning needs. To respond to these issues, the action plan Strengthening Numeracy and Adapted Instruction: A Roadmap for SPED Success outlines

a strategic and inclusive framework grounded in the principles of equitable education. It emphasizes three core pillars: differentiated instruction, collaboration among teachers, specialists, and families, and continuous professional development. By integrating these elements, the plan aims to create supportive learning environments that empower teachers and ensure all students can build strong foundational numeracy skills.

General Objectives

1. To improve the numeracy skills of students with special needs by providing adapted, differentiated, and inclusive instructional strategies that cater to their unique learning profiles.
2. To build the instructional capacity of SPED teachers through continuous professional development in Universal Design for Learning (UDL), multi-sensory approaches, and data-driven teaching.
3. To create a supportive and inclusive learning environment that reduces math anxiety, promotes student engagement, and fosters mathematical confidence.
4. To establish collaborative support systems among teachers, parents, therapists, and school leaders to ensure consistent and individualized numeracy instruction.
5. To utilize assessment data effectively for monitoring student progress, identifying learning gaps, and informing instructional decision-making.

Table 2: Action Plan: Strengthening Numeracy and Adapted Instruction: A Roadmap for SPED Success

Objectives	Activities	Time Frame	Persons Involved	Resources Needed	Budget	Expected Output
1. Enhance SPED teachers' capacity to deliver adapted math instruction	Conduct training on Universal Design for Learning (UDL), differentiated instruction, and multi-sensory math strategies	Quarterly (August, November, February, May)	SPED teachers, school heads, external trainers	Training modules, venue, speakers' honorarium, printed materials	\$530/training	Increased teacher competency in using inclusive math strategies
2. Improve student engagement and understanding of math concepts	Integrate manipulatives, visual aids, real-life math activities, and assistive technology into daily instruction	Daily/Weekly classroom implementation	SPED teachers, instructional aides	Manipulatives, projectors, math games, apps/tools	\$175/classroom/year	Improved student engagement and comprehension in math
3. Strengthen collaboration among stakeholders supporting students with special needs	Schedule regular case conferences with parents, co-teachers, and therapists for instructional planning	Bi-monthly	Teachers, parents, therapists, school SPED coordinator	Meeting logs, student progress reports, digital communication tools	\$90/year	Aligned and holistic support for individual learning needs
4. Use data-driven	Conduct formative	Monthly	SPED teachers,	Assessment tools,	\$50	Instruction adjusted based

instruction to address individual learning gaps	assessments and data reviews to tailor math instruction		academic coordinator	student profiles, analysis templates		on student performance trends
5. Foster a positive classroom environment that reduces math anxiety	Implement routines promoting emotional safety, growth mindset, and praise for effort	Ongoing (daily)	SPED teachers, classroom aides	Posters, SEL materials, positive reinforcement tools	\$35	Increased student confidence and reduced anxiety in math
6. Create a repository of math instructional materials for SPED	Develop and share adapted lesson plans, worksheets, and interactive resources	Start of School Year + Ongoing updates	SPED teachers, ICT coordinator	Google Drive access, templates, computer access	\$35	Accessible digital resource hub for inclusive math instruction

The first phase of the action plan centers on enhancing SPED teachers' capacity to deliver adapted math instruction. To achieve this, quarterly training sessions will be organized, focusing on Universal Design for Learning (UDL), differentiated instruction, and multi-sensory math approaches. These professional development efforts aim to expand teachers' instructional repertoire, enabling them to effectively accommodate diverse learning profiles in inclusive classrooms. By deepening their pedagogical understanding, teachers will be better prepared to design engaging, accessible math lessons that meet students' unique needs. Investing in teacher capacity is essential, as well-prepared teachers are the cornerstone of quality special education.

Building on teacher development, the second phase aims to improve student engagement and understanding of mathematical concepts. This will be accomplished by integrating manipulatives, visual aids, real-life problem-solving scenarios, and assistive technology into daily instruction. Such tools provide multiple entry points for learning, particularly for students who find abstract mathematical reasoning difficult. Through hands-on and contextualized learning experiences, students are more likely to grasp and retain concepts, ultimately fostering a deeper and more meaningful understanding of math.

Recognizing the importance of collaborative support, the third phase focuses on strengthening partnerships among key stakeholders—teachers, parents, therapists, and co-teachers. This is achieved through bi-monthly case conferences, which serve as structured platforms for discussing student progress and aligning instructional strategies. Open communication and shared responsibility among stakeholders ensure that students receive consistent, well-coordinated support both at home and in school. This collaborative model not only enhances student learning but also fosters trust and cooperation within the school community.

The fourth phase highlights the use of data-driven instruction to close learning gaps. By conducting regular formative assessments and analyzing results, teachers can make timely, evidence-based decisions about instructional adjustments. Data becomes a powerful tool for identifying areas of struggle and implementing targeted interventions. Rather than treating assessment as a one-time event, this approach promotes ongoing reflection and responsiveness, ensuring that instruction remains aligned with students' evolving needs.

Equally critical to instructional effectiveness is the emotional climate of the classroom. The fifth phase seeks to foster a positive learning environment that minimizes math anxiety. Strategies such as promoting a growth mindset, implementing emotional regulation techniques, and using positive reinforcement will be incorporated into daily routines. These practices help students develop confidence, persistence, and a sense of safety when engaging with mathematical tasks, all of which are necessary for meaningful learning to take place.

Finally, the sixth phase ensures the sustainability and scalability of the action plan through the creation of a shared digital repository of instructional materials. This repository will house adapted lesson plans, worksheets, and teaching resources tailored for SPED students. By maintaining and updating this resource bank collaboratively, teachers can save time, improve lesson quality, and support peers—especially those new to SPED. It also reinforces a culture of collaboration and continuous improvement within the teaching community.

In conclusion, each phase of this action plan contributes to a comprehensive strategy for strengthening numeracy instruction for students with special needs. From empowering teachers and engaging students to fostering collaboration and reducing anxiety, the plan addresses both instructional quality and student well-being. With ongoing commitment and implementation, it provides a clear roadmap for inclusive and effective math education.

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

This chapter presented a summary of the key findings from the study, drawing conclusions based on the data collected, and offering recommendations for improving the implementation of inclusive education.

Summary of Findings

The following was the summary of the findings:

1. The narratives of the Special Education (SPED) teachers revealed both the rewarding and challenging aspects of teaching math to students with special needs. Many shared moments of small victories, such as a student grasping a basic concept after repeated effort, as deeply fulfilling. Teachers also recounted struggles with limited resources, varied student abilities, and curriculum constraints. Despite the obstacles, their stories reflected deep commitment, creativity, and resilience in making math accessible and meaningful.
2. To address the diverse needs of their students, teachers employed a range of strategies including differentiated instruction, use of manipulatives and visual aids, real-life applications, multi-sensory approaches, and integration of assistive technology. They also emphasized the importance of establishing routines, maintaining patience, and using positive reinforcement to build student confidence and reduce math anxiety. Collaborative teaching and continued professional development were also mentioned as key strategies for success.
3. Four major themes emerged from the participants' responses: adaptability and innovation in teaching strategies to meet varied students' needs, emotional sensitivity and the importance of building confidence and reducing anxiety in math learning, collaboration and support systems involving parents, co-teachers, and therapists, and commitment to continuous learning, highlighting teachers' willingness to improve their practice despite systemic limitations.
4. From the shared experiences, it became clear that successful mathematical instruction in SPED settings required more than content knowledge. It demanded empathy, flexibility, strong communication skills, and access to resources. The insights also pointed to the value of supportive school leadership, peer collaboration, and ongoing training in inclusive pedagogies. Most importantly, teachers recognized the individuality of each student and the need to personalize instruction accordingly.
5. Drawing from the significant stories and strategies shared by the participants, an Action Plan for Strengthening Numeracy and Adapted Instruction was developed. This included targeted teacher training, the integration of multi-sensory instructional tools, regular stakeholder collaboration, data-driven teaching practices, and the creation of a repository of SPED math resources. The action plan served as a practical roadmap to address the challenges identified and build a more inclusive and effective numeracy program for students with special needs.

Conclusion

The following conclusions were drawn from the study's findings:

1. The narratives of SPED teachers highlight the emotional depth and professional dedication required in teaching math to students with special needs. Despite facing resource constraints and instructional challenges, their persistence and innovative practices enable students to achieve meaningful progress. These stories affirm the importance of recognizing and celebrating small academic milestones, as they reflect significant breakthroughs in both teaching and learning.
2. The strategies shared by the teachers demonstrate a thoughtful and multi-faceted approach to supporting students with special needs in mathematics. By integrating hands-on tools, real-world connections, and inclusive teaching techniques, teachers create an environment where students can thrive. These approaches not only address academic needs but also foster confidence, independence, and a positive attitude toward learning math.
3. The emergence of key themes underscores the essential components of effective SPED math instruction: adaptability, emotional intelligence, collaboration, and continuous professional growth. These themes suggest that success in SPED classrooms is driven not solely by curriculum or methods but by the teachers' ability to respond compassionately and flexibly to each student's unique learning journey.
4. Insights gained from the participants' experiences highlight the need for a holistic approach to SPED math instruction. Teaching math to students with special needs is not just a technical task, it is relational, responsive, and deeply personal. These insights advocate for stronger institutional support and the cultivation of a teaching culture that values individualized instruction, collaboration, and professional development.
5. The development of the action plan marks a proactive and evidence-based step forward in enhancing numeracy instruction for students with special needs. Grounded in the lived experiences of SPED teachers, it provides a structured and practical framework to address instructional gaps, empower teachers, and foster more inclusive learning environments. This plan serves as a vital tool for transforming classroom practices and promoting long-term educational equity.

Recommendation

Considering the findings and insights drawn from the narratives of the co-participants, the following recommendations are suggested:

1. Parents may actively engage in supporting their child's math learning at home by reinforcing concepts through real-life problem-solving activities, celebrating small academic achievements, and maintaining regular communication with teachers to monitor progress and provide consistent encouragement.
2. School administrators may ensure SPED classrooms are equipped with hands-on tools, manipulatives, and technology to support inclusive and engaging math instruction.
3. Teachers may participate in peer collaboration sessions and reflective practices to strengthen adaptive teaching and emotional responsiveness.
4. Parents may participate in school-led workshops and mentoring sessions to better understand personalized instruction strategies and collaborate effectively with teachers, therapists, and school staff to support child's learning and development.
5. School administrators may pilot the action plan in select grade levels, collect feedback from teachers and students, and refine it before scaling school-wide; provide the necessary support and resources for implementation.

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REFERENCES

1. Abtahi, Y., & Planas, N. (2024). Mathematics teaching and teacher education against marginalisation, or towards equity, diversity and inclusion. *ZDM*, 56(3), 307–318. <https://doi.org/10.1007/s11858-024-01602-x>
2. Alam, A., & Mohanty, A. (2023). Cultural beliefs and equity in educational institutions: exploring the social and philosophical notions of ability groupings in teaching and learning of mathematics. *International Journal of Adolescence and Youth*, 28(1). <https://doi.org/10.1080/02673843.2023.2270662>
3. Arundel, K. (2022, November 2). Students with disabilities continue to lag behind peers on NAEP. K-12 Dive. <https://www.k12dive.com/news/students-with-disabilities-NAEP-scores-lag/635566/>
4. Asmaveedu, H. A. (2021). Challenges Faced by Teachers of Learners with Learning Disability. *International Journal of Indian Psychology* 9(2). <https://www.researchgate.net/publication/351303413>
5. Baog, I. W., Anit, E. J., Panes-Tapo, L., & Huelar, M. M. (2024). Unveiling the Secrets of Teaching Mathematics to Students with Special Needs: Challenges, Strategies, and Teacher Insights. *International Journal of Research and Innovation in Social Science*, VIII(VII), 1330–1346. <https://doi.org/10.47772/ijriss.2024.807112>
6. Banerjee, N. T., & Gautam, N. D. M. K. (2024). INCLUSIVE MATHEMATICS CLASSROOM PRACTICES FOR CHILDREN WITH DIVERSE LEARNING NEEDS FROM THE PERSPECTIVE OF COGNITIVE LOAD THEORY. *EPRA International Journal of Multidisciplinary Research (IJMR)*, 548–555. <https://doi.org/10.36713/epra16279>
7. CAST. (2022). About Universal Design for Learning. <https://www.cast.org/impact/universal-design-for-learning-udl>
8. Cole, S. M., H. R. Murphy, M. B. Frisby, T. A. Grossi, and H. R. Bolte. 2021. "The Relationship of Special Education Placement and Student Academic Outcomes." *The Journal of Special Education* 54 (4): 217–227. doi:10.1177/0022466920925033.
9. Cordova, A., Jr., DMC College Foundation, Inc., Kilag, K. T., ECT Excellencia Global Academy Foundation, Inc., Andrin, R., University of the Visayas, Groenewald, S., SG Virtuosos International, Tañiza, N., Department of Education, Abella, L., & Department of Education, Schools Division of Toledo City, Philippines. (2024). Leadership Strategies for Numeracy development in Educational Settings [Article]. VOLUME II, ISSUE NO. 1. <https://www.researchgate.net/publication/378497036>
10. Cularaja, J. P. M. & Cularaja, C. J. (2023). A Case Study on Teacher's Challenges on Inclusive Mathematics Classes in a Secondary Public School. *Journal of Mathematics Instruction Social Research and Opinion* 2(2):145-157. <https://doi.org/10.58421/misro.v2i2.90>
11. Danuri., Waluya, S. B., Sugiman., & Sukestiyarno, Y. L. (2023). Numerical literacy and math self-concept of children with special needs in inclusive elementary schools. *International Journal of Instruction*, 16(3), 1095-1112. <https://doi.org/10.29333/iji.2023.16358a>

12. Das, K. (2021). Inclusive Mathematics Education in Classroom Practice. *Shanlax International Journal of Arts, Science and Humanities*, 8(3), 1–5. <https://doi.org/10.34293/sijash.v8i3.3462>
13. Diano Jr, F., Kilag, O. K., Malbas, M., Catacutan, A., Tiongzon, B., & Abendan, C. F. (2023). Towards Global Competence: Innovations in the Philippine Curriculum for Addressing International Challenges. *Excellencia: International Multi-disciplinary Journal of Education* (2994-9521), 1(4), 295-307.
14. Ediyanto, E., Zulkipli, Z., Sunandar, A., Subanji, S., Wahat, N. W. A., & Iliško, D. (2023). Mathematics learning for students with special needs. *Pegem Journal of Education and Instruction*, 13(4), 93–99. <https://doi.org/10.47750/pegegog.13.04.11>
15. Florian, L. (2021). The universal value of teacher education for inclusive education. In A. Köpfer, J. J. W. Powell, & R. Zahnd (Eds.), *Handbuch Inklusion international/International Handbook of Inclusive Education: Globale, nationale und lokale Perspektiven auf Inklusive Bildung/Global, National and Local Perspectives* (1st, pp. 89–106). Verlag Barbara Budrich. <https://doi.org/10.2307/j.ctv1f70kvj.8>
16. Fritz, H. L. (2020). Coping with caregiving: Humor styles and health outcomes among parents of children with disabilities. *Research in Developmental Disabilities*, 104. <https://doi.org/10.1016/j.ridd.2020.103700>
17. Gang, D. "Effective Interventions to Increase Basic Math Skills for Students with Learning Disabilities" (2022). *Culminating Projects in Special Education*. 140. https://repository.stcloudstate.edu/sped_etds/140
18. Gkeka, E. G., Agorastou, E. K., & Drigas, A. S. (2020). Mobile Multimedia Education for Language Disorders. *International Journal of Emerging Technologies in Learning*, 15(6), 50–59. <https://doi-org.libserv-prd.bridgew.edu/10.3991/ijet.v15i06.11175>
19. Gonzaga, N., Aguipe, M. & Plan, L. (2024). Readiness And Challenges Of General Education teachers On The Implementation of Inclusive Education. *Russian Law Journal*. 12(1). <https://doi.org/10.52783/rlj.v12i1.3534>
20. Great Minds. (2025, March 24). Equity in Action: Building an inclusive education system through engagement in California. Great Minds. <https://greatminds.org/math/blog/eureka/equity-in-action-building-an-inclusive-education-system-through-engagement-in-california>
21. Han, C., & Lei, J. (2024). Teachers’ and Students’ Beliefs towards Universal Design for Learning Framework: A Scoping review. *SAGE Open*, 14(3). <https://doi.org/10.1177/21582440241272032>
22. Hiltrimartin, C., Afifah, A., Scristia, Pratiwi, W. D., Handrianto, C., & Rahman, M. A. (2024). Analyzing Students’ Thinking in Mathematical Problem Solving Using Vygotskian Sociocultural Theory . *Revista De Gestão - RGSA*, 18(1), e04802. <https://doi.org/10.24857/rgsa.v18n1-105>
23. Hubbard, J.; Livy, S. (2021) Self-Study of a Mathematics Learning Consultant: Supporting Teachers to Plan Lessons for Implementing Differentiation in the Classroom. *Math. Teach. Educ. Dev.* 2021, 23, 148–165. <https://files.eric.ed.gov/fulltext/EJ1321059.pdf>
24. Jeong, S., Clyburn, J., Bhatia, N. S., McCourt, J., & Lemons, P. P. (2022). Student Thinking in the Professional Development of College Biology Instructors: An Analysis through the Lens of Sociocultural Theory. *CBE—Life Sciences Education*, 21(2). <https://doi.org/10.1187/cbe.21-01-0003>
25. Kırmızıgül, H. G. (2022). Teachers’ experiences, problems and solutions regarding special education and inclusive education in secondary school mathematics lessons: The case of Türkiye. *International Journal of Educational Studies in Mathematics*. 9(4), 219-232. <https://dergipark.org.tr/en/download/article-file/2586246>
26. Klang, N., Göransson, K., Lindqvist, G., Nilholm, C., Hansson, S., and Bengtsson, K. 2020. “Instructional Practices for Pupils with an Intellectual Disability in Mainstream and Special Educational Settings.” *International Journal of Disability, Development and Education*, 67(2): 151–166. doi:10.1080/1034912X.2019.1679724
27. Ku, B., & Rhodes, R. E. (2020). Physical activity behaviors in parents of children with disabilities: A systematic review. *Research in Developmental Disabilities*, 107. <https://doi.org/10.1016/j.ridd.2020.103787>
28. Kurniastuti, I., Evanjeli, L. A., & Sari, D. P. (2023). Teachers’ challenges and strategies in teaching literacy skills for children with special needs. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(1), 937-948. <https://doi.org/10.31004/obsesi.v7i1.3598>
29. Larsen, H. G., & Adu, P. (2021). The theoretical framework in phenomenological research. In *Routledge eBooks*. <https://doi.org/10.4324/9781003084259>

30. Luo, Y., Zhou, R. Y., Mizunoya, S., & Amaro, D. (2020). How various types of disabilities impact children's school attendance and completion - Lessons learned from censuses in eight developing countries. *International Journal of Educational Development*, 77(May), 102222. <https://doi.org/10.1016/j.ijedudev.2020.102222>
31. MacKenzie, A., Bower, C., & Owaineh, M. (2020). Gratitude versus children's rights: An exploration mothers' attitudes towards disability and inclusive education in Palestine. *International Journal of Educational Research Open*, 1, 100001. <https://doi.org/10.1016/j.ijedro.2020.100001>
32. Mader, J. (2023, October 18). Disabilities in math affect many students — but get little attention. *The Hechinger Report*. <https://hechingerreport.org/disabilities-in-math-affect-many-students-but-get-little-attention/>
33. Mahmoud, A. (2021). An overview of children with special needs.
34. Manire, E., Kilag, O. K., Habig, M., Satin, R., Genovania, M. R., & Tan, S. J. (2023). A Technological Approach to Early Childhood Education: Unveiling the SEEDS Pedagogy. *Excellencia: International Multi-disciplinary Journal of Education* (2994-9521), 1(5), 333-344.
35. Mungunda, A. E. (2023). Challenges Faced by Mathematics Teachers in Teaching Secondary School Learners with Visual Impairment in The Khomas Region. [Masteral dissertation, University of Namibia]. <https://repository.unam.edu.na/server/api/core/bitstreams/51c2aa4c-d455-4fdc-a16c-b36f2b8b35ba/content>
36. Özdemir, S., & Kılıç, Y. (2023). Investigating Special education Teachers' views on Mathematics Instruction Process: Sugestions for Sustainable Special Education in Mathematics Instruction. *Sustainability*, 15(4), 3584. <https://doi.org/10.3390/su15043584>
37. Risdiyanti, I., Zulkardi, N., Putri, R. I. I., & Prahmana, R. C. I. (2024). Mathematical literacy learning environment for inclusive education teachers: A framework. *Journal on Mathematics Education*, 15(3), 1003–1026. <https://doi.org/10.22342/jme.v15i3.pp1003-1026>
38. Romaine, A. (2023). The Role of Multi-Sensory Learning in Elementary Classrooms on Student Development. *Undergraduate Review*, 17, p. 59-72. Available at: https://vc.bridgew.edu/undergrad_rev/vol17/iss1/9
39. Sari, H., Gokdag, H. & Pursun, T. (2024, September 25). Numeracy for Children with Special Educational Needs. *TeachingTimes*. <https://www.teachingtimes.com/ecj62-sen-children-numeracy/>
40. Schnepel, S., Dessemontet, R. S., & Opitz, E. M. (2022). The impact of inclusive education on the mathematical progress of pupils with intellectual disabilities. *International Journal of Inclusive Education*, 28(12), 2815–2829. <https://doi.org/10.1080/13603116.2022.2132425>
41. Sugiman, Suyitno, H., Junaedi, I., & Dwijanto. (2020). The creation of teaching aids for disabled students as mathematical-thinking-imaginative product. *International Journal of Instruction*, 13(3), 777–788. <https://doi.org/10.29333/iji.2020.13352a>
42. Sukinah, S., & Triadi, A. A. (2022). The Effectiveness Of Blended Learning Model Towards Learning Outcomes Of Students' Multiplication Operations With Autism. *Journal of ICSAR*, 6(2), 216-229
43. Tan, P.; Padilla, A.; Lambert, R. A Critical Review of Educator and Disability Research in Mathematics Education: A Decade of Dehumanizing Waves and Humanizing Wakes. *Rev. Educ. Res.* 2022, 92, 871–910.
44. TreeHozz. (2020). Who first established the term learning disabilities in 1963? Retrieved from <https://treehozz.com/who-first-established-the-term-learning-disabilities-in-1963>
45. Vodičková, B., Mitašiková, P., & Slavičková, M. (2023). Supportive factors in inclusive Mathematics education: Mathematics Teachers' perspective. *Education Sciences*, 13(5), 465. <https://doi.org/10.3390/educsci13050465>
46. Wardani, K. D., & Prahmana, R. C. I. (2021). Learning direct and inverse proportion using pen and money for slow-leaners. *Indonesian Research Journal in Education [IRJE]*, 5(1), 63–84. <https://doi.org/10.22437/irje.v5i1.10302>
47. Zagana, A. L., Lansey, K. R., Kurth, J. A., & Kuhlemeier, A. (2021). Fostering participation during literacy instruction in inclusive classrooms for students with complex support needs: Educators' strategies and perspectives. *The Journal of Special Education*, 55(1), 34-44. <https://doi.org/10.1177/0022466920936671>

Approval Sheet

This thesis entitled “**Building Numeracy and Adapted Instruction: SPED Teachers’ Perspectives on Development**” is prepared and submitted by **ERLYN YAP** in partial fulfillment of the requirements for the degree of **Master of Arts in Education major in Special Education** has been accepted and approved.

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ORAL EXAMINATION COMMITTEE

Approved by the Committee on Oral Examination with a grade of ____.

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Appendix A

Interview Guide

Building Numeracy and Adapted Instruction: Sped Teachers’ Perspectives on Development

Research Interview Guide

Preliminary

1. How do you describe your experiences teaching mathematical literacy to students with special needs?

Main

2. What factors do you believe will contribute to successful numeracy development in special education settings?

3. What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

4. What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

5. How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Closing/Wrap Up

6. What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Appendix B

Transcripts of Interviews

Building Numeracy and Adapted Instruction: Sped Teachers' Perspectives on Development

Participant 1

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: Based on my experience, by identifying each student's baseline and specific needs, and using the right teaching materials, such as manipulatives, number lines, and interactive games, math instruction becomes much more effective, even for students with severe challenges. Repetition, consistency, and clear instructions are key. With the right support, these students can truly succeed in developing their mathematical literacy.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: Specialized Academic Instruction (SAI) plays a vital role in developing numeracy skills by providing targeted, individualized support tailored to students' unique learning needs. Through structured interventions, modified instruction, and personalized strategies, SAI helps students grasp fundamental math concepts, build confidence, and make meaningful progress in numeracy. It ensures equitable access to learning by addressing learning gaps and supporting diverse cognitive styles.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Special needs students struggle with mathematical literacy for a variety of reasons, including limited working memory, language processing problems, and difficulty understanding abstract concepts. Deficits in basic skills and a lack of specialized training or individualized support can also hinder progress. When teaching students with special needs, a teacher's methods and background are very important. Math concepts can be made more approachable through the use of efficient techniques like step-by-step instruction, practical exercises, and visual aids. An experienced teacher is better able to modify lessons to accommodate different learning preferences and give each student the assistance they require to succeed.

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: To support the development of mathematical concepts in elementary special education classes, I use hands-on activities with manipulatives like counters and base-ten blocks (Singapore Math) to build number sense. I incorporate visual aids, step-by-step modeling, and frequent repetition to reinforce understanding. I also differentiate instruction and provide scaffolded support, including using math games and technology tools to engage students at their levels.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: For students with SEN, support systems are essential to improving their math learning. Parents support learning at home, co-teachers and therapists offer focused interventions, and school administrators supply materials and training. Consistency, tailored support, and a supportive learning environment are guaranteed when all stakeholders work together.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: Professional development in multi-sensory math strategies, differentiated instruction, and using assistive technology would help improve my math teaching. Training on how to look at student data to guide instruction and learning new ways to make abstract concepts clear would also be helpful.

Participant 2

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: Over the past decade, teaching mathematical literacy to students with special needs has been both a rewarding and evolving journey. I have worked with students across a wide range of abilities and needs, including those with intellectual disabilities, autism spectrum disorders, ADHD, and specific learning disabilities in math (dyscalculia). These experiences have taught me the importance of patience, flexibility, and creativity in instruction. I've learned that developing numeracy skills goes beyond just teaching numbers and operations—it involves fostering confidence, motivation, and real-world application. I continuously adapt my methods to meet individual learning styles, using concrete manipulatives, visual aids, and technology to make math more accessible and meaningful.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: Successful numeracy development in special education settings relies on several interconnected factors:

- Individualized Instruction: Tailoring lessons to meet each student's learning profile, pace, and developmental level is essential.
- Use of Concrete and Visual Supports: Manipulatives, visual representations, and step-by-step models help students grasp abstract concepts.
- Consistent Reinforcement and Practice: Regular, structured opportunities for practice help reinforce skills and aid retention.
- Functional and Real-Life Application: Making math meaningful by connecting it to real-life tasks (e.g., shopping, time management) improves engagement and understanding.
- Positive Learning Environment: A safe, supportive classroom climate builds student confidence and reduces math anxiety.

Co-teaching models, therapist support, and shared goal setting contribute to more comprehensive support.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Several key challenges impact mathematical literacy development in students with special needs:

- Cognitive Processing Deficits: Many students struggle with memory, attention, sequencing, and problem-solving, which are critical for math.
- Language Barriers: Math often involves complex language and vocabulary, which can be difficult for students with speech and language impairments.

- **Lack of Foundational Skills:** Gaps in early numeracy can make it difficult for students to progress with more advanced concepts.
- **Math Anxiety:** Past struggles and a fear of failure can hinder participation and confidence.
- **One-Size-Fits-All Curriculum:** Standardized approaches may not meet diverse learning needs.
- **Limited Exposure to Real-World Math:** Students may not see its relevance or utility if math is taught in isolation without practical application.

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: To support math development, I use a variety of evidence-based and student-centered strategies:

- **Concrete-Representational-Abstract (CRA) Approach:** Starting with manipulatives, moving to visual models, and then to abstract symbols.
- **Differentiated Instruction:** Tailoring tasks, materials, and assessments based on individual readiness levels.
- **Scaffolded Learning:** Breaking tasks into manageable steps and providing support as needed.
- **Use of Technology:** Incorporating apps and tools like virtual manipulatives, math games, and adaptive software.
- **Real-Life Simulations:** Creating activities that simulate real-world scenarios, like budgeting for a meal or measuring ingredients.
- **Routine and Repetition:** Establishing consistent math routines and revisiting skills to reinforce learning.
- **Positive Reinforcement:** Celebrating small achievements to build motivation and self-esteem.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: Support systems play a crucial role in student success. Collaboration and communication among all stakeholders ensure that instruction is aligned, consistent, and holistic:

- **School Administration:** Provides necessary resources, professional development opportunities, and supports inclusive practices.
- **Co-Teachers:** Offer subject-matter expertise and help deliver differentiated instruction in inclusive settings.
- **Therapists (e.g., OT, Speech):** Address underlying developmental challenges that affect learning, such as fine motor skills or language processing.
- **Parents/Caregivers:** Reinforce learning at home and provide valuable insight into their student's strengths and challenges.

When all parties work together and maintain open communication, students receive more consistent, targeted, and supportive instruction.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: Despite my extensive experience, I firmly believe that ongoing professional development is essential to growth. The areas that would most benefit me include:

- Training in Evidence-Based Math Interventions: Especially those tailored for students with learning disabilities or autism.
- Workshops on Functional Math and Life Skills: To better incorporate real-world math applications into the curriculum.
- Assistive Technology in Math Education: Learning to use adaptive tools more effectively to support diverse students.
- Universal Design for Learning (UDL): To create lessons that are accessible and engaging for all students from the outset.
- Data-Driven Instruction: Enhancing my ability to collect, interpret, and use assessment data to inform instruction and track progress.

Participating in professional learning communities and ongoing mentorship or coaching would also help deepen my practice and stay current with research-based strategies.

Participant 3

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: My experience teaching mathematical literacy to students with special needs has been both challenging and rewarding. Each student brings a unique learning profile, which requires me to adapt lessons and use multiple strategies to make concepts accessible. I've learned that hands-on learning, visual supports, and constant reinforcement are essential. Although progress can be slower, every small milestone, like a student confidently solving a basic problem or understanding place value, is incredibly meaningful.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: Successful numeracy development depends on differentiated instruction, consistency, and student engagement. Using concrete materials such as manipulatives helps students visualize abstract concepts. Another key factor is creating a supportive, low-pressure environment where students feel safe making mistakes. Collaboration with parents and regular assessments to monitor progress also play a big role in shaping effective instruction.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Several factors can hinder mathematical literacy development, including language processing difficulties, memory deficits, and anxiety toward numbers. Some students may also struggle with attention, making it harder to follow multi-step procedures. Inadequate early exposure to foundational math skills and limited home support can further widen the learning gap. Lastly, a rigid or fast-paced curriculum that doesn't allow for scaffolded learning can be a barrier.

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: I use a variety of strategies, including visual aids, real-life problem-solving scenarios, and interactive games. Repetition and routine are key, so I often incorporate daily math warm-ups and small group work. I break down complex problems into manageable steps and provide frequent checks for understanding. I also try to celebrate small wins to boost students' confidence and motivation.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: Support systems are crucial. Co-teachers and instructional aides help provide individualized support during lessons. Therapists, especially occupational and speech therapists, often help students develop the foundational skills they need for math, like sequencing or understanding instructions. Parents reinforce learning at home, and administrators who support flexible scheduling and provide resources allow me to better meet student needs. Collaboration among all these roles makes a big difference in the consistency and quality of learning students receive.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: Professional development focused on differentiated math instruction for students with special needs would be highly beneficial. Training in evidence-based strategies, such as the Concrete-Representational-Abstract (CRA) approach, universal design for learning (UDL), and multi-sensory techniques, can enhance instructional effectiveness. Workshops on math-specific assistive technology, formative assessment tools, and behavioral support strategies would also help in addressing diverse learning profiles. Additionally, collaborative learning opportunities, such as peer observations, learning communities, or coaching sessions with math specialists, could provide practical insights and support. Strengthening skills in data analysis for instructional planning and gaining a deeper understanding of neurodiverse students' math processing challenges would further improve outcomes in mathematical literacy instruction.

Participant 4

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: It has been challenging specially with diverse students. Culture and practices become the factors to consider in planning the learning process and resources.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: The following are:

Customized Teaching Approaches- Adapting instructional strategies to address the specific learning requirements and strengths of each student.

Integration of Assistive Devices- Employing tools such as calculators, visual supports, and educational applications to enhance understanding.

Stable and Nurturing Classroom Climate:** Creating a consistent and positive environment that promotes student confidence and engagement.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Insufficient tailored instruction

Teachers' lack of specialized training

Math anxiety and low confidence

Cognitive or learning disabilities

Emotional or behavioral challenges

Uninclusive or unstimulating learning environments

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: I use visual aids, manipulatives, and step-by-step instructions; incorporate hands-on activities; provide immediate feedback; and differentiate tasks to meet each student's needs, fostering engagement and understanding of mathematical concepts.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: Support systems like school staff, therapists, and parents collaborate to create an inclusive environment, improving math outcomes for students with SEN.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: Training in differentiated instruction and inclusive teaching strategies would enhance my math instruction for students with diverse needs.

Participant 5

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: Teaching mathematical literacy to students with special needs is both a rewarding and challenging experience. It requires an exquisite approach that is tailored to the unique learning styles and needs of each student. Teaching mathematical literacy to students with special needs requires creativity, flexibility, and a compassionate approach. The experiences gained through this journey are invaluable, offering lessons in adaptability, empathy, and the joy of seeing students succeed against the odds.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: Developing numeracy skills in special education settings requires a thoughtful approach that considers the unique needs of each student. Here are several factors that contribute significantly to successful numeracy development: individualized instruction, skilled teachers, engaging and relevant curriculum, supportive environment, regular assessment and feedback, and parental involvement

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Students with special needs often face unique challenges in developing mathematical literacy. Several factors contribute to these difficulties, which can vary depending on individual needs and circumstances.

Cognitive Processing Challenges

Students with special needs may experience cognitive processing difficulties that hinder their ability to understand and retain mathematical concepts. Such challenges can include:

Memory Issues: Difficulty retaining and recalling information can impact the learning of mathematical formulas and procedures.

Processing Speed: Slower processing speeds can make it challenging for students to keep up with the pace of instruction and problem-solving tasks.

Language Processing: Problems with language comprehension can affect the ability to understand mathematical word problems and instructions.

Learning Disabilities

Specific learning disabilities, such as dyscalculia, directly impact mathematical abilities. Dyscalculia can manifest as:

Difficulty with Number Sense: Struggles with understanding numbers and their relationships.

Trouble with Arithmetic: Challenges in performing basic calculations or understanding arithmetic concepts.

Issues with Spatial Awareness: Difficulty in visualizing and understanding spatial relationships, which are crucial for geometry.

Emotional and Behavioral Factors

Emotional and behavioral challenges can also impede mathematical literacy development:

Anxiety: High levels of math anxiety can interfere with performance and the ability to engage in mathematical tasks.

Attention Deficits: Attention Deficit Hyperactivity Disorder (ADHD) can result in difficulties focusing on math tasks, following multi-step procedures, and managing time effectively.

Motivational Issues: Lack of motivation or negative attitudes towards math can reduce engagement and persistence in learning.

Instructional and Environmental Barriers

The instructional approaches and learning environments can either support or hinder mathematical literacy:

Inadequate Instructional Strategies: Teaching methods that do not accommodate diverse learning needs can limit understanding and progress. For example, a lack of multisensory approaches can be a significant barrier.

Insufficient Support: A lack of individualized support and resources, such as specialized teaching aides or adaptive technology, can impede learning.

Classroom Environment: Overcrowded or overstimulating environments can distract students and prevent effective learning.

Socioeconomic and Cultural Influences

Broader socioeconomic and cultural factors can also contribute to difficulties:

Limited Access to Resources: Students from low-income backgrounds may lack access to supplementary educational resources and technology.

Cultural Expectations: Cultural perceptions about math ability and gender stereotypes can influence a student's confidence and interest in math.

Addressing these factors requires a comprehensive, individualized approach that considers the unique needs of each student. By creating supportive learning environments and employing tailored teaching strategies, teachers can help students with special needs develop stronger mathematical literacy skills.

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: Supporting mathematical concepts among students in special education classes requires a combination of tailored instructional strategies and effective classroom practices. These approaches focus on meeting diverse learning needs and fostering a supportive environment for all students. Here are key strategies and practices that can help:

Differentiated Instruction - Differentiated instruction involves tailoring teaching methods to accommodate different learning styles and abilities. This could include:

Visual Aids: Use charts, diagrams, and visual models to help students grasp abstract concepts.

Manipulatives: Incorporate physical objects like blocks or counters to provide hands-on learning experiences.

Technology Integration: Utilize educational software and apps that offer interactive math activities and adapt to individual learning paces.

Scaffolded Learning - Scaffolded learning involves breaking down mathematical concepts into smaller, more manageable pieces. This supports students as they build their understanding step-by-step.

Guided Practice: Start with teacher-led examples and gradually shift responsibility to students as they gain confidence.

Think-Alouds: Demonstrate problem-solving processes by verbalizing your thinking during lessons.

Use of Multi-Sensory Approaches - Engaging multiple senses can enhance understanding and retention of mathematical concepts:

Kinesthetic Activities: Encourage movement-based activities, such as using body movements to represent mathematical operations or geometric shapes.

Auditory Techniques: Incorporate songs, rhymes, or chants to help memorize math facts or formulas.

Flexible Grouping - Flexible grouping allows students to work in various group settings, such as pairs, small groups, or individually, based on their needs and the task at hand:

Peer Tutoring: Pair students to facilitate peer learning, where more knowledgeable students can assist others.

Collaborative Learning: Foster a classroom culture where students work together to solve problems, promoting communication and teamwork.

Explicit Instruction - Explicit instruction involves clear, direct teaching of mathematical concepts and procedures:

Clear Objectives: Set and communicate specific learning goals for each lesson.

Step-by-Step Instructions: Provide detailed explanations and model processes explicitly for students.

Continuous Assessment and Feedback - Regular assessment and feedback help monitor student progress and adjust instruction accordingly:

Formative Assessments: Use quizzes, exit tickets, or quick checks to gauge understanding and inform instruction.

Timely Feedback: Provide constructive feedback promptly to help students correct errors and improve.

Cultivating a Positive Classroom Environment - Creating an inclusive and supportive classroom atmosphere is crucial for student success:

Encouragement and Praise: Recognize and celebrate student achievements to boost confidence and motivation.

Growth Mindset: Encourage a mindset that mistakes are opportunities for learning and growth.

By incorporating these strategies and practices, teachers can effectively support the development of mathematical concepts among students in special education, promoting a deeper understanding and a lifelong appreciation for math.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: Support systems play a crucial role in enhancing mathematical learning outcomes for students with special educational needs (SEN). These systems comprise school administration, co-teachers, therapists, and parents, each contributing uniquely to the educational experience. By working collaboratively, they create a robust environment that caters to the diverse needs of these students, facilitating not only academic success but also personal growth.

School Administration - School administrators set the tone and direction for inclusive education. They are responsible for:

Policy Development: Crafting policies that prioritize inclusive practices and allocate resources effectively to support SEN students.

Resource Allocation: Ensuring that classrooms are equipped with the necessary tools and technologies, such as adaptive learning software and manipulatives, that can aid mathematical comprehension.

Professional Development: Providing training for teachers on the latest inclusive teaching strategies and methodologies to enhance their ability to teach mathematics to students with diverse needs.

Co-Teachers - Co-teachers, often working in an inclusive classroom setting, offer direct support:

Collaborative Teaching: They team up with general education teachers to design and implement lesson plans that accommodate different learning styles and paces.

Individualized Attention: Offer more personalized support, breaking down complex mathematical concepts into manageable parts for students who may need extra help.

Flexible Grouping: Organize students into various group settings, allowing for peer learning and increased engagement with the material.

Therapists - Therapists, including occupational and speech therapists, contribute significantly:

Skill Development: Work on developing fine motor skills necessary for writing and using mathematical tools, as well as language skills essential for understanding and expressing mathematical concepts.

Behavioral Interventions: Implement strategies that help students manage anxiety and frustration often associated with challenging subjects like mathematics.

Sensory Integration: Assist in designing environments that minimize sensory overload, making it easier for students to focus on their mathematical tasks.

Parents - Parents are vital partners in the educational process:

Home Support: Reinforce learning at home by engaging in math-related activities and ensuring a consistent routine that supports academic work.

Advocacy: Communicate with teachers and administrators to ensure their student's needs are met and to advocate for necessary resources or adjustments.

Emotional Support: Provide encouragement and motivation, building their student's confidence in tackling mathematical challenges.

The collaboration between school administration, co-teachers, therapists, and parents is essential in creating a nurturing and effective learning environment for students with special educational needs. Each entity plays a distinct yet interconnected role, ensuring that these students receive the comprehensive support they need to succeed in mathematics and beyond. By fostering an inclusive, supportive atmosphere, these support systems enhance both the academic outcomes and personal development of students with SEN.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: Improving mathematical literacy instruction requires a combination of targeted professional development, collaborative learning experiences, and access to innovative teaching strategies. Here are some key areas to consider for professional development or training that can enhance mathematical literacy instruction: workshops on pedagogical strategies, content-specific training, collaborative learning communities, cultural competency training, assessment literacy, professional conferences and seminars, and online courses and webinars.

Participant 6

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: My experience teaching mathematical literacy to students with special needs has been both rewarding and challenging. Each student presents a unique set of abilities and learning styles, requiring me to be flexible, creative, and patient in my instructional approach. I've had to adapt lessons using visual aids, manipulatives, and technology to ensure that mathematical concepts are accessible and meaningful. While some students grasp concepts quickly with proper support, others need consistent repetition and individualized guidance. These experiences have deepened my understanding of inclusive education and strengthened my commitment to helping every student succeed.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: Several factors contribute to successful numeracy development in special education settings. One of the most important is differentiated instruction, which tailors lessons to match students' individual needs and abilities. The availability of teaching resources such as manipulatives, assistive technology, and simplified materials also plays a significant role. In addition, a supportive and positive learning environment that encourages exploration and reduces anxiety about making mistakes is crucial. Collaboration among teachers, specialists, and parents helps create consistency in instruction and reinforcement of skills both at school and at home.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Various challenges hinder the development of mathematical literacy among students with special needs. These include limited cognitive and processing abilities, poor memory retention, language difficulties, and attention-related concerns. In some cases, the lack of appropriate instructional materials or insufficient time

for individualized instruction adds to the difficulty. Furthermore, a lack of training or confidence among teachers in handling diverse learning needs in math can also affect student outcomes.

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: To support the development of mathematical concepts, I incorporate several instructional strategies and classroom practices. I often use hands-on activities, real-life applications, visual supports, and step-by-step guided instruction. Breaking down complex problems into smaller, manageable steps helps make learning less overwhelming. I also integrate games and technology-based tools to keep students engaged while reinforcing basic skills. Frequent assessments and feedback allow me to track progress and adjust instruction accordingly.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: Support systems play a vital role in enhancing mathematical learning for students with special needs. School administrators who provide resources and promote inclusive policies make a big difference. Collaboration with co-teachers allows for team-teaching and sharing of best practices. Therapists contribute by addressing underlying developmental delays or behavioral issues that affect learning, while parents provide valuable insights and help reinforce learning at home. When these stakeholders work together, students receive the consistent support they need to succeed in numeracy.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: To improve my instruction in mathematical literacy, I believe that ongoing professional development is essential. Training focused on evidence-based instructional strategies for math, the use of adaptive technology, and behavior management techniques specific to special education would be highly beneficial. Workshops or seminars that provide hands-on experience with inclusive math materials and strategies for differentiating instruction would also help me become more effective in addressing the diverse needs of my students.

Participant 7

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: Teaching math to students with special needs has been both rewarding and demanding. Each student brings unique challenges, especially when cultural backgrounds and learning differences intersect. Planning instruction requires careful consideration of individual learning styles, available resources, and culturally responsive strategies to ensure that math concepts are accessible and meaningful.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: The factors that I believe will contribute to successful numeracy development in special education settings are:

Individualized Learning Plans – Personalizing instruction based on assessment data and student profiles helps target specific areas of need.

Use of Technology and Visual Tools – Tools like talking calculators, interactive math apps, and visual cues support comprehension and engagement.

Positive Reinforcement and Consistency – Encouraging effort and progress while maintaining structured routines builds student confidence and persistence.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: Lack of differentiated instruction and specialized teaching strategies

Limited access to math-focused interventions and resources

Challenges related to attention, working memory, and processing speed

High levels of math-related anxiety and previous negative experiences

Gaps in early math exposure and support from home

Rigid curriculum pacing and insufficient scaffolding

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: I incorporate structured, multi-sensory instruction using tangible materials, visuals, and guided practice. Lessons are broken into manageable steps, with frequent checks for understanding. I also use math games, real-life problem-solving activities, and collaborative work to make learning both interactive and relevant. Differentiation and repetition are key in reinforcing skills over time.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: The involvement of a strong support system makes a significant difference. When administrators provide adequate training and resources, and co-teachers and therapists work together to align instructional goals, students receive more comprehensive support. Parents are also essential in reinforcing learning at home and maintaining communication with teachers, ensuring continuity across settings.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: I would benefit from professional development in multi-sensory math instruction, Universal Design for Learning (UDL), and the effective use of assistive technology in math. Additionally, training on using data to guide instruction and practical workshops on teaching functional math skills would help me better serve students with varying needs and abilities.

Participant 8

Researcher: How do you describe your experiences teaching mathematical literacy to students with special needs?

Participant: The experiences in teaching mathematical literacy to students with special needs were challenging and/or brain squeezing, rewarding or fulfilling.

Researcher: What factors do you believe will contribute to successful numeracy development in special education settings?

Participant: The factors that will contribute to successful numeracy development are a supportive and inclusive learning environment, individualized instruction, and the use of appropriate accommodations and assistive technology. Teachers should also focus on building positive relationships with students and fostering a sense of belonging, while collaborating with parents and other professionals to create a comprehensive support system.

Researcher: What factors do you identify as contributing to difficulties in mathematical literacy development among students with special needs?

Participant: The factors that may possibly affect mathematical literacy development among students with special needs are individual learning disabilities, sensory impairments, and social-emotional challenges, as well as external factors such as family background, socioeconomic status, and the accessibility of the learning environment. Additionally, negative attitudes from teachers and peers.

Researcher: What instructional strategies and classroom practices do you use to support the development of mathematical concepts among students in special education classes?

Participant: The instructional strategies and classroom practices to support the development of mathematical concepts are emphasize individualized approaches, clear communication, and creating an inclusive learning environment. This includes breaking down information, using visual aids, providing positive reinforcement, and fostering a sense of community in the classroom. Additionally, collaboration with parents, specialists, and other professionals is crucial for supporting the diverse needs of these students.

Researcher: How do you perceive the role of support systems (school administration, co-teachers, therapists, parents) in enhancing mathematical learning outcomes for students with SEN?

Participant: Supportive systems play a crucial role in the education of students with special needs, ensuring they have access to a quality education and can reach their full potential.

Researcher: What professional development or training do you believe would help you improve your mathematical literacy instruction for your students?

Participant: Professional development may focus on the following: Understanding Special Educational Needs, Instructional Strategies and Creating Inclusive Classroom

Appendix C

Request Letter

REQUEST LETTER

VENUS R. CASTRO
SPED-LEAD TEACHER
JJA CAMPUS
102 INVESTMENT BLVD
CALIFORNIA USA

MAY 15, 2025

Subject: Request for Permission to conduct Research study

Dear VENUS,

Greetings!

I am ERLYN YAP, a graduate student at University of Perpetual help System, currently pursuing my degree in Master of Arts in Education Major in Special Education. I am conducting a research study entitled **"Building Numeracy and Adapted Instruction: SPED Teacher's Perspectives on Development"** as part of my requirements of my study.

In line with this, I would like to respectfully request your permission to conduct my study at John Adams Academy-El Dorado Campus. The research will involve teachers who handling Sped students.

Please be assured that the data gathered will be treated with strict confidentiality and will be used solely for academic purposes.

Should you grant approval, I will coordinate with the appropriate personnel to ensure that the study will not disrupt any classes or activities.

Thank you very much for your time and consideration. I look forward to your positive response.

Respectfully yours,



Erlyn B. Yap
Sped student

APPROVED BY:


VENUS R. CASTRO

All information shall be used by the University for legitimate purposes and shall be processed by authorized personnel in accordance with the Data Privacy Policies of the UPHSD Las Piñas Campus.

Appendix D

Certificate of Originality



**UNIVERSITY OF
PERPETUAL HELP
SYSTEM DALTA**

ADTA-09/08/2025: #7



CERTIFICATE OF ORIGINALITY

This is to certify that the research paper with the following specifics has been checked for originality using the TURNITIN platform.

Title: **BUILDING NUMERACY AND ADAPTED INSTRUCTION: SPED TEACHERS' PERSPECTIVES ON DEVELOPMENT**

Name of Student: **ERLYN YAP**

Program: Master of Arts in Education Major in Special Education

Date of Submission to TURNITIN: September 8, 2025

Percentage: 9%

This is to further certify that all pertinent sources from which ideas and other extracts have been taken were duly acknowledged and cited. As it is, the project is free from any plagiarism and may be eligible for possible publication in any reputable peer reviewed or refereed journal.

Processed by



Anabelle Tabuac
Intellectual Property Officer



Belinda T. Conde, PhD
Research Director

September 8, 2025
Date Issued

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Alabang-Zapote Road, Pampiona Tres, Las Piñas City 1740 Philippines • Tel. No.: (+632) 8871-06-39
www.perpetualdalta.edu.ph

Appendix E

Certificate of Data Processing



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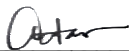
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Anabelle Tabuac
Intellectual Property Officer



Belinda T. Conde, PhD
Research Director

September 8, 2025
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Appendix F

Language Editing Certification



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Appendix G

Curriculum Vitae



ERLYN B. YAP

MATH/ SPED TEACHER

CONTACT

(571) 268-0138
yap.lyn80@gmail.com
El Dorado Hills, CA 95762

SKILLS

- Efficient classroom management skills
- Use of new media for interactive learning
- Proficient in a range of teaching styles
- Passionate about teaching and leading student success
- Verbal communication
- Written communication

PROFESSIONAL SUMMARY

I am a licensed teacher with 16 years of classroom experience, skilled in lesson planning, classroom management and student engagement. Committed to fostering a positive learning environment.

EXPERIENCE:

August 2024 - May 2025
Math Interventionist
John Adams Academy, El Dorado Hills, California

- Adapted teaching methods based on the individual needs of each student receiving math interventions.
- Documented all interactions with students during intervention sessions using appropriate forms.
- Assessed the impact of intervention programs and made adjustments accordingly.

September 2023 - July 2024

Math Interventionist

Cougar Elementary School, Manassas, VA

- Math Interventionist for Elementary students.
- Prepare, administer, and grade tests to evaluate students' progress.

June 2014 - August 2023

Secondary Mathematics/Sped Teacher

Alubijid National Comprehensive High School, Alubijid, Misamis Oriental

- Teach Mathematics to Grade 11 and Grade 12 students.
- Prepare, administer, and grade tests to evaluate students' progress.
- Outstanding Teacher for School Year 2016-Present.
- Grade 11 Year Level Coordinator.

June 2012 - April 2014

Middle School Mathematics Teacher

Xavier Academy, Initao, Misamis Oriental

- Teach Mathematics to Grade 7 and Grade 10 students.
- Prepared, administered, and assessed Summative tests to evaluate students' learning.
- Mathematics Coordinator.