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Middle School Special Education Math Teachers’ Perceptions on the Use of Quality-Plus Teaching Strategies

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,

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Walden University

2025

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Ed.S., Walden University 2021

M.Ed., Grand Canyon University, 2016

B.S., University of North Georgia, 1992

Proposal Submitted in Partial Fulfillment

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Abstract

The problem addressed through this study was that middle school special education math teachers' use of quality-plus teaching strategies (QPTS) is not known at a large Georgia school district (GSD, a pseudonym). The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions about using QPTS to improve standardized test scores for students with specific learning disabilities (SLD) at GSD. The study was grounded in Piaget's theory of constructivism, which holds that knowledge is best gained through a process of action, reflection, construction, and the interaction of experiences and ideas. For this basic qualitative design, data were collected through 17 semistructured interviews with middle school math teachers at GSD. Inductive coding revealed three major themes: (a) improved performance in mathematics is perceived to be a characteristic of implementing QPTS; (b) implementation of QPTS was hindered by insufficient support and limited resources; and (c) QPTS were often misaligned with student needs, requiring modification by special education teachers. The findings of this study may contribute to positive social change by equipping special education teachers and educational leaders with insights to implement QPTS for students with disabilities more effectively. This will empower special educators to make more informed instructional choices. The results may inform pedagogical planning and targeted professional development, thereby enhancing instruction and improving mathematical achievement.

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Dedication

This dissertation is dedicated to my students, both past and present, as well as those yet to come, who have encountered and continue to navigate the challenges associated with learning disabilities. Your strength, commitment, and steadfast nature motivate me each day to find ways to support you so you can reach your highest potential. Your courage and perseverance serve as a powerful reminder of the essence of education: it is not merely the exchange of knowledge, but the development of resilience, optimism, and the conviction that every learner possesses the potential to succeed.

This dissertation is also dedicated to my beloved nephew, Charlie, whose courage and resilience in the face of epilepsy and ASD have served as a profound source of inspiration. Diagnosed at the age of two, Charlie's resilience exemplifies the essence of loudly advocating for what is important, and his journey has inspired my educational pursuits. His influence motivated my return to school, where I am committed to acquiring the knowledge and skills needed to assist not only him but also all the students encountering similar challenges. This work honors his steadfast spirit and acknowledges every child who merits the chance to flourish, regardless of the challenges they encounter. Charlie, you are the inspiration for this journey, and it is for you and many others that I persist in my efforts to effect change in the realm of special education.

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First and foremost, I would like to express my gratitude and praise to God for providing me with direction, strength, and guidance during this journey. His grace has been a consistent source of motivation and endurance for me, and without His blessings, I would not have been able to complete this dissertation. Throughout every difficulty and victory, I have relied on His presence, and His constancy has helped me get through the most difficult times.

I am unable to adequately express my sincere thanks to my mother, Janie Burel, for the infinite amount of love and encouragement that you have always shown me throughout my life, as well as the numerous sacrifices that you have made for me. During the most trying times in my life, you have been my rock of support, providing me with guidance, solace, and unflinching support. As a result of your faith in me, even during times when I questioned my abilities, I have become the person I am today. Every one of these steps has been a demonstration of the love and wisdom that you have provided. Everything that you have done for me and continue to do for me is something for which I will be eternally thankful. You have always been my biggest cheerleader, and I love and appreciate you more than you will ever know.

In addition, I want to use this opportunity to pay tribute to and convey my utmost appreciation to my dearly departed grandmother, Lois Simmons Childers, whose memory and spirit continue to serve as a source of inspiration for me daily. Her presence continues to be an everlasting source of strength, grace, and wisdom in my life. Her teachings had a significant effect on my personality and morals, and I continue to take her influence with

me in every success I achieve. As a way of paying honor to the love, wisdom, and resiliency that she instilled in me, my dissertation is dedicated to her. Even though she may not have been physically present, I am certain that she is looking down on me from on high, proud of the person I have become. I will be eternally grateful to her for the fact that her spirit continues to live on in everything that I do.

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evidence of your commitment to ensuring that I am successful. Your ingenuity and the way you pushed me to improve my ideas are both things that I am extremely grateful for.

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Chapter 1: Introduction of the Study

Introduction

Many students struggle to succeed and achieve proficiency in mathematics (Myers, Brownell et al., 2021). This struggle typically persists throughout their educational careers, particularly when students move up to middle school and school district officials begin to set higher standards for math proficiency (Myers, Brownell et al., 2021; Powell et al., 2021). Although middle school mathematics may be difficult for many students due to the heightened rigor and abstract concepts involved, a specific group of students experiences more adverse and continuous challenges (Powell et al., 2021). As students enter middle school, the complexity of math learning increases, and many students with Specific Learning Disabilities (SLD) continue to have lower performance levels than their non-disabled peers (Myers, Brownell et al., 2021).

Students with SLD may find it more challenging to comprehend complex math concepts due to the difficulty in remembering complicated rules, formulae, problem-solving techniques, and invoking prior knowledge (Siagan et al., 2019). They often struggle to understand the relevance of mathematical facts, formulas, and procedures. Both basic and complex math ideas may be difficult for students with SLD to understand, thereby leading to a decrease in comprehension and below-average test scores on classroom and standardized assessments. Students with SLD may experience these difficulties due to severe deficiencies in their cognitive skills (Myers, Brownell et al., 2021). Recent math scores documented by the National Assessment of Educational Progress have raised some nationwide concerns about overall mathematics achievement levels (Myers, Brownell et al., 2021). Proficiency in mathematics is a key factor in predicting students' future success, including high school graduation rates, college acceptance, college completion, and employment (Powell et al., 2021). Among all participating nations, students in the United States exhibit one of the largest performance gaps between the highest and lowest-scoring students according to the 2019 Trends in International Mathematics and Science Study (TIMMS); this gap has widened over the past 5 years (U.S. Department of Education, 2023).

Every Student Succeeds Act (ESSA) of 2015 is the most recent educational reform legislation that requires schools in the United States to provide accommodations for students with disabilities to be educated in their Least Restrictive Environment (LRE). Special education students are expected to master the standards written within the Common Core State Standards (CCSS) framework. The Individuals with Disabilities Act [IDEA] of 2004 mandates that students with disabilities have access to a free, appropriate public education and be prepared for further education and employment. To address the needs of Students with Disabilities (SWD) in mastering mathematical concepts, special education teachers must consider the requirements outlined in all these regulations. This section contains a discussion of the legislative requirements outlined in the mentioned acts and demands that teachers must adhere to when using instructional practices to improve mathematics test scores for students with SLD.

Common Core State Standards for Mathematics

The Common Core State Standards for Mathematics (CCSSM), as published in 2010, provides a complete collection of standards adopted by 47 states in the United States. The CCSSM outlines a framework of essential mathematics skills for teachers across grades K-12. There are eight standards provided under the CCSM practice, including (a) making sense of problems, (b) reasoning quantitatively and abstractly, (c) constructing viable arguments, (d) model for mathematics, (e) use appropriate tools strategically, (f) attend to precision, (g) look for and make use of the structure, and (h) express regularity in repeated reasoning (Common Core State Standards Initiative [CCSSI], 2022). The main goal of the Common Core in the elementary grades (K–5) is to define the foundational knowledge students need to master. In middle school, the CCSM outlines the content necessary for students to understand ratios, geometry, functions, proportions, statistics, and pre-algebra skills needed for mathematics (CCSSI, 2022). Additionally, the high school curriculum builds upon the foundational concepts introduced in middle school, placing greater emphasis on functions, advanced algebra, statistics, probability, mathematical modeling, and geometry.

Adopting the CCSSM standards can be challenging when dealing with students with learning difficulties. Filippi and Hackmann (2019) claimed that to realize the desired outcomes of the Common Core state standards initiatives, districts and school leadership must identify implementation issues and work to resolve those challenges. For instance, although CCSSM includes a focus on improving problem-solving abilities across grade levels, students with SLD face challenges that lead to low scores. In 2019, only 17% of students with disabilities scored at or above the National Assessment of Educational Progress (NAEP) math assessment proficiency (Myers, Witzel et al., 2021). Therefore, implementing the CCSSM can be challenging, especially when providing instruction for students with SLD. For instance, students with moderate and severe disabilities lack the basic mathematical skills for understanding and solving problems. Allensworth et al. (2021) noted that there is limited research showing the effectiveness of the CCSSM in changing outcomes in response to the new mathematics standards. Therefore, educators face challenges in integrating CCSSM in the classroom because most students with SLD underperform compared to their counterparts (Strickland & Maccini, 2013). Evidence-based instructional practices for teaching mathematics to students with LDs must be aligned with the CCSSM standards.

Lambert (2020) established that although the developers of the CCSSM intended to promote inclusion of all children in education, students with disabilities have not experienced equal access to academic instruction that aligns with the standards. Educators face challenges when providing instructions to students with mathematics SLD. Lambert and Schuck (2021) found that supporting students with disabilities in learning mathematics remained a major challenge for educators in the United States, as witnessed during the COVID-19 pandemic. Special educators face challenges when teaching mathematics to students with disabilities, as aligned with the CCSSM. According to Myers, Witzel et al. (2021), the CCSSM standards prioritize solving complex problems over memorization. However, students with disabilities have limited access to sustained problem-solving because special education in the United States focuses more on direct instruction than open-ended problem-solving as required under the CCSSM standards (Lambert & Schuck, 2021). Also, students with disabilities have received fewer opportunities to participate in standards-based mathematics in classrooms, which affects their academic performance (Lambert & Schuck, 2021). In a previous study, Lambert (2018) located this issue in a lack of access to mathematical meaning-making, resulting from deficit conceptions associated with students with SLD.

Individuals with Disabilities Education Improvement Act (IDEA)

The reauthorized Individuals with Disabilities Education Act (IDEA) of 1997 required teachers to use evidence-based classroom practices to improve learning among persons with disabilities (United States, 1997; U.S. Department of Education, 2006). The primary tenet of IDEA was the use of evidence-based practice, such as instructional practices and programs, to improve students' outcomes (Lott, 2021). The foundational principles outlined in the IDEA include (a) free appropriate public education, (b) evaluation, (c) individualized education program, (d) least restrictive environment, (e) student and parent participation in decision making, (f) procedural safeguards (Francisco et al., 2020). After the reauthorization, the amendments included requiring special education teachers to have licensure and certification and changes in the IEPs composition and committee involvement in the process (Francisco et al., 2020). Other changes in requirements were related to the suspension and expulsion of students with SLD, due process hearings, transition from school to post-school, and identification procedures for students with SLD. In 2004, policymakers reauthorized and renamed the

IDEA to align it with the No Child Left Behind (NCLB) legislation, aiming to improve existing educational policies. Students placed in special education programs and inclusive classrooms reported improved standardized scores and academic growth compared to their counterparts in isolated learning environments (Francisco et al., 2020).

One requirement of IDEA is to provide an appropriate LRE for students with SLDs. For this study, SLDs meet the following characteristics: students with IEPs who have weaknesses in reading comprehension, math concepts, and identifying and applying multistep problems in the co-taught and resource settings. In other words, placing them in the appropriate classroom setting promotes success based on their level of ability. Francisco et al. (2020) explain that under IDEA regulations, schools are required to educate students with disabilities alongside their peers in general education classrooms without removing them from that environment. After the passage of IDEA, the principle of the LRE led to a significant increase in the percentage of students with disabilities accommodated in the general educational classroom compared to the past years before the legislation (Francisco et al., 2020). In another study, Hott et al. (2020) noted that under the IDEA, students with mathematics learning disability are eligible for a free appropriate public education as required under their Individual Education Plan (IEP). The study's findings suggested that most of the students with mathematics learning disability have needs in (a) reading, (b) calculations, (c) decimals and percentages, (d) behavioral and social skills, and (e) functional mathematics. The main challenge was that 70% of the reviewed IEPs included only instruction without specialized services to meet the needs of students with a mathematics learning disability (Hott et al., 2020). The conclusion was that students with mathematics were not receiving free appropriate public education to meet their learning goals.

Every Student Succeeds Act (ESSA)

The ESSA law was passed in 2015 with the intent to govern the K–12 public education policy in the United States (U.S. Department of Education, 2015). The law replaced the NCLB Act and did not eliminate provisions related to periodic standardized tests given to students. According to the U.S. Department of Education [USDE], the ESSA provisions ensure that students and schools are successful (U.S. Department of Education [USDE], 2023). The law advances equity and inclusion by protecting America's disadvantaged and special-needs students in the United States. The legislation requires that essential information be provided to families, educators, students, and communities to ensure the progress of all children in the United States (USDE, 2023). Also, ESSA requires each state to measure students' mathematics, science, and reading performance. Another requirement under ESSA is to ensure accommodations for students with disabilities as identified under the IDEA, and other Acts. Although ESSA supports inclusion, teachers require additional training to ensure that students with disabilities receive special education services in the LRE based on Evidence-based Practices (EBPs) to support individualized learning needs (Mahoney, 2020).

Evidence-based practices (EBPs) have been an integral part of the special education field for many years. With the passing of federal legislation, Every Student Succeeds Act (ESSA), EBPs are mandated for use in promoting the overall academic achievement levels of students with disabilities (Basckin et al., 2021; Cook et al., 2021). While numerous EBPs can be implemented for students with disabilities, four EBPs have shown moderate evidence in improving student success in mathematics: Explicit instruction, visual representations, schema instruction, and metacognitive strategies (IRIS Center, 2023). In addition to the matter of legal responsibility, it is worth noting that EBPs greatly enhance the likelihood of student achievement and comprehension. Using EBPs in the special education mathematics classroom has potential advantages: increased accountability because the selection of a practice or program is supported by data, which facilitates support from administrators, parents, and others; decreased time and resource waste because educators begin with an effective practice or program instead of attempting to select one through trial and error; and increased accountability (IRIS Center, 2023). However, selecting an EBP is just one step in the process. Effectively implementing EBP with fidelity is required to increase the likelihood of student success. As such, teachers need to receive training and support, follow procedures, implement suggested frequency (e.g., daily, three times per week), adopt the recommended timeframe for results (e.g., semester, academic year), and skillfully provide instruction for successful application (Rowe et al., 2021).

Integrating the use of EBPs in math instruction is one strategy for reducing the math learning gap for students with SLD. With more effective teaching strategies, such as implementing EBPs into math instruction, special education teachers can better support their students with SLD and potentially increase the overall math achievement level. EBPs have been shown to have a positive effect on academic performance, according to

Basckin et al. (2021). To support the needs of students with disabilities, especially, but not limited to those students with SLD, it has been suggested that EBPs be used in mathematics instruction (Leko et al., 2019). Hughes et al. (2016) have shown that effective instruction can improve mathematics performance for most students with learning disabilities. The use of EBPs can help educators provide appropriate mathematics instruction to any student and provide a starting point for providing effective instruction to students with learning disabilities (Spooner et al., 2019).

In the GSD, all math teachers, including those in special education, are required to use quality plus teaching strategies (QPTS) as part of their daily instruction. These strategies were developed based on evidence-based practices (EBPs), which are teaching methods proven through research to be effective. Because QPTS are grounded in EBPs, I use the terms interchangeably throughout this study. The district promotes QPTS as its official approach to effective instruction. When combined with responsive teaching, where instruction is adjusted based on students' needs, QPTS helps educators better support individual learning differences and improve outcomes for all students, especially those with SLD. The core components of QPTS are problem-solving, background and prior knowledge, collaboration, vocabulary, summarizing, non-verbal representation, comparison and contrast, modeling and practice, and questioning.

The problem-solving strategy involves teachers engaging students with Academic Knowledge and Skills (AKS) through an appropriate challenge to improve knowledge and skills, promoting a deeper understanding. Problem-solving involves teachers using models and engaging students using real-world problems, enabling learners to demonstrate mastery of the AKS. The use of problem-solving enables teachers to ask high-level questions, monitor learners' processes, formatively assess student learning, and provide timely feedback.

Background and prior knowledge involve building upon depending on students' understanding by identifying, activating, and leveraging learners' existing understanding. The strategy enables teachers to create opportunities for students to make connections that promote learning, enhance curiosity, and understand new competencies. The background knowledge is essential for assisting students in gaining new learning and rectifying misconceptions.

Collaboration requires teachers to intentionally design learning experiences using different flexible grouping structures. Applying collaborations ensures that student decisions and interdependence occur to promote consolidated learning. The collaborative process enables teachers to embed high-level questioning with learners' expectations to guide them in cognitively challenging activities.

Vocabulary involves teaching the specific language used in a specific subject. Explicit instruction in vocabulary helps students understand and use discipline-specific content language in context. Teachers purposefully identify and model the essential vocabulary and language that are specific to the content area. When students understand vocabulary, they can use it in learning activities, including writing tasks and classroom discussions.

Through summarizing activities, teachers guide students to regularly reflect on and communicate their learning. The process allows students to identify, reflect, and organize their understanding to build upon and apply the new knowledge and competencies gained. The models applied include written expressions, think-aloud, and non-verbal representations. The teachers' role in summarizing is listening, asking high-level questions, addressing gaps in knowledge, and offering feedback frequently.

Non-verbal representation is a strategy where teachers leverage visual and concrete examples to improve students' conceptual understanding and academic vocabulary. Teachers use non-verbal representation to purposefully and intentionally illustrate abstract concepts to enhance learners' conceptual understanding and vocabulary. Teachers provide students with symbols, models, graphs, diagrams, manipulatives, and pictures to assist students with representing their thinking and understanding. Students use comparison and contrast to delineate, differentiate, and distinguish information. The teachers use the strategy model to assess quality and classify subtle and significant similarities or differences between two or more items to assist learners in understanding how the concepts are alike, equal, or analogous to each other. The strategy is effective when learning requires assessing subtle differences and similarities between relevant ideas or concepts, promoting a detailed understanding. Modeling and practice involve teachers illustrating and applying expected skills, using academic vocabulary, and applying specific learning strategies. The strategy is applied to assist learners in gaining new knowledge and skills through multiple settings and formats. Applying the strategy enables teachers to respond to student learning and actively engage in direct interaction.

Students engage with educators through collaboration.

Questioning requires teachers to intentionally plan and pose high-level questions during teaching and learning to expand students' thinking. The teacher intentionally uses strategic questioning to help students clarify their thinking and articulate their reasoning. Students use this strategy to think deeply and strategically, applying knowledge and competencies when responding to probing questions. With nationwide concern surrounding the indication of poor math scores, teachers are responsible for providing high-quality instruction for all students (Alam & Mohanty, 2023). Math teachers are encouraged to incorporate practical, real-world applications into the implementation of new strategies or techniques (Szabo et al., 2020). It is thought that students will be able to connect with the new techniques if teachers apply them in a way that is relevant to real-life situations. According to Rossoni et al. (2024), teaching students how to use active learning with the help of visualizations, games, or action in the real or virtual environment can be very beneficial. When teaching mathematics to students who have disabilities, it is advised that only the EBPs that have been proven to be beneficial are used. Including the study's setting, problem, objective, and research questions (RQ), this chapter offers a summary of the investigation. In addition to that, it contains information regarding the conceptual structure, scope, and theoretical foundation of the work. Explanations of the study's definitions and assumptions, the scope of the investigation, its delimitations, the constraints of its methodology and design, and its significance will be presented in this chapter.

Background

The use of standardized testing in education has been a longstanding and widely adopted practice, serving as a common method for measuring student achievement, evaluating curriculum effectiveness, and holding schools and educators accountable. Standardized testing is used to evaluate student knowledge and the acquisition of advanced math skills uniformly across different educational institutions and regions (Kubiszyn & Borich, 2024). This practice began in the early 20th century, when the need for a more uniform and objective student performance assessment became apparent (Nortvedt & Buchholtz, 2018). Math standardized testing is used to ascertain students' level of expertise and comprehension regarding mathematical knowledge. Educators and administrators use test scores as an unbiased, dependable measure of math abilities to gain insight into individual academic performance and broader student achievement (Portz & Beauchamp, 2022). Educators use these scores to select teaching strategies and identify areas that require supplementary support or remedial intervention (Bicehouse & Faieta, 2017). Furthermore, standardized test results provide data that educators and policymakers analyze to gauge the effectiveness of existing scholastic policies, teaching techniques, and the overall math curriculum. When students with SLD are included in general education classrooms, their combined standardized math test results, alongside those from students in special education classrooms, tend to be significantly lower than those of students without disabilities (Myers, Witzel et al., 2021). While considerable research has been devoted to examining how Evidence-based Practices (EBPs), such as explicit instruction, visual representations, schema-based instruction, and metacognitive strategies, enhance mathematical comprehension among gifted and standard students, the need for additional research on EBPs and comprehension levels and, consequently, assessment scores when applied to mathematics instruction for students with SLD has been supported (Casale-Giannola et al., 2023; Doabler et al., 2021).

EBPs for students with SLD within the middle school environment involve challenges. The primary challenge is the lack of knowledge among special education teachers regarding which EBPs are the most appropriate and effective for students with SLD (Leko et al., 2019). This barrier can deter them from selecting the most suitable strategies and interventions. Moreover, the insufficiency of training and professional development opportunities for SLD-specific EBPs further compounds the issue (Almutlaq, 2022; Scheibel, 2023). Without adequate support, guidance, and professional development, teachers may struggle to implement these instructional practices effectively in their classrooms. This lack of preparation can lead to inconsistent application, reduced student engagement, and missed opportunities to address diverse learning needs. Determining which EBP would correspond to the diverse requirements of students in numerous educational settings can be a laborious and uncertain process (Leko et al., 2019). The varied needs of students with SLD present another set of challenges, as each student may require tailored interventions, therefore rendering a standard approach ineffective (Scheibel, 2023).

Lastly, the added pressure of enhancing standardized test scores intensifies the challenge of implementing EBPs for students with SLD. Teachers may be forced to prioritize test preparation over personalized interventions, which might undermine the effectiveness of their teaching practices. Although there is considerable concern among special education teachers regarding the implementation of authentic EBP when teaching students who have challenging and unique educational needs (J.L. Mitchell, 2023; SantosTrigo, 2020; Spooner et al., 2019), the field of education is noted for its research-to-practice gap (D. Mitchell & Sutherland, 2020). Enhancing outcomes for middle school students with SLD and improving the implementation of EBPs can be achieved by addressing these challenges and offering targeted support and resources to special education teachers.

Problem Statement

The problem addressed through this study was that middle school special education math teachers' use of quality-plus teaching strategies (QPTS) is not known at a large Georgia school district (GSD, a pseudonym). I used a basic qualitative exploratory methodology to gain a clearer understanding of the perceptions of middle school math special education teachers regarding the use of EBPs to support students with SLD. Researchers have examined the efficacy of EBPs in assisting students with SLD. Doabler et al. (2021) identified challenges teachers face in consistently and meticulously implementing EBPs after receiving training or resources. Implementation issues, such as whether an intervention is practical or impractical, are frequently cited as primary causes of breakdowns in the EBP adoption and execution process (Doabler et al., 2021). Doabler et al. (2021) recommended that future studies should focus on other programs and interventions at different grade levels.

In a review of research on the effectiveness of EBPs in supporting students with SLD in algebra, Bone et al. (2021) found that the instructional practices being used to teach algebra to secondary students with SLD did not meet the requirements to be considered an EBP. In addition, some of the instructional approaches among existing studies used an intervention package, coupling EBPs with non-evidence-based strategies (Bone et al., 2021). As stated by Bone et al. (2021), further research should be conducted to help educators find the most successful EBPs for teaching more complicated mathematical topics, like algebra, to students with SLD. Spooner et al. (2019) found that there is little research on providing students with EBPs that include a problem-solving component. The authors also described procedures required to identify components of EBPs. According to Spooner et al. (2019), research on providing students with EBPs that incorporate a problem-solving component is scant. In addition, the authors explained the methods necessary to identify EBP components. In general, this is carried out by following established guidelines and regarding a particular population of students utilizing research that lacks practical application in educational settings and does not apply to all students (Spooner et al., 2019). This problem remains relevant in math education because the use of EBPs by educators can help students with SLD connect prior knowledge to foundational math skills (Spooner et al., 2019); perceptions of teachers are lacking regarding EBPs for students with various disabilities (Basckin et al., 2021), and understanding of EBPs on the part of special educators to bridge the gap between research and practice may improve overall learning outcomes (Cook et al., 2021).

I approached this study with the understanding that this gap in the literature represents a relevant issue in mathematics education. When appropriately implemented by teachers, EBPs can support students with SLD by helping them connect prior knowledge to foundational math skills (Spooner et al., 2019). However, as Basckin et al. (2021) noted, teacher perceptions of EBPs, especially for students with a range of disabilities, are still under-researched. I believe that by deepening special educators' understanding of EBPs and QPTS, we can begin to bridge the gap between research and classroom practice, ultimately improving learning outcomes for students with SLD (Cook et al., 2021).

Purpose Statement

The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions regarding the use of Quality Plus Teaching Strategies (QPTS) at GSD to improve standardized test scores among students with specific learning disabilities (SLD). As educators continue to seek effective and inclusive instructional approaches, it is essential to understand how research-based teaching practices are applied in real-world classrooms, particularly for students who face persistent academic challenges. For more than 25 years, researchers and practitioners have demonstrated a sustained interest in investigating how individuals with learning disabilities perform in mathematics when instruction is adapted to meet their unique cognitive, behavioral, and academic needs (Polo-Blanco & González López, 2021). This ongoing exploration underscores the importance of differentiated instruction, evidence-based strategies, and responsive teaching that align with each student's learning profile. By examining teachers’ experiences and insights, this study aimed to contribute valuable perspectives to the growing body of knowledge on how QPTS can be effectively implemented to support academic achievement in diverse middle school settings.

Research Questions

I developed the research questions after reviewing current literature on evidence-based practices (EBPs) and Quality Plus Teaching Strategies (QPTS) in special education math instruction. The review revealed limited research on how middle school special education teachers perceive and implement these strategies for students with specific learning disabilities (SLD). These gaps informed the focus of my study and guided the development of the research questions.

Research Question 1 (RQ1): What are special education middle school math teachers’ perceptions of QPTS, which are intended to improve assessment scores in math for students with SLD?

Research Question 2 (RQ2): Which QPTS are currently being used in the co-taught and small group classrooms to address low assessment scores of students with SLD?

Conceptual Framework

Piaget’s theory of constructivism (1964) provided a conceptual framework for this study.-According to the theory of constructivism, humans develop knowledge through the interaction of experiences and ideas (Arpentieva et al., 2021; Noddings, 1990). Teachers create classroom settings in which students are prompted to question their ideas, enabling opportunities to challenge the assumptions upon which traditional teaching and learning are built (Sawyer, 2019). The role of the teacher in a constructivist classroom is to establish a collaborative problem-solving atmosphere in which students become active participants in their learning, with the teacher taking on the role of facilitator rather than instructor (Vintere, 2018). Based on the constructivist theory, the teacher's role is to set up the environment so the students can construct the cognitive forms the educator intended to give them (Babakr et al., 2019; Piaget, 1964; Vintere, 2018). According to Vander Ark et al., (2020), educators have a responsibility to cultivate authentic settings in which students can put their knowledge into practice.

Piaget's learning theory indicates individuals construct meaning and knowledge from previous experiences. According to Piaget's (1964) theory, from his original work, which is grounded in a focused application of relevant theories or conceptual framework, children undergo the same sequence of development in terms of learning, albeit at different paces (Lefa, 2014). Like in the constructivist paradigm, learning is affected by the environment in which an idea is taught and student attitudes and beliefs (Piaget, 1964; Vintere, 2018). According to Piaget, social interaction through discussions among children or students with differing views may aid in promoting cognitive development and establishing equilibrium (Bozkurt, 2017; Piaget, 1964, 1977).

Constructivism posits that instead of passively absorbing information, students actively construct knowledge. Individuals construct their representations and integrate new information into their pre-existing knowledge (schemas), resulting from their worldly experiences and subsequent reflections (Stemhagen & Henney, 2021). Therefore, teachers may incorporate evidence-based practices (EBPs) and other supplementary materials to help students with SLD build foundational knowledge and provide a supportive context for mastering more advanced mathematical concepts. Students with SLD may effectively learn mathematical concepts using hands-on experiences or visual representations (Bone et al., 2021; Gecu-Parmaksiz & Delialioglu, 2019; Hord et al., 2022; Park et al., 2022; Satsangi et al., 2018; Shin et al., 2021). When applied by educators, EBPs can support students with SLD in transitioning from concrete to abstract levels of understanding, aligning with Piaget's constructivist and learning theories. Students can develop (a) conceptual knowledge, (b) procedural knowledge, and (c) procedural flexibility by utilizing objects to represent mathematical concepts (Hord et al., 2022). When teachers successfully implement EBPs grounded in Piaget's theory, students may develop their problem-solving and critical-thinking skills, students will be able to cultivate and develop their problem-solving and critical-thinking skills (Osman et al., 2018).

Piaget's theory of constructivism was applied because it is suitable for understanding how students with SLD learn through EBPs. In their study, Sanal and Erdem (2023) supported the idea that constructivist learning helps students because it allows them to integrate new information at their own pace, per their unique learning needs. A constructivist approach encourages personalized, collaborative, and integrative learning environments consistent with EBPs. The chosen theory relates to the selected qualitative methodology because it explains the foundation for the EBPs suitable for teaching complex math concepts to students with SLD. An emphasis of the theory is constructivist learning, individualized teaching, social interaction, engagement, and active knowledge, which are consistent with EBPs (Sanal & Erdem, 2023). The framework is consistent with the research approach because it will allow an understanding of middle school special education teachers' perceptions of how EBPs assist students with learning disabilities to gain knowledge.

The study's conceptual framework, based on Piaget's theory, informed the approach and research questions by helping to identify appropriate pedagogical materials for middle school math students with SLD (Devi, 2019). In a diverse society, it is a daunting task for educators to design instruction and construct a curriculum that will promote student learning (Ogodo, 2024). An explanation regarding how the conceptual framework guides the study's methodology, the primary research questions, and the data analysis is elaborated in the following section.

Piaget's theory of constructivism, the premise that learning is an active process that enables students to create new ideas or concepts per their current and past knowledge, provides the foundation for developing the research questions (Arpentieva et al., 2021; Noddings, 1990). For instance, the first research question is related to constructivist principles because it is focused on understanding how special education practices are focused on the unique learning processes of students with SLD. The second research question relates to teachers' roles, learning environments, and individualized instructions. According to a constructivist approach, teachers guide and support students during learning, influencing how EBPs are implemented to improve math assessment scores. Also, a suitable learning environment for students with SLD is interactive, vibrant, and adaptable to students' needs, which can influence the EBPs selected and used in co-taught and small group classrooms. Based on constructivism, learning is a subjective and personal experience (Arpentieva et al., 2021; Noddings, 1990). Hence, it is essential for learning to be individualized and EBPs to be tailored to students' needs.

During the interviews, I used questions to gain insights into teachers' roles, learning environments, and approaches to individualized instruction within the context of evidence-based practices (EBPs). My data analysis was guided by the study's conceptual framework. To analyze the interview data gathered during the preliminary phase, I extracted initial codes based on the conceptual framework. Using anticipated topics, I developed priori codes deductively, before data collection (Locke et al., 2022; Roberts et al., 2019). Throughout the analysis, I considered the premise of Piaget's theory of constructivism to better understand how its principles influence the instructional practices of special education teachers as they address the learning needs of students with specific learning disabilities (SLD). A more detailed explanation of the conceptual framework is provided in Chapter 2.

Nature of the Study

I used a qualitative research design for this study, as it was well-suited for exploring the perceptions and experiences of special education math teachers. This approach allowed me to conduct in-depth, open-ended interviews that captured participants' insights, beliefs, and practices regarding the use of evidence-based practices (EBPs) to improve standardized test scores for students with specific learning disabilities (SLD). Through this qualitative lens, I was able to focus on the meanings teachers assign to their instructional decisions and gain a richer understanding of how EBPs are implemented in middle school math classrooms. Basic qualitative research is designed with a straightforward objective of resolving a problem, bringing about a transformation, or identifying relevant themes (Merriam & Grenier, 2019). It is suitable for examining (a) how individuals interpret their experiences, (b) how they construct their perceptions of the world, and (c) what significance they attribute to their experiences. For instance, a basic qualitative study can be used to explore the thoughts, experiences, and perceptions of participants through their responses to the interview questions (Locke et al., 2019). Therefore, a basic qualitative research design was suitable for gaining a grasp of math teachers' perceptions of EBPs and their use of EBPs to improve standardized test scores for students with SLD. Semistructured interviews were used to seek individual perspectives of middle school special educators who met the selection criteria and agreed to participate in the study (DeJonckheere & Vaughn, 2019). I developed the interview questions based on the information needed to address my research questions. I audio recorded each interview to gain deeper insights into participants' perceptions of their use of evidence-based practices (EBPs) to support students with specific learning disabilities (SLD), and to identify which strategies they believed were most successful in improving assessment scores. I followed Saldaña's (2021) six-step approach to coding qualitative data. I used thematic coding to analyze the interview data, focusing on middle school math educators' perceptions of the strategies and EBPs they used in the classroom to support students with SLD (Rogers, 2018; Saldaña, 2021).

To begin developing categories, I organized recurring ideas and commonalities into a structured system of classification. This process helped formalize the data and prepare it for deeper analysis. In the next phase, I engaged in codification, which involved separating, grouping, regrouping, and relinking the data to consolidate meaning and generate explanations. Through repeated application of codes, I was able to categorize similarly coded data into families based on shared characteristics, marking the first step in recognizing meaningful patterns in the responses.

Definitions

Accommodation: Accommodations in special education are listed in a student's IEP and indicate a change in how a student with a disability learns or shows what they know, without changing the actual content or learning expectations. The goal is to remove barriers and give all students an equal chance to succeed in the classroom. For example, a student might get extra time on a test, sit closer to the teacher, use assistive technology, listen to an audio version of a text, or take breaks during lessons. These supports allow students to access the same material as their peers, but in a manner adapted to their specific needs (IRIS Center, n.d.).

Modification: A modification is also listed in the student's IEP and means changing the learning goals or curriculum to fit a student's unique needs. Unlike accommodations, which adjust how a student learns or demonstrates knowledge without changing what they're expected to learn, modifications change the content or expectations. This might look like simplifying assignments, cutting down the number of tasks, or teaching material at a lower grade level so the student can keep up (Brown & Taylor, 2019).

Co-Teaching: The practice of assigning, supervising, and evaluating students by teaming teachers in a classroom is known as co-teaching (Schwartz, 2018). When two teachers co-teach, they share equal accountability and responsibility for the classroom. As part of an effort to create a more inclusive classroom, general and special education teachers are frequently teamed to practice co-teaching.

Evidence-Based Practices: interventions grounded in evidence. Methods of instruction that have been shown to raise student performance in the classroom are supported by empirical evidence and scientific research investigations (Basckin et al., 2021; D. Mitchell & Sutherland, 2020). Evidence-based strategies can also be referred to as best practices or evidence-based teaching strategies. For this paper, I am using the terminology evidence-based practices or EBPs.

Quality-Plus Teaching Strategies: research-based methods developed to enhance student learning across subjects and grade levels. By applying these strategies, GSD teachers can more effectively address students' needs and support improved learning outcomes. To use QPTS successfully, teachers must understand each strategy's practical application, select the most effective approach for their content and all learners, and implement it effectively to achieve the best results. For this study, EBPs and QPTS were used interchangeably.

Individual Education Plan (IEP): An individualized learning plan is developed to address the unique requirements of a pupil who has been identified as having a disability that hinders their learning (Individuals with Disabilities Education Act [IDEA], 2004). The Individuals with Disabilities Education Act mandates this for all pupils who have been identified as requiring special education services.

Learning disability: Implies a psychological condition that makes it difficult for a person to learn things like reading, writing, or mathematics (Grigorenko et al., 2020). The ability of the brain to send, receive, and process information is affected by neurological conditions when an SLD is diagnosed (White Swan Foundation, 2015; Mhlongo, 2022). SLD covers a range of neurological disorders such as ADHD, Dyscalculia, the development of aphasia, brain injury, and dyslexia. While SLD can be mild, moderate, or severe and can focus on deficits in reading comprehension, writing, or math, this study will refer to SLD as a mild to moderate condition that may impede student performance in the classroom and hinder their performance on high-stakes assessments.

Assumptions

My initial assumption of this study was that reality is subjective. I assumed this because participants had unique experiences with the study topic (Alhazmi & Kaufmann, 2022). Participants had different perspectives, interpretations of reality, and experiences related to the study phenomenon. My second assumption was that my interactions with the participants influenced the result of the study (Alhazmi & Kaufmann, 2022). For the third assumption, knowledge is subjective and was co-created through the interaction between me and the participants. Fourth, I assumed that my values influenced the research process. I maintained reflexivity throughout the study to acknowledge the influence of subjectivity (Olmos-Vega et al., 2023).

Limitations

One limitation associated with this study is the possibility of bias during data collection and interpretation. Robinson (2023) contended that researcher bias may arise during interviews, particularly through the phrasing of questions and the process of notetaking. Roberts (2020) further emphasized that such bias can manifest during data collection, especially when researchers pose leading or suggestive questions. Examining one’s research bias is essential in promoting accurate and trustworthy interpretation of qualitative data (McSweeny, 2021).To minimize bias during data collection, I approached each interview with professionalism, ensuring that questions were asked in a neutral manner without suggestions, cues, or leading language that could influence the participants' responses. In addition to taking measures to minimize researcher bias, I also implemented steps to reduce the potential for participant-related bias. This included creating a comfortable and nonjudgmental interview environment to encourage honest and open responses. I assured participants of the confidentiality of their responses and emphasized that there were no right or wrong answers. These efforts were intended to foster trust and reduce the likelihood that participants would tailor their responses based on what they believed I wanted to hear. Specifically, I carefully selected participants from schools with which I had no professional affiliation or current employment ties. Furthermore, I excluded any individuals who were close personal friends, and current or former colleagues, to avoid conflicts of interest and ensure that the data collected reflected authentic, unbiased perspectives. These measures were implemented to enhance the credibility and trustworthiness of the study's findings.

The second limitation is the subjective nature of the qualitative methodology (Olmos-Vega et al., 2023). The data I gathered in this study were rooted in the knowledge, experiences, and personal beliefs of special education math teachers, which are naturally subjective. Because qualitative research relies heavily on individual perspectives, this subjectivity may have influenced how the findings can be applied to other settings. As a result, the transferability of the study's results could be limited, especially in contexts that differ from the one in which the research was conducted. Examining one's research bias is essential in promoting accurate and trustworthy interpretation of qualitative data (Olmos-Vega et al., 2023).

The third limitation relates to potential researcher bias. Since I conducted the data interpretation independently, there is a possibility that I may have unintentionally overlooked certain data that could have provided additional insights or alternative perspectives.

Scope and Delimitations

The target population I included in the study was middle school special education math teachers who provide support to students with SLD in a large school district in Georgia. The focus of this study was to understand how middle school special education math teachers perceive the use of EBPs to improve standardized test scores for students with SLD. In this study, the problem that was addressed was a limited understanding of how middle school special education teachers perceive the use of EBPs intended to improve standardized test scores for students with SLD. This understanding enabled educators to implement EBPs more efficiently to improve overall math learning outcomes among students with SLD.

This study was delimited to special education educators who teach students with SLD in small group/resource classrooms and general education inclusive classrooms alongside their nondisabled peers. The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions regarding the use of QPTS at GSD to improve standardized test scores among students with SLD. This target population was selected due to the increase of students with specific learning disabilities (SLD) in middle school mathematics classrooms (Siagan et al., 2019) and the gap in the literature about special education teachers' perceptions concerning EBPs used with students with specific learning disabilities (Sims, 2018).

Middle school teachers who had no experience with students with SLD would be unable to provide extensive information regarding the research topic, and I excluded them from the study. Also, teachers working with learners on the autism spectrum, students with moderate to severe intellectual disabilities, and those providing support in the self-contained classroom were also excluded. The reason I excluded teachers who provide support for students with severe disabilities is that these learning environments were not within the scope of the phenomenon being explored.

Significance

Mathematics is one of the more difficult core content areas to grasp. The National Center for Education Statistics (NCES) presents substantial evidence indicating that mathematics proficiency among students in the United States is generally low, with students with SLD performing notably below their peers without disabilities (Myers, Brownell et al., 2021). Moreover, in mathematics, students with SLD underperform compared to their peers in inclusive classrooms. As students transition to middle school, ineffective mathematics instruction appears to have a negative effect on their academic performance and learning. As a result, evidence-based and research-supported instructional practices are essential to help students with SLD achieve success in mathematics, in alignment with the Common Core State Standards for Mathematics (CCSSM) (Filippi & Hackmann, 2019; Soares et al., 2019).

Students who struggle with math learning difficulties may find it challenging to recall complex rules, formulas, problem-solving methods, and math facts (Powell et al., 2021). Math facts, processes, and formulas may be difficult for them to comprehend (Siagan et al., 2019). Consequently, students with SLD often require supplemental instruction and other evidence-based instructional strategies to access mathematics content (Basckin et al., 2021; Bouck & Park, 2018; Leko et al., 2019). Intensive interventions using evidence-based educational components have been shown to help students with SLD understand the math concepts under investigation and improve their overall math comprehension (Hughes & Yakubova, 2019). Teachers are responsible for understanding which strategies are most effective in catering to the unique requirements of students with SLD (Kuntz & Carter, 2019; D. Mitchell & Sutherland, 2020).

By addressing at least one of the gaps in existing literature, the current study contributes to the body of knowledge in the field. The research offers insights into the perspectives of middle school special education mathematics teachers regarding the efficacy of EBP in enhancing standardized test scores. The researcher in the results section identified obstacles middle school educators encounter when attempting to implement QPTS per CCSSM and IDEA standards. Insights into the instructional practices employed by middle school special education mathematics instructors to assist students with SLD were provided in the study findings.

The successful implementation and consistent use of proven EBPs in math can enable special education teachers to support students with SLD, increasing their academic success, especially when exposed to higher levels of mathematics (Bone et al., 2021; Doabler et al., 2021; Leko et al., 2019; Nelson et al., 2022; Powell et al., 2021; Spooner et al., 2019). The results of this study offer insights regarding instructional practices used by middle school special education math teachers to support their students with SLD and increase comprehension, as measured by classroom, district, and standardized assessments. It is important to note that while EBPs can be a reliable method for identifying successful instructional practices, they do not guarantee effectiveness for all learners (Cook et al., 2021). While educators may perceive the task of identifying, reading, evaluating, and synthesizing all relevant research on EBPs as arduous and time-intensive, their personal beliefs and perceptions frequently influence which EBPs to implement (Basckin et al., 2021; Leko et al., 2019). However, this reliance on personal beliefs may compromise the accumulation of knowledge if it hinders teachers' capacity to acquire and use EBPs.

It is anticipated that the findings of this study may inform efforts aimed at promoting positive social change for students with SLD because the findings are expected to improve special education teachers’ understanding of which EBPs are most effective for enhancing comprehension, engagement, and performance on high-stakes math assessments for middle school students with SLD. Sufficient evidence supports the effectiveness of different EBPs, such as visual representation, in improving math learning outcomes among students with SLD (Alhwaiti, 2022; Bone et al., 2021; Gecu-Parmaksiz & Delialioglu, 2019; Hord et al., 2022; Park et al., 2020; Satsangi et al., 2018; Shin et al., 2021). Joswick et al. (2023) argued that teachers should incorporate EBPs in their instructional methods to improve learning outcomes among students with learning disabilities. However, according to Basckin et al. (2021), perceptions of teachers about

EBPs for students with various disabilities are lacking. Consequently, Cook et al. (2021) argued that increased understanding of EBPs among special needs educators may bridge the gap between research and practice and may improve overall learning outcomes. As such, policymakers in education, teachers, and students with SLD may benefit from the results of this study.

Understanding how middle school special education teachers perceive the use of EBPs intended to improve standardized test scores for students with SLD will inform the design and implementation of EBPs to improve learning outcomes. For example, policymakers may develop appropriate interventions to address the negative teachers' perceptions about the use of EBPs while optimizing their positive perceptions. In the process, educational policymakers will enhance the utilization of EBPs to realize the associated benefits among SLD learners. Also, challenges and barriers to the implementation of EBPs by special education teachers may emerge through this study. Therefore, the results of this study could help policymakers and school administrators to enhance the implementation of QPTS, for example, by addressing the reported barriers to optimize the implementation process. Through this study, middle school special education teachers had the opportunity to raise their concerns and considerations regarding the implementation of QPTS for teaching students with SLD. After addressing teachers' concerns, implementing QPTS effectively may support students with SLD in improving their overall math learning outcomes by facilitating their transition from concrete to abstract levels of understanding.

Summary

SLD refers to students having a group of disorders displayed by significant challenges in the acquisition and use of listening, speaking, reasoning, reading, writing, or mathematical abilities. Students with math learning difficulties require serious instructional attention and support to improve their problem-solving proficiency. Individuals with SLD in math often experience ongoing challenges in completing multiple-step calculations, distinguishing mathematical operations, and organizing problems (Myers et al., 2023). The determination of whether a child has an SLD necessitating special education is the responsibility of a multidisciplinary team. This determination is made during an initial eligibility meeting after the student has undergone an extensive evaluation by the school psychologist and a battery of academic assessments (IDEA, 2004). Students must meet the inclusionary, exclusionary, and need criteria provided by the National Joint Committee on Learning Disabilities (NJCLD) and IDEA for classifying an SLD (Benson et al., 2020).

In Georgia, students consistently rank at or slightly above the national average for scores in the basic range, with only a third of its students scoring in the proficient range (National Center for Education Statistics [NCES], 2020). Standardized test scores of students with SLD are significantly lower than those of students without SLD (NCES, 2020). How effectively teachers are utilizing strategies to increase math comprehension and test scores of their students with and without SLD has caused concern at the local, district, and state levels (NCES, 2020). The basic qualitative study was conducted to explore middle school special education math teachers' perceptions of the use of EBPs intended to improve standardized test scores for students with SLD. While numerous strategies and EBPs are being utilized in general education math classrooms, there seems to be a dearth of research on the perceptions of special educators toward EBPs and which EBPs they use to improve standardized test scores for middle school students with SLD. The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions regarding the use of QPTS at GSD to improve standardized test scores among students with SLD.

This study's findings may provide a clearer picture of typical practices that promote or restrict the use of certain EBPs in mathematics instruction. In addition, qualitative data from the study may indicate an increase in middle school processes and practices that promote the implementation of EBPs for students with learning disabilities. In Chapter 2, the literature and theoretical framework supporting the study are discussed.

Chapter 2: Literature Review

Studies indicate that limited understanding existed regarding how middle school special education teachers utilized evidence-based practices (EBPs) to improve standardized test scores for students with specific learning disabilities (SLD). While researchers have examined the efficacy of EBPs in assisting students with SLD, Doabler, C.T., Clarke, B., et al. (2021) identified challenges in ensuring that EBPs are consistently and meticulously implemented by teachers once they have been provided. Implementation problems, including the viability of the intervention or its non-viability, are frequently the primary reasons for challenges in implementing EBPs effectively (Doabler et al., 2021). With nationwide concern surrounding the indication of poor math scores, teachers are responsible for providing high-quality instruction for all students. Math teachers are encouraged to incorporate practical, real-world applications into the implementation of new strategies or techniques (Szabo et al., 2020). As a result, Doabler et al. (2021) recommended that future studies should focus on other programs and interventions at different grade levels.

The purpose of this basic qualitative study was to examine middle school special education math teachers' perceptions of QPTS that may improve standardized test scores in math for students with SLD. There has been a greater interest in examining how well individuals with learning disabilities do mathematics when provided with instruction tailored to their specific learning requirements (Polo-Blanco & González López, 2021). Implementing EBPs is a promising strategy that may improve mathematics scores and academic outcomes of middle school students with SLD.

Synopsis of Current Literature

Mathematics is often a challenging subject for students with learning disabilities to understand and master. Students with mathematics learning difficulties may experience difficulty in recalling complex rules, problem-solving methods, facts, and formulas (Powell et al., 2021). As a result, students with SLD require supplemental or differentiated instruction and other EBP strategies to improve their learning abilities and mathematics performance (Basckin et al., 2021; Bouck & Park, 2018; Leko et al., 2019). Teachers are responsible for understanding the challenges faced by students and the most effective EBPs that can meet the unique learning needs of students with SLD (Kuntz & Carter, 2019; D. Mitchell & Sutherland, 2020).

Myers, Brownell et al. (2021) acknowledged that students across the United States underachieve and underperform in mathematics proficiency. Students with SLD perform comparatively worse than their counterparts without disabilities. According to the National Center for Education Statistics (NCES), in 2019, approximately 45% of fourth-grade students in the United States without disabilities and 17% of students with SLD scored at or above proficiency requirements on the National Assessment of Educational Progress (NAEP) math assessments (NCES, 2020). Although these elementary math scores are low, relative performance is expected to decline for middle-school students (Myers, Witzel et al., 2021). Based on the NAEP data, only 38% of eighth graders without learning disabilities and 9% with disabilities scored at or above the proficient math level (Myers, Witzel et al., 2021). Multiple factors may contribute to the low performance of students with SLD, but effective mathematics instruction is essential for closing performance gaps in middle school mathematics. Effective and consistent instruction using research-supported practices and evidence-based practices (EBPs) is essential for middle school students to succeed in mathematics. Educators use EBPs to help students with disabilities meet increasingly rigorous mathematics standards and improve standardized test scores (Spooner et al., 2019). The challenge middle school teachers continue to face is finding appropriate evidence-based practices to raise the standardized test scores of students with math learning disabilities. Bone et al. (2021) found that the instructional practices used to teach algebra to secondary students with SLD did not meet the requirements to be considered EBPs. In addition, some of the instructional approaches among existing studies used an intervention package, coupling EBPs with non-evidence-based strategies. Spooner et al. (2019) found little research on providing students with EBPs that include a problem-solving component. Therefore, it is important to understand teachers' perceptions of EBP instructional practices that can help all learners, especially those with SLD (Cook et al., 2021).

In this chapter, I focused on the literature search strategy and the conceptual framework that grounded my study, along with a review of literature related to the key variables and concepts. I synthesized relevant studies and concluded with a summary of the main findings. I discussed the major databases I searched, the keywords I used, and the inclusion and exclusion criteria I applied for selecting peer-reviewed studies. For the conceptual framework, I used Piaget’s theory of constructivism. In the conclusion, I summarized the main findings and identified a gap in the existing literature.

Literature Search Strategy

I conducted the literature search by accessing relevant academic databases through the Walden University online library portal. The databases included PsychINFO, ERIC, PubMed, EBSCO, SAGE, ProQuest, and Education Source. I consulted and collaborated with the University's librarian during the search process for peer-reviewed studies in different research databases.

The key search terms that I used were *Common Core standards for mathematical practice, mathematics, standardized score, students with disabilities, learning disabilities, Individuals with Disabilities Act (IDEA), No Child is Left Behind (NCLB), ESSA-specific learning disability, EBPs, teachers' perceptions, challenges, implementation, self-efficacy, teacher self-efficacy, inclusion, less restrictive, least restrictive environment, legislative demands,* and *mathematics test scores*. I combined the Boolean operators AND and OR with selected keywords to enhance the search process. This combination helped me create more precise search phrases that improved the effectiveness of my search. I used the key search terms and their combinations in the different databases to search for peer-reviewed articles published within the last 5 years. Additional sources were gathered by reviewing the different references for scholarly articles and books. The inclusion criteria for these materials were that all the articles written in English, published in the last 5 years, were available in full text, scholarly and peer-reviewed, and related to students with learning disabilities. All the scholarly articles not written in English, published more than 5 years ago, not related to SLD, not scholarly and peer-reviewed, and only available in abstracts and not full-text were excluded. I applied a filtering process to eliminate all articles that failed to meet the inclusion and exclusion criteria. I also searched Google Scholar to identify the gray literature related to standardized test scores for students with SLD, mathematical learning disabilities, and middle school special education.

Conceptual Framework/Theoretical Foundation

The conceptual framework for this study was based on Piaget's theory of constructivism. As a biologist, Piaget was interested in the adaptation of an organism to the environment and the role of its previous mental knowledge on behaviors. Piaget (1964) contended that "the development of knowledge is a spontaneous process tied to the whole process of embryogenesis. Embryogenesis concerns the development of the body, but it also concerns the development of the nervous system and the development of mental functions" (p. 176). Conversely, learning is often initiated by specific situations, such as by a teacher or a psychological experimenter. Piaget further explained that operations were the essence of knowledge and entailed actions such as measuring or counting.

According to Piaget (1964), learning entails modeling, transforming, and understanding how an object is constructed. Based on the constructivism theory, knowledge is best gained through action, reflection, construction, and the interaction of experiences and ideas. The concept of operations dictates that the modification of objects allows the learner to achieve the structures of transformation (Piaget (1964). The concepts under the model are assimilation, accommodation, cognitive equilibrium, and schema. When students interact with the environment, they change their internalized view, which helps them develop knowledge. Piaget (1964) proposed that an individual's cognitive schema or thought process is updated by external stimuli. Assimilation and accommodation operate jointly where, after experiencing ideas, the learner can revise pre-existing concepts based on the new experience and information. Through assimilation, a student can transfer the new information and fit it with the pre-existing schema.

Piaget's learning theory indicates that individuals construct meaning and knowledge from previous experiences (Piaget, 1964); children undergo a similar sequence of learning development regardless of the differences in paces. Based on the constructivist paradigm, the environment in which an idea is taught affects the student's learning process (Piaget, 1964). Piaget further pointed out that social interaction among children promotes cognitive development, and they construct knowledge instead of absorbing information. Individuals construct their representations and integrate new information into their pre-existing knowledge (schemas) resulting from their worldly experiences and subsequent reflections.

According to Piaget's theory of constructivism, the four stages of development are sensorimotor, preoperational, concrete operational, and formal operational (Piaget, 1964). The sensorimotor stage entails the development of an infant's cognitive and mental attributes at birth until they understand language. The preoperational stage entails increased language ability, limited logic, egocentric perspective, and symbolic thought.

The concrete operations stage is characterized by improved cognitive growth, and a child's language development and acquisition of basic skills accelerate dramatically. The last stage in the formal operation is where a child can form a hypothesis and deduce possible consequences (Piaget, 1964). During this development stage, the child can construct mathematics and use symbols to execute abstract thoughts. The child can clarify problems, make mathematical inductive and deductive inferences, evaluate, formulate hypotheses, and apply mathematical concepts to real-life scenarios.

Studies have been conducted involving the application of Piaget's theory of constructivism to improve learning and knowledge for students with SLD. Bermejo et al. (2021) applied Piaget's theory in a constructivist intervention program to improve mathematical performance. The program was based on the foundation of Piaget's theory that students are the agents of their learning and achieve this objective by constructing their knowledge. The authors also noted that a teacher facilitates and ensures the construction process required to develop the child's mathematical thinking. Although the study primarily involved first- and second-grade students in Madrid and Zaragoza, the authors explicitly note that the program's methods, grounded in Piaget's constructivist theory, have strong potential for application with students experiencing learning difficulties.

Thu and Thu (2023) applied constructivism theory when teaching mathematics to second-grade students and explored Piaget's idea of knowledge construction. Additionally, Thu and Thu (2023) found that constructivist theory played a key role in teaching Mathematics by helping students to actively and positively discover and control new knowledge. Ebo (2018) found that students with disabilities learn best if the principles of Piaget's constructivism are integrated into the classroom.

The current study benefits from Piaget's theory of constructivism. Piaget's theory emphasizes the active role of students in constructing their understanding. The theory is beneficial for students with SLD because learning activities allow them to combine variables and concepts from multiple content areas. According to Piaget (1964), learning is a construction, and teachers can use this concept to improve their knowledge of students with SLD and improve their mathematics competencies. By adopting EBP in the classroom, learners with intellectual impairments, such as those with a math learning disability, may progress through the same steps of knowledge and cognitive development (Stemhagen & Henney, 2021). Piaget's theory of cognitive construction acknowledges that their physical development influences students' ability to understand numbers and learning. Given that students with SLD have slowed cognitive development, they have a slow understanding of numbers, and this theory can be used when implementing EBPs to improve standardized test scores. According to Piaget, learning is action-based and entails performing tasks to improve competency. Therefore, learning mathematics through EBPs, such as manipulatives, is action-based and can be useful in improving knowledge and test scores.

Constructivism challenges traditional teaching methods and advocates a student-centered approach where learners engage in problem-solving, critical thinking, and knowledge construction (Piaget, 1964). Therefore, Piaget's theory of constructivism is applicable in learning mathematics, where the teacher provides students with SLD with experiences and then develops their knowledge, which is used to hypothesize, predict, and manipulate objects. The students can also use the acquired knowledge to pose questions, investigate, and imagine, which are critical steps in critical thinking and solving mathematical equations. The role of a teacher, based on Piaget's theory of constructivism, is to facilitate the learning process (Sanal & Erdem, 2023). Therefore, the theory is applicable in this study as it would show how a teacher can use the EBPs for students with mathematics learning disabilities to help them learn and improve their standardized test scores.

Literature Review Related to Key Concepts

Few qualitative studies have been conducted that include a focus on the perceptions of middle school special education mathematics teachers on EBPs to improve standardized test scores (Lott, 2021). Lott (2021) conducted a basic qualitative study on the perceptions of six high school special education teachers on the personalization of EBPs for students with learning disabilities. The findings from the semistructured interviews suggested that teachers believed in using effective EBPs to meet the needs of students with SLD. Similarly, Mihajlovic (2020) investigated the perceptions of special educators in Finland regarding their role in inclusive education. Data were collected through semistructured interviews. These studies found that teachers were not prepared for inclusive teaching, and they lacked the necessary training and knowledge.

Teaching mathematics to students with learning disabilities can be challenging because the learners require more attention and resources than their counterparts. In another qualitative study, Özdemir and Kılıç (2023) investigated special education teachers' views on the mathematics instruction process by collecting data from 17 participants. Data were collected through interviews, and most teachers perceived explicit instruction as the most effective approach for the mathematics instruction process (Özdemir & Kılıç, 2023). The findings suggested that teaching children with disabilities was a challenge because of crowded classrooms and time insufficiency.

In my literature review, I included key concepts such as the Individuals with Disabilities Education Improvement Act, the Every Student Succeeds Act, the Common Core State Standards in Mathematics (CCSSM), evidence-based practices, manipulatives, explicit instruction, and technology-aided instruction (TAI). I chose these concepts because they aligned closely with my research question and the main themes of my study. These themes included evidence-based practices for teaching students with SLD, the challenges of implementing these practices, and middle school special education math teachers' perceptions of EBPs. I reviewed and synthesized studies related to these key concepts, variables, and themes to provide a comprehensive understanding of the topic.

Individuals with Disabilities Education Improvement Act (IDEIA)

The Individuals with Disabilities Education Improvement Act (IDEIA) replaced the Individuals with Disabilities Education Act of 1997, which was established to improve students' outcomes. The foundational principles of IDEA are the provision of free and appropriate public education (FAPE), procedural safeguards, promotion evaluations, the least restrictive environment, individual education program (IEP), and parent and student participation in decision-making (Francisco et al., 2020). After reauthorization in 2004, IDEA became IDEIA to ensure it was realigned with the No Child Left Behind (NCLB) regulation. According to Francisco et al. (2020), IDEIA ensures that students with disabilities are educated in the least restrictive environment and are included in regular classrooms. Hott et al. (2020) established that students with mathematics learning disabilities are protected under IDEIA and are eligible for a FAPE as required under their IEP.

Every Student Succeeds Act (ESSA)

In 2015 Every Student Succeeds Act (ESSA) law was passed to govern the K–12 public education policy in the United States (Every Student Succeeds Act, 2015). The ESSA was a reauthorization of the Elementary and Secondary Education Act of 1965, and it established the federal government's expanded role in public education (Center for Parent Information and Resources, 2023; Portz & Beauchamp, 2022). The ESSA replaced the No Child Left Behind Act (NCLBA), but the provisions of standardized tests were not eliminated. Additionally, the goal of ESSA implementation was to promote academic success for all American students, regardless of their abilities. ESSA aimed to advance equity and inclusion in the United States by ensuring the projections of disadvantaged and special-needs students (Portz & Beauchamp, 2022). Also, ESSA requires each state to measure students' mathematics, science, and reading performance. Sugarman (2019) stated that the law ensures high school graduation rates are met by including underserved student populations. Through the accommodation of all students with disabilities, ESSA includes provisions intended to promote inclusion, but teacher training is required to ensure the accommodation of all learners in the least restrictive environment (Mahoney, 2020).

Under the ESSA, states are required to adopt challenging academic standards for guiding instruction for all students. Under ESSA, similar to NCLB, states are required to publish detailed school report cards and include graduation rates as a key accountability indicator, thus emphasizing efforts to raise graduation levels (Center for Parent Information and Resources, 2023; Klein, 2016). One of the challenges with ESSA is that it ignores the role of gender, race, and other factors limiting students' learning opportunities (R.P. Robinson & Bell, 2024). One of the benefits of ESSA is that it eradicates the requirement for special education teachers to be certified in their content area in addition to pursuing special education. Accountability mandates under the law place pressure on schools and teachers by holding them accountable for each student's performance, regardless of their abilities in mathematics. Under ESSA (Every Student Succeeds Act, 2015), states must ensure that at least 95 percent of all students—and 95 percent of each subgroup, including students with disabilities and English learners—participate in annual state assessments, or else schools may face accountability consequences (Every Student Succeeds Act, 2015). Although Every Student Succeeds Act (ESSA) introduced several reforms intended to move beyond the limitations of No Child

Left Behind (NCLB), it shares a key shortcoming: both policies have fallen short in fully addressing the needs of students with specific learning disabilities (SLD). Despite efforts to increase accountability and flexibility, ESSA, like NCLB, has not ensured comprehensive inclusion or equitable support for students with SLD within general education settings.

Common Core State Standards in Mathematics

The CCSSM is one of the significant reforms in the history of the United States educational system because it provides unified academic standards across all states. According to the Common Core State Standards Initiative (CCSSI), the CCSM provides eight standards for middle school teachers, and include (a) making sense of problems, (b) reasoning quantitatively and abstractly, (c) constructing viable arguments, (d) model for mathematics, (e) use appropriate tools strategically, (f) attend to precision, (g) look for and make use of the structure, and (h) express regularity in repeated reasoning (CCSSI, 2022). The standards are essential for middle-school students as they provide requirements for understanding ratios, algebra, and geometry skills important for mathematics. For high school students, functions, advanced algebra, statistics, probability content, modeling, and geometry are provided under the CCSSM. Therefore, the CCSS were designed to outline the essential skills and knowledge for all students, including those students with SLD and those with moderate and severe intellectual disabilities.

Although CCSS was formulated to grant equal opportunity in teaching math to all students, it may have some shortcomings, especially when instructing students with SLD.

According to Soares et al. (2019), the adoption of CCSS in the United States standardizes students' expected knowledge and abilities at a certain grade level. Additionally, the CCSS allows students to easily transition and move between districts and states without any learning challenges. However, CCSS may cause some students to fall further behind their colleagues and leave gaps in essential skills and general mathematics understanding (Soares et al., 2019). In support of Soares et al. (2019) findings, Filippi and Hackmann (2019) found that although CCSS initiatives standardize learning, students with learning disabilities face challenges such as scoring low marks in mathematics. The CCSS is necessary, but it may create hardship for students with mathematics disabilities, given their limited ability to quickly master concepts. Also, CCSS is associated with time constraints because students are expected to cover learning materials within a set period, and failure to meet those standards may cause them to fall back. Therefore, CCSS is appropriate, but given that it is reading intensive, students with SLD may struggle and face additional challenges transitioning.

There is limited evidence of the CCSSM's effectiveness in changing outcomes in response to the new mathematics standards among students with learning disabilities. Allensworth et al. (2021) conducted a cross-sectional study to assess changes in students' instructional experiences and academic achievement after implementing new standards in Chicago. The findings showed that, in the adoption of CCSSM, there were improvements in math scores among students with low to below-average math skills. Thus, CCSSM implementation in middle schools can improve mastery of mathematics and standardized test scores (Morano et al., 2020). However, professional teachers learning about instructional practices is important for the successful implementation strategy of CCSS standards. Middle schools implementing CCSS-M must undergo training and professional learning related to student-centered instructional practices and develop the skills required to transition from old to new teaching ways (Allensworth et al., 2021; Filippi & Hackmann, 2019). Although CCSSM is associated with changes in mathematics outcomes for students with learning disabilities, training, and support are needed for successful transitions and the use of instructional practices.

Evidence-based Practices for Teaching Students with SLD

Spooner et al. (2019) reviewed EBP's effectiveness in teaching students with moderate and severe learning and developmental disabilities. The findings demonstrated that graphic organizers, systematic instruction, manipulatives, instructional procedures of technology-aided instruction, and explicit instructions were the commonly used EBPs. This study informs the current project by providing evidence on the EBPs that are currently being co-taught in small-group classrooms to address low assessment scores of students with SLD. Similarly, Alhwaiti (2022) examined teaching mathematics to students with SLD and investigated relevant effective teaching EBPs. Unlike Spooner et al. (2019), Alhwaiti (2022) reviewed studies published between 2018 and 2021. Based on the findings, the commonly used EBPs for mathematics when teaching students with intellectual disabilities were explicit instruction, virtual-representational-abstract (VRA) teaching, and technology-aided instruction. The findings in these two studies inform the current project.

Technology-aided Instruction (TAI)

One of the commonly used EBPs to help students with disabilities improve their performance and achievement is TAI. Spooner et al. (2019) evaluated nine studies and established that TAI was based on electronics and technology applications, and students with moderate and severe disabilities benefited from using such tools for learning. Similarly, Shin et al. (2023) found that educational technology, including TAIs, was effective in helping students with disabilities improve their mathematical achievements. Alhwaiti (2022), Shin et al. (2023), and Spooner et al. (2019) findings support the implementation of TAI to help students with SLD learn mathematics and improve their performance.

Augmented reality is another form of TAI that can deliver instructions to students with intellectual disabilities. Although Kellems et al. (2020) included the adult population with intellectual disabilities in their study, the findings showed that participants reported significant gains immediately after video-based math intervention maintained the learned skills. Besides, these findings are consistent with a similar study by Kellems et al. (2020) conducted to teach mathematics to middle school students with SLD. Based on these findings, TAI and other technology-based approaches can be used to help students with SLD improve their achievement and learning.

Manipulatives

Manipulatives are concrete or virtual objects utilized to assist students in understanding and solving abstract mathematical problems and concepts. Spooner et al.

(2019) found that manipulatives effectively helped students with moderate and severe disabilities improve their performance. As EBPs, manipulatives are essential in classrooms as they assist learners in exploring using different methods. Manipulatives are effective because they are associated with a higher percentage of mastering mathematics, such as number sense, and utilizing learning materials (Spooner et al., 2019). Gecu-Parmaksiz and Delialioglu (2019) conducted a quantitative study using a sample of 72 participants for four weeks to determine the effectiveness of virtual manipulative geometry. The findings demonstrated that virtual manipulatives are more effective than concrete manipulatives when used with students with SLD. Manipulatives can help students with learning disabilities master mathematical manipulative concepts. There is a consensus in these reviewed studies that there are effective EBPs that special educators use to raise standardized scores and performance among students with SLD.

Explicit Instructions

Integrating EBPs into an inclusive classroom can significantly improve mathematics outcomes and achievement for students with SLD. In their systematic reviews, Spooner et al. (2019) included eight studies with 26 participants with severe and moderate disabilities, and the findings suggested that explicit instruction was an effective EBP when used for teaching mathematics to students with SLD. Guilmois et al. (2019) conducted a comparative study to determine the effectiveness of explicit instruction when teaching middle school students. The sample included 87 students from low-achieving backgrounds. After data were collected, pre- and post-analyses were performed, and the findings showed that explicit instruction of teaching was effective when teaching mathematics to students from disadvantaged backgrounds.

Lein et al. (2020) conducted a systematic review to determine the effectiveness of mathematical word problem-solving interventions such as explicit instruction for students with SLD and those with difficulties. The findings suggested that explicit instruction effectively improved mathematics scores for students with SLD. Similarly, Ashman et al. (2020) conducted a randomized controlled experiment using a sample of 135 participants. The findings suggested that explicit instruction improved math performance in students with disabilities. Based on these findings, explicit instructions are effective problem-solving methods for mathematics and can be adopted to improve students' scores.

Evidence-based Practices Improve Standardized Test Scores

Several meta-analyses and systematic reviews have been conducted to examine mathematics interventions for students with SLD, especially those with math learning disabilities (Myers, Brownell et al., 2021; Spooner et al., 2019). Authors of these studies concluded that math scores increased after employing strategies that helped students identify the underlying structures of problems. Spooner et al. (2019) established that technology-based approaches, such as augmented reality and TAIs, increased students' achievements. Additionally, Shin et al. (2023) established that educational technology helped students with disabilities improve their mathematical achievements. Thus, there is a consensus in these findings that EBP approaches can improve students' academic performance.

There are limited studies that have examined the connection between EBPs and increased mathematics standardized test scores for SLD. Available studies have examined different EBPs' effectiveness in improving the learning and achievement of students with moderate to severe disabilities (Gecu-Parmaksiz & Delialioglu, 2019; Lein et al., 2020). Evidence suggests that mathematical word problem-solving interventions founded on explicit instruction improved performance for students with SLD (Lein et al., 2020). Therefore, explicit instruction, which is an EBP, can improve math performance for students with SLD (Ashman et al., 2020; Lein et al., 2020). Schools can, therefore, integrate explicit instructions in inclusive classrooms to ensure that students have access to learning and interaction that improves their performance.

Challenges in Introducing Evidence-Based Practices

One of the primary challenges middle school teachers encounters is selecting an evidence-based practice (EBP) that effectively aligns with a student's individual learning needs. Kittelman et al. (2020) and Leko et al. (2019) acknowledged that adopting an EBP was not a small task because it entailed selecting one that aligns with student needs. In addition, the section process was uncertain and time-consuming because students with SLD have different learning needs. Teachers must be familiar with the language of the EBP and the new instructions to ensure they align with each student's academic and learning needs (Leko et al., 2019). According to Alhossein (2021), limited knowledge and a lack of training and support hindered the successful adoption of EBPs for students with SLD. Consistent with the findings of Alhossein (2021) and Leko et al. (2019), the complexity of the EBP must be considered to avoid challenges in implementation and adoption. An EBP requiring limited content knowledge and minimal training can easily be adopted and implemented in middle schools without major challenges. Therefore, special educators and schools have to consider the complexity of the EBP before choosing one and implementing it to improve the performance and test scores of students with SLD.

Special education teachers have limited knowledge about EBP, which can be challenging when implementing new strategies to improve the standardized test scores for students with SLD. Casale-Giannola et al. (2023) examined their perceptions towards adopting EBPs to support students with intellectual disabilities. The teachers noted that although EBPs effectively improved learning, special educators were not trained in using evidence-based strategies in inclusive classrooms with students with disabilities. The teachers implementing these EBPs in inclusive classrooms had limited pedagogical knowledge required to support students with intellectual disabilities (Casale-Giannola et al., 2023). Additionally, there is an insufficiency of training and professional development opportunities for special educators to promote the successful implementation of EBPs in inclusive classrooms (Almutlaq, 2022; Scheibel, 2023). Therefore, without the proper professional training and support from schools and the district, teachers are more likely to continue facing difficulties in implementing EBP practices in their classrooms to help students with SLD.

Teachers face pressures to enhance standardized test scores based on existing regulations such as IDEA and CCSSM, which may impede the adoption of EBPs for students with SLD. Multiple studies have established that schools and special educators feel pressured to implement CCSSM to improve test scores (Savage et al., 2018; Sperlinga, 2020). The CCSS is significantly demanding and requires support from school administrators and other stakeholders for successful implementation. However, raising content and curriculum reforms is a challenge for most schools, which has increased the pressures of high-stakes accountability (Savage et al., 2018; Spooner et al., 2019). Political pressure to have CCSSM successfully implemented is transferred to special educators who, without district and state support, cannot manage to adopt the new changes. Therefore, teachers face pressures when implementing the NCLB and CCSSM legislation aimed at improving student academic performance and achievement. Also, teachers face pressures when focusing on preparing students with SLD for high-stakes testing and standardized scores that are above curriculum expectations.

Most of the EBPs are student-centered and designed to align with the new standards to raise test scores and performance of students with SLD. Traditional approaches of teachers are different from EBPs because they depend heavily on step-by-step procedures, memorization, and "plug and chug" strategies to solve mathematical problems (Sperlinga, 2020, p. 6). Previously, states called for classroom learning that revolved around the application of procedures and memorization to solve mathematical problems. However, the new requirements under the CCSSM have shifted from memorization to solving mathematical problems based on the eight standards (Myers, Brownell et al., 2021).

Teachers are pressured to adopt the CCSSM, which is a challenge because students with SLD have fewer opportunities to participate in classroom standards-based mathematics. Shifting from traditional approaches to teaching mathematics faces challenges such as pressures to perform and limited opportunities for students with SLD (Lambert & Schuck, 2021). Adopting CCSSM faces opposition from teachers because the standards are misaligned with their traditional and previous teaching methods. According to Sperlinga (2020), opponents of the Common Core have stated that the implementation of CCSSM has led to a challenging transition for teachers and students, and it takes away creativity. Also, CCSSM is more focused on standardized testing than the previous state standards.

Special Education Middle School Math Teachers' Perceptions of EBPs

The implementation of evidence-based practices (EBPs) by teachers in the classroom can greatly enhance the academic outcomes of students with autism spectrum disorder (Alhossein, 2021). The increased prevalence of autism spectrum disorder and the inclusion of students with mild to moderate SLD in general education classrooms have intensified the need for effective practices to significantly improve educational functioning and academic performance (Myers, Brownell et al., 2021). Alhossein (2021) conducted a study among 240 special education teachers to establish their knowledge levels in using EBPs for students with autism spectrum disorder. Based on the findings, participants reported an average knowledge and use of EBPs for students, hence the need for improvement. Additionally, after attending over five programs, the teachers reported knowing EBPs (*M* = 2.56, *SD* = 0.379) compared to those who never participated in the professional development initiatives (Alhossein, 2021). Based on these findings, there is a relationship between the use of EBPs and teachers' knowledge, and for this reason, equipping instructors with skills and competencies can increase their practical use when teaching. Therefore, teachers' understanding of evidence-based practices (EBPs) for students with specific learning disabilities (SLD) can be strengthened through high-quality professional development programs.

Teachers have varying perceptions regarding the use of evidence-based practices (EBPs) in the classroom to support students with specific learning disabilities (SLD) in improving their mathematics test scores. Myers, Brownell et al. (2021)conducted a pilot study on middle school math teachers' perceptions when working with students with SLD. A survey was carried out to explore teachers' use of research-supported practices and the challenges faced in providing instructional practice. According to Myers, Brownell et al. (2021), teachers reported difficulties experienced when providing accommodations for students with SLD and applying instruction during e-learning. The perceived challenges when transitioning from traditional instruction-based approaches to technology-based and eLearning. For instance, 60% of the teachers reported technological issues that affected student engagement and instructional content planning and delivery (Myers, Brownell et al., 2021).

Teachers have perceived explicit instructions as an appropriate and effective EBP for teaching students with SLD (Myers, Brownell et al., 2021). The favorable perception of evidence-based practices has motivated middle school teachers to continue using explicit instruction for students with SLD, despite the challenges. Aslan et al.'s (2021) findings align with those of Myers, Witzel et al. (2021) regarding positive attitudes toward explicit instruction and special education technologies. Teachers can also use technology-assisted instruction (TAI) and online tools, such as virtual manipulatives, to support students with SLD and improve their test scores and academic performance.

Two more recent studies explored teachers' perceptions when providing online and virtual instruction for SLD (Catalano et al., 2021; Jenkins & Walker, 2021). In the first study, Catalano et al. (2021) evaluated teacher perceptions among students with SLD when accessing and participating in online learning during the COVID-19 pandemic. The authors used 300 K-12 teachers in New York and established that students with SLD in high-needs districts faced more challenges completing their assignments than their peers in low-income districts. Lack of motivation and comprehension were the contributing factors linked to the poor performance of students with LD. Jenkins and Walker (2021) conducted a survey study in Virginia using 142 stakeholders to evaluate instructional delivery effectiveness among students' individualized education programs. Based on these two studies, online methods of instruction are an effective EBP for students with SLD and should be encouraged to improve academic performance and achievement.

Casale-Giannola et al. (2023) surveyed the state of New Jersey to determine teachers' perceptions towards the use of EBPs in K-12 classrooms for students with intellectual disabilities. A sample of 107 participants from the state of New Jersey was included in the study. Convenience sampling was utilized to enable the overgeneralization of the outcomes in different regions in the United States. After the data analysis, the findings demonstrated that teachers were familiar with EBPs and perceived them as valuable tools for improving student performance (Casale-Giannola et al., 2023). However, teachers noted that they had limited exposure and training with the most useful EBP that could improve students' performance and achievement. The participants rated high-tech assistive technology, audio texts, and assistive and augmentative communication devices as the most useful EBPs in supporting students with intellectual disabilities.

Synthesis of Studies

Researchers have consistently found explicit instruction to be an effective EBP for mathematics when supporting students with SLD. Explicit instruction is based on a systematic, direct approach to teaching where teachers emphasize sequential progression (Bouck, Maher et al., 2020). Explicit instructions are effective for students with SLD who require extra support to improve their academic achievement and learning (Long et al., 2021; Wickstrom et al., 2020). Spooner et al. (2019) found that using "explicit instruction provided mathematics instruction on more advanced concepts in a scaffolded manner with modeling and guided practices" (p. 160). Therefore, explicit instruction for students with SLD shows promise to scaffold guided practices for students to improve their understanding of mathematics. Spooner et al. (2019) and Bouck, Maher et al. (2020) confirmed the effectiveness of explicit instructions as an effective EBP for teaching mathematics among students with SLD.

Assistive technology (AT) helps students with SLD by aiding the student in learning how to complete tasks and bypass areas of difficulty. Myers, Brownell et al. (2021) established that assistive technology was effective for students with SLD and essential, removing barriers to students' learning and increasing student progress and academic goals. Similarly, Shin et al. (2023) found that assistive technology increased students' self-reliance and helped them complete mathematics problems independently. Therefore, there is a consensus in existing studies that assistive technology can help students with SLD learn mathematics and improve their ability to interact with other students (Alhwaiti, 2022; Spooner et al., 2019). These studies together confirmed the effectiveness of augmentative or assistive technology in helping students with SLD gain the independence and self-reliance needed to learn mathematics.

Manipulatives are a form of EBP that special educators use to help students with SLD acquire and maintain computational skills and learn about mathematical concepts. According to Bouck, Park et al. (2020), virtual manipulatives are used on computers, mobile devices, and active whiteboards, such as virtual algebra tiles and bases, to advance learning. Manipulatives can help students with SLD learn more advanced math concepts, including algebra, and improve their problem-solving ability (Bone et al., 2021). Researchers suggest virtual manipulatives are effective when used by special educators to teach mathematical concepts to students with SLD (Anderson-Pence, 2020; Bone et al., 2021; Bouck, Park et al., 2020). However, when using manipulatives, teachers must provide students with disabilities the accommodations outlined in their individualized education programs to ensure equitable access to the curriculum and accurate learning (Rice, 2022; Wickstrom et al., 2020). Additionally, teachers using virtual manipulatives should consider the learning abilities of middle school students with disabilities and their individualized education program.

Technology-based EBPs such as TAI, have been shown to improve student outcomes when used to teach middle school students with mathematics learning disabilities. According to Alhwaiti (2022) and Spooner et al. (2019), TAI can assist students with SLD in improving their performance and achievement. Spooner et al. (2019) and Shin et al. (2023) have agreed that educational technology, such as TAI, effectively helps students with SLD improve mathematical achievements. Two studies conducted by Kellems et al. (2020) demonstrated that video-based math intervention effectively helped students gain significant improvement in learning new mathematical skills. Therefore, there is an agreement in the reviewed studies that TAI can effectively help students with SLD improve their achievement and learning.

Manipulatives such as concrete or virtual objects can effectively assist students in understanding and solving abstract mathematical problems. According to Spooner et al. (2019), manipulatives can effectively help students with severe disabilities improve their performance. In support of these findings, Bouck, Park et al. (2020) established that manipulatives provided students with disabilities, support and access to inclusive classrooms. Additionally, teachers serving students with a disability in the middle grades are encouraged to choose virtual manipulatives over concrete manipulatives. Virtual manipulatives provide a higher percentage of mastering mathematical concepts and solving algebra (Gecu-Parmaksiz & Delialioglu, 2019; Spooner et al., 2019). Also, virtual manipulatives can help students with SLD solve algebra and perform data analysis, geometry, and probability-related mathematical problems. Manipulatives support students with SLD in their acquisition, maintenance, fluency, and generalization of mathematical skills. Although concrete manipulatives provide an effective and viable option, they can pose challenges for students with SLD, especially when students enter middle school. Nonetheless, special educators can use virtual manipulatives to help students with SLD transition to middle schools to raise their standardized scores.

Integrating explicit instruction in an inclusive classroom can significantly improve mathematics outcomes for students with SLD. Multiple researchers (Ashman et al., 2020; Guilmois et al., 2019; Lein et al., 2020; Spooner et al., 2019) agree on the effectiveness of explicit instructions in helping middle school students with severe and moderate disabilities when learning mathematics. Explicit teaching instruction can help students with SLD and those with mathematics and intellectual difficulties. Similarly, Spooner et al., (2019) established that explicit instruction helps students with autism spectrum disorder in the acquisition of mathematical concepts in the classroom. Based on evidence from these studies, explicit instructions that form EBPs positively affect students with SLD by improving their ability to acquire mathematical concepts and solve algebra and geometry problems.

Currently, there are no studies on special education middle school math teachers' perceptions of EBPs intended to improve assessment scores in math for students with SLD. However, some studies have related to the general perceptions of teachers on using

EBPs to improve performance for students with SLD (Alhossein, 2021; Lott, 2021; Mihajlovic, 2020). The findings from these three qualitative studies suggested that teachers perceived EBPs as effective for meeting students with SLD educational needs. However, Alhossein (2021) established that special education teachers required training because they had limited to average knowledge and use of EBPs for students. In another study, Myers, Brownell et al. (2021)examined middle school math teachers' perceptions and found that difficulties were experienced when providing accommodations to students with SLD. Additionally, technological issues affected student engagement and instructional delivery, hence the need for further training. Explicit instruction is perceived as the most appropriate and effective EBP for teaching students with SLD (Lott, 2021; Mihajlovic, 2020; Myers, Brownell et al., 2021).

Although teachers were familiar with EBPs' useful tools for improving student performance, most lacked training. Teachers have perceived a lack of exploration and training as a major hurdle to implementing EBPs in inclusive classrooms (Casale-Giannola et al. et al., 2023; Catalano et al., 2021). Other perceived challenges include the adoption of CCSSM standards and pressure to ensure that students with SLD pass their exams (Filippi & Hackmann, 2019; Soares et al., 2019). Despite the challenges, these reviewed studies together confirm that systematic instruction, manipulatives, instructional procedures of technology-aided instruction, and explicit instructions are the most effective EBPs to help students with disabilities.

Summary and Conclusions

The primary concepts of the literature review are IDEIA, ESSA, CCSSM, TAI, EBPs, manipulatives, and explicit instructions. The main themes were EBPs for teaching students with SLD, challenges introducing EBPs, and special education middle school math teachers' perceptions of EBPs. It is well-documented in the NCES that students in the United States underachieve in mathematics proficiency, and students with SLD perform comparatively lower than their counterparts without disabilities (Myers, Brownell et al., 2021). Additionally, students with specific learning disabilities (SLD) tend to perform at lower levels in mathematics compared to their peers in inclusive classroom settings. Evidence suggests ineffective mathematics instruction affects students' learning and academic performance as they transition to middle school. Therefore, there is a need for consistent and effective EBPs and research-supported practices to help students with SLD succeed in mathematics based on the CCSSM standards (Filippi & Hackmann, 2019; Soares et al., 2019).

Evidence from the literature suggested that explicit instruction was perceived as the most effective EBP for teaching students with SLD to improve their mathematics proficiency (Lott, 2021; Myers, Brownell et al., 2021). Other effective EBPs that can be used to support middle school students with SLD are systematic instruction, manipulatives, TAIs, and explicit instructions (Spooner et al., 2019). However, middle school teachers may experience challenges transitioning from traditional teaching methods based on memorization to adopting EBP approaches.

Based on the literature review, it was not known which EBPs were currently being used in co-taught and small-group classrooms to address low assessment scores of students with SLD. Also, there were limited studies about special education middle school math teachers' perceptions of EBPs intended to improve math assessment scores for students with SLD. Most existing studies take a generalized approach, examining evidence-based practices (EBPs) for students with disabilities without specifying the educational level or grade. Also, the studies have not shown how manipulatives or explicit instructions can increase mathematics standardized test scores for middle school students with SLD.

The present study fills at least one of the gaps in literature and provides extensive knowledge in the discipline. For instance, the study helps understand middle school special education math teachers' perceptions of EBP in improving standardized test scores. The findings from this study extend knowledge by identifying challenges faced by middle school teachers when implementing QPTS to align with CCSSM and IDEA requirements. The results of this study offer insight into instructional practices used by middle school special education math teachers to support their students with SLD.

From the literature reviewed, there was a gap in the literature regarding teachers' perceptions of the most effective EBPs for improving mathematical scores for students with SLD. Conducting the basic qualitative study helped bridge the gap by providing findings to address the problem. In Chapter 3, I provide a detailed explanation of the research design and the rationale behind it to address the research questions guiding this study. I also discuss my role as the researcher, including any personal or professional relationships with participants, potential biases, and ethical considerations. This chapter includes a thorough overview of the methodology covering the population, sampling strategy, selection criteria, recruitment procedures, participant selection, data collection methods, and data analysis plan. Additionally, I will describe the strategies I used to ensure the credibility, validity, dependability, and confirmability of the study. I outline the ethical procedures followed to protect participants and the data collected, including obtaining approval from the Institutional Review Board (IRB). The chapter concludes with a summary of the key points from each section.

Chapter 3: Research Method

Standardized testing is plays a central role in the educational system in the United States (Kubiszyn & Borich, 2024). The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions regarding the use of QPTS at GSD to improve standardized test scores among students with SLD. Chapter 3 contains a discussion on (a) research design and rationale, (b) the role of the researcher, (c) methodology, (d) issues of trustworthiness, and (e) summary.

Research Design and Rationale

The research questions that I used to guide the study were:

RQ1: What are special education middle school math teachers' perceptions of QPTS, which are intended to improve assessment scores in math for students with SLD?

RQ2: Which QPTS are currently being used in the co-taught and small group classrooms to address low assessment scores of students with SLD?

The phenomenon under study was the perception of special education math teachers using QPTS to improve standardized test scores for students with SLD. I used a qualitative methodology in this study for three core reasons. First, I collected data using open-ended semistructured interviews. I chose to use open-ended, semistructured interviews in this study because they allow for the collection of rich, in-depth data on participants' subjective beliefs, motivations, and experiences (Busetto et al., 2020). These types of interviews allowed for the collection of detailed insights from middle school math teachers and effectively address the research questions.

I also selected a qualitative approach because it is grounded in human experience and observation. This methodology allows for the integration of intuition in the data collection process, which can lead to more accurate findings and give the data a predictive quality (Aspers & Corte, 2019). By exploring the perceptions of middle school math teachers in depth, I was able to gain a better understanding of the significance of using evidence-based practices (EBPs) in their instruction.

I determined that a qualitative methodology was most suitable for this study, as other approaches, particularly quantitative and mixed methods, did not align with my research goals. Quantitative research relies on collecting numerical data and applying statistical analysis, often to determine cause-and-effect relationships (Aspers & Corte, 2019). Since my research focused on exploring experiences and perceptions, numerical data would not have adequately addressed the research questions. I also chose not to use a mixed-methods approach, as its quantitative component would have required numerical data that was not relevant to the nature of the problem being investigated.

A basic qualitative research design was selected for this study. The design was appropriate for this study for six reasons. First, a basic qualitative design supports understanding how individuals interpret, construct, or formulate meaning from their experiences (Kahlke, 2014). By applying a basic qualitative design, I was able to understand how middle school math teachers perceive the use of EBPs among students with SLD. I used this design to interpret middle school math teachers' experiences by answering straightforward questions without framing them within an explicit theoretical, philosophical, epistemological, or ontological tradition (see Kahlke, 2014).

Second, a basic qualitative design is highly inductive, and researchers use the design to develop cases, categories, and themes from the collected data (Kahlke, 2014). As such, in this study, the use of the design supported performing a thematic analysis of the collected data, resulting in identifying the answers to the research questions from the teachers' responses. An inductive assessment of the data promoted the study findings' trustworthiness because the results were based on the teachers' verbatim responses (see Bingham, 2023).

Third, I chose a basic qualitative design because the approach is expressive, and participants are asked specific questions on the topic, allowing for focus on detailed personal experiences and real-world activities within the appropriate contexts (see Ellis & Hart, 2023). Collecting data from middle school math teachers using interviews meant they could respond based on their experiences. The teachers' responses were informed by the activities they encountered in their classrooms when teaching students with SLD.

Fourth, I selected a basic qualitative design because it is a practical and flexible approach that helps researchers address the research problem (see Ellis & Hart, 2023). I used the basic qualitative design to explore the problem in depth, support understanding of the nuances, and generate insights that might not be possible with other approaches. The design's flexibility allowed me to collect follow-up responses from participants based on their responses, underpinning in-depth data collection.

Fifth, I chose a basic qualitative design because it supports collecting data from participants in their naturalistic settings (Ellis & Hart, 2023). For this study, I recruited special education math teachers and conducted interviews either at their workplace or in their homes. Interviewing participants in their everyday environments helped minimize disruptions to their routines and allowed me to gather data grounded in their real-world teaching contexts.

Sixth, a basic qualitative research design is the most appropriate when other research designs ineffectively align with the research topic (Ellis & Hart, 2023). Other research designs, such as grounded theory, narrative, and ethnographic, were unsuitable for this study. I did not choose a narrative research design because it is best suited to understanding participants' experiences by analyzing their stories (see Ellis & Hart, 2023). In narrative research, researchers collect diverse participants' experiences in the form of a story when interviewed (Scheffelaar et al., 2021). The stories provide a human outlook on the participants' lives. A narrative research design was not selected because the approach is typically used to explore how humans experience the world (see Scheffelaar et al., 2021).

I determined that grounded theory was not an appropriate design for this study because my purpose was not to develop a theoretical framework to explain the phenomenon. Grounded theory is typically used to construct or discover theory based on collected data (Tie et al., 2019) and is most suitable when little is known about a topic, and a theoretical explanation is needed (Makri & Neely, 2021). Since my goal was to explore middle school special education math teachers' perceptions of using evidence-based practices (EBPs) to improve standardized test scores for students with specific learning disabilities (SLD), grounded theory did not align with the study's objectives.

I also did not choose ethnography for this study because the focus of ethnography is on understanding a group's culture-sharing(see Black et al., 2021), which was inconsistent with the study. Ethnographic research involves applying a cultural perspective to study participants' lives within their community (Celikoglu & Hamarat, 2022). In this study, the population included special education math teachers, and the aim was not to understand their culture or ways of thinking. Accordingly, the alternative research designs were not selected because they did not align with the study purpose or research questions.

Role of the Researcher

In qualitative research, the researcher is an objective data collection instrument (Yin, 2017). As such, in this study, I took the role of an observer, where I performed activities to ensure the successful completion of the study. The activities that I performed included (a) applying for Institutional Review Board (IRB) approval, (b) creating the recruitment email, (c) developing the interview guides, (d) screening participants for eligibility to be part of the study based on inclusion-exclusion criteria, (e) purposefully sampling the participants, (f) conducting a mini-test, (g) collecting data and performing a thematic analysis, and (h) interpreting the data.

I reduced bias by not recruiting teachers I knew or had any supervisory or instructor relationship with. I recruited teachers with whom I did not have a personal or professional relationship. For this reason, I recruited participants from other schools besides the one I was employed in to mitigate any undue influence on the population or conflict of interest. I did not have any power over the participants. I ensured that participation in this study was voluntary. I did not compensate the participants for agreeing to be part of the study, but I verbally expressed my gratitude for their time and responses.

Social desirability and confirmation bias might have occurred in this study. Social desirability bias in qualitative studies occurs when participants provide more socially acceptable responses than their perceptions or opinions. I reduced social desirability bias by reassuring the participants that there were no right or wrong answers to the interview questions (Junior, 2022). Reassuring participants that they were supposed to respond to the interview questions according to their experiences reduced social desirability bias, promoting the responses' trustworthiness (Junior, 2022).

Confirmability bias occurs when researchers interpret and favor data that confirms their preconceived expectations and ignore those that contradict them (McSweeney, 2021). In this study, confirmability could have occurred when I sought findings indicating that the EBPs improve students' assessment scores. I mitigated the bias by requesting participants review the findings and provide feedback on whether the results accurately represent their responses.

Participation in this study was voluntary, indicated by participants signing the informed consent form. The consent form contained information on the purpose and nature of the research study. The form contained five elements: A statement that the project is for research purposes only and participation is voluntary; a summary of the research including the purpose, duration, and list of procedures, as well as the risks or discomforts that are reasonably foreseeable, the benefits that are reasonably anticipated, and alternative procedures or courses of action (see Manti & Licari, 2018).

Methodology

Participant Selection Logic

In the United States, 369,848 special education teachers were in the workforce in 2021 (Data USA, 2023). The target population in this study was special education math teachers who teach middle school students with SLD. As such, the target population was (a) special education math teachers, (b) having at least two years of experience teaching students with SLD using EBPs, (c) working within the United States, and (d) having their contact information publicly available. The focus on special education math teachers who teach middle school students and have at least 2 years of experience involved educators with diverse experiences with various students, learning styles, and challenges. Special education math teachers served as a valuable source of data, making it essential to select participants who were well-positioned to provide meaningful responses to the interview questions. I used purposive sampling to recruit special education math teachers. While this is a non-probabilistic method, it was suitable for this study for three key reasons.

First, I used a purposive sampling strategy to choose the most appropriate special education math teachers with at least two years of experience teaching students with mild to moderate SLD using EBPs (see Campbell et al., 2020). Second, a purposive sampling strategy requires fewer resources in terms of time, effort, and money than other probabilistic approaches, such as randomized techniques (Campbell et al., 2020).

Although the specific number of special education math teachers is unknown, there were enough individuals to select a sample size. I recruited special education math teachers from middle schools within the GSD Public School district in Georgia. The recruitment process involved sending emails or messages (see Appendix A) to at least 100 special education math teachers, which resulted in recruiting 17 participants. Only special education math teachers with publicly available information were contacted. The recruitment message contained demographic questions, which I used to determine participants' eligibility.

I used a screening tool to assess the eligibility of the sampled participants (see Appendix B. I reviewed the participants' demographic information to determine their eligibility. Only those who answered "yes" to all the screening questions were considered eligible. I then sent the informed consent forms, asking participants to select the "I consent" option in the designated space and return the completed form to me. I contacted the respective participants to schedule the interviews when I received the signed consent forms. I scheduled the interviews based on the participants' availability to promote convenience. Conversely, any prospective participant who responded *no* to any of the screening questions was thanked for being interested in being part of the study and informed why they would not be interviewed.

I recruited 17 participants who were interviewed in the data collection process. The sample size was based on the point at which data saturation was reached. Researchers in published literature have supported that the sample size in qualitative research is usually small because of the in-depth nature of the collected data (Hennink & Kaiser, 2022; Subedi, 2021).

Instrumentation

An interview protocol containing 11 semistructured interview questions and nine follow-up prompts was used to collect data (see Appendix D). The researcher-developed interview guide contains questions founded on literature and theoretical principles of active learning, knowledge construction, and socially formulated information. Legal and historical data were not used as sources of information in the study. A semistructured interview protocol was used as the data collection tool because it is a flexible and suitable approach for retrieving responses to understanding individuals' thoughts, experiences, and beliefs (see DeJonckheere & Vaughn, 2019). Adeoye-Olatunde and Olenik (2021) emphasize that interviews in qualitative research allow participants to provide rich, in-depth, and nuanced responses**.** Unlike closed-ended surveys or questionnaires, interviews enable the researcher to explore participants' perspectives in detail, clarify ambiguous answers, and probe further into responses to uncover deeper insights. This method fosters a flexible dialogue that can adapt to each participant's unique experiences, making it especially valuable for understanding complex educational phenomena.

Researcher-developed Instruments

Questions in the semistructured interview guide were grounded in the core components discussed in Chapter 2 and principles in Piaget's theory of constructivism (Piaget, 1964; Vintere, 2018). In the interview questions, I focused on key concepts such as EBPs, assessment scores, co-teaching, and small group classrooms. Data collected using semistructured interview questions were used to address special education middle school math teachers' perceptions of QPTS, which are intended to improve assessment scores in math for students with SLD. The data was used to identify the QPTS currently used in the co-taught and small group classrooms to address low assessment scores of students with SLD.

Establishing Content Validity

Bhalla et al. (2023) emphasized that pre-testing semistructured interview questions through expert review helps establish their content validity and reliability. I used an expert review panel to establish the content validity of the semistructured interview protocol. I formed an expert review panel to assess the relevance and clarity of each interview question in collecting data that helped answer the research questions. I requested the assistance of three qualitative research experts from Walden University to comment on the data collection protocol. I consulted three experts—professors knowledgeable in qualitative research at Walden University. Their feedback ensured that the interview protocol questions were clear and relevant. They also evaluated whether pairing the interview questions with their respective research questions would effectively support collecting in-depth data. Based on their input, I did not make any significant changes to the interview protocol.

Sufficiency of the Data Collected in Answering the Research Question

Each interview session I conducted lasted approximately 45 to 60 minutes. According to the literature, interviews of about 60 minutes typically gather sufficient data to answer research questions (Buschle et al., 2022; Jamshed, 2014). However, some researchers note that the length of in-depth interviews can vary depending on the study's objectives and design, as well as the complexity of the topic and the depth of information required (Buschle et al., 2022). In this qualitative study, I made sure to allocate enough time to cover all the questions in the interview protocol while remaining flexible to follow up based on participants' responses. The 45 to 60-minute duration was adequate to collect rich, in-depth data and allowed special education math teachers to fully express their experiences.

Procedures for Recruitment, Participation, and Data Collection

To begin the recruiting process, I contacted at least 200 middle school special education math teachers in the GSD whose email addresses were publicly available. I got the publicly available emails of special education math teachers by contacting the district to obtain a list of special education teachers in the county. For instance, *searching for school math special education teachers' contact information* resulted in identifying two staff directories. The recruitment process was facilitated by access to the GSD staff directory, which provided teachers' full names, professional titles, email addresses, and phone numbers. Having comprehensive contact information allowed me to communicate efficiently and maintain consistent, clear interactions with potential participants. It streamlined my outreach efforts, enabling me to quickly follow up, address questions, and coordinate participation without unnecessary delays. I contacted participants through emails and Microsoft Teams, which contained information about the study and demographic questions. Following approval from Walden University's Institutional Review Board (Approval No. 07-03-24-0989839) and GSD's Institutional Review Board (File ID 2025- 07E), I began to send out recruitment emails. Approximately 10% of the special education math teachers contacted responded to the email, agreeing to be part of the study and providing their demographic information. Once I verified the participants' eligibility using the screening tool, I sent the informed consent forms to each participant via email. In the email, I requested participants willing to be interviewed to select "*I Consent"* on the provided section at the bottom of the consent form and send it back to me. Once I received the signed consent forms, I scheduled the interviews via phone, email, or Microsoft Teams. Only respondents who met the eligibility criteria, signed the informed consent form, and agreed to participate were included in this study. I conducted all 17 interviews using a Plaud note audio recorder. The one-on-one data collection sessions allowed participants to respond comprehensively to the interview questions. At the beginning of each interview session, I requested participants to provide verbal consent to record their audio. I gave participants time to respond to the questions and followed up where relevant. Each participant was interviewed only once, for approximately 45 to 60 minutes. Audio data were recorded using a Plaud Note audio recorder. During the data collection process, I frequently checked whether the interviews were being recorded.

After each interview, I stopped the recording and saved the audio file using the participant's pseudonym. I made copies of each data collection section, which served as backup. Once I completed the interviews, I performed transcription using Plaud's transcription feature (https://www.plaud.ai/). I confirmed the accuracy of the transcribed interviews by listening to the audio while reading the output. When collecting the data, I verified the participants' responses by applying reflective listening, where I asked participants, "You indicated that__________, I understand that correctly?" (Ravitch & Carl, 2021).

Participants Recruitment Follow-up Plan

I recruited 17 middle school special education math teachers. I did not need to recruit and interview additional participants because data saturation was achieved (Naeem et al., 2024). I did not seek help from a third-party organization, *User Interviews* (https://www.userinterviews.com/), to expedite the participants' recruitment process. User Interviews help researchers to recruit high-quality participants.

Exiting the Study

I reminded each participant that being part of the study is voluntary, and they could withdraw at any time and request that their responses not be included in the findings section. During data collection, participants were free to end the call if they no longer wished to participate in the study. No participants chose to exit the study.

Follow-up Procedure

The interviews were conducted in a quiet place to prevent background noise from affecting the recordings. Using this strategy reduced the need for follow-up. Conversely, when participants' responses were unclear, I followed by asking them to clarify their responses. Follow-up in qualitative research is essential because it promotes probing more and getting detailed data on the research topic (DeJonckheere & Vaughn, 2019).

Data Analysis Plan

Data in this study were collected using an 11-item semistructured interview protocol containing open-ended interview questions (see Appendix D). The interview protocol also contains nine probing questions to facilitate the collection of in-depth data. The first research question was answered using the responses collected using interview prompts three, four, five, and six and follow-up questions 3a, 3b, 4a, 5a, and 6a (see Table 1). Interview questions seven, eight, nine, and ten, and follow-up prompts 7a, 8a, 9a, and 10a were used to answer the second research question.

Table 1

Research Questions, Interview Questions, and Follow-up Promotes

Research Questions	Interview Questions	Follow-up Promotes
RQ1: What are special education middle school math teachers' perceptions of QPTS which are intended to improve assessment scores in math for students with SLD?	3,4,5, and 6	3a, 3b, 4a, 5a, and 6a
RQ2: Which QPTS are currently being used in the co-taught and small group classrooms to address low assessment scores of students with SLD?	7, 8, 9, and 10	7a, 8a, 9a, and 10a

Coding, Software, and Discrepant Cases

Saldana's four steps were used for data analysis (Saldaña, 2021). The four steps include (a) identifying the codes, (b) creating categories, (c) reviewing the categories and combining them to develop themes, and (d) applying the themes to the study's research. Given the qualitative nature of this study, I selected MAXQDA as the primary tool for data analysis due to its robust capabilities in qualitative and mixed methods research. MAXQDA is widely recognized for its ability to assist researchers in organizing, coding, and facilitating the interpretation of textual, audio, and visual data(MAXQDA, 2024). I imported the interview transcripts into the software to streamline data management and facilitate systematic analysis. As qualitative analysis software does not interpret data independently but aids the researcher in managing and analyzing it (Oswald, 2019), MAXQDA was used to support, rather than replace, the interpretive process. Then, I read and re-read the interviews, ensuring I was familiar with the data. When reading the interviews, I wrote the initial ideas that I found repeated and interesting about the data, which formed codes (Braun & Clarke, 2006; Saldaña, 2021). Coding involves going through the collected data and identifying interesting information. Codes were essential labels assigned to the descriptive information provided by participants.

Then, I formulated categories by combining codes. The categories represent more abstract ideas and concepts (Braun & Clarke, 2006; Saldaña, 2021). Categories were broader groupings that allowed me to organize codes into meaningful clusters. Creating categories helped to combine and classify the coded data into groups based on commonalities (Braun & Clarke, 2006; Saldaña, 2021).

After, I reviewed the categories and combined them to create themes (Braun & Clarke, 2006; Saldaña, 2021). I reviewed the categories created in the previous step and searched for patterns or relationships between them. I used the patterns to develop themes. The themes are broad statements about the data that contain meaning and help answer the research question (Braun & Clarke, 2006; Saldaña, 2021). I used MAXQDA to assign data extracts to the respective themes (Oswald, 2019).

In the final step, I applied themes to answer the research questions. I did this by selecting compelling and vivid extract examples for the respective themes and relating them to the research question. The process resulted in developing the results sections of this qualitative study. The findings were presented in narrative and paragraph format, supported by figures.

Managing Discrepant Cases

Seeking discrepant cases is essential in qualitative research because it is a hallmark of trustworthiness (Booth et al., 2013). In instances where some aspects of the analyzed data contradict or do not fit with the emerging explanations or patterns, their effective management is essential. I managed discrepant cases by analyzing them to understand why they differ from the norm, resulting in a better understanding of their occurrence. Then, I reported any discrepant cases and explained their occurrence, which promoted the findings' credibility and transparency.

Issues of Trustworthiness

Trustworthiness is essential because it promotes a study's quality. In this study, trustworthiness was promoted through credibility, dependability, transferability, and confirmability (Ahmed, 2024; Korstjens & Moser, 2018). In this section, trustworthiness is discussed.

Credibility

Credibility in this study was promoted through data saturation and member-checking (Ahmed, 2024; Korstjens & Moser, 2018). Data saturation is achieved during data collection when information no longer provides fresh insights into the research questions (Naeem et al., 2024). In this qualitative study, data were collected until no new data emerged from conducting additional interviews. As such, data using the interview protocol until participants' responses become repetitions of the already collected information.

I performed member-checking during the interviews to promote credibility (Ahmed, 2024). The process involved requesting participants to confirm whether my understanding of their responses was correct. For instance, I asked participants “You indicated that __________ is my interpretation of your responses, correct?” During the interview process, I made notes in the journal of my understanding, which helped when developing the preliminary findings (Ahmed, 2024; Ravitch & Carl, 2021).

Member-checking also involves providing participants with a written report of the analyzed data to provide feedback on the content’s accuracy and authenticity (Ahmed, 2024). In this study, I promoted the results’ credibility by performing member checking, which involved sending participants the preliminary findings via email. I then requested participants to provide feedback on the authenticity of the findings. Member checking allowed the interviewed special education math teachers to critically assess the findings and respond to the findings’ accuracy (Ahmed, 2024; Ravitch & Carl, 2021). There was no need to revise the findings based on the participants’ feedback.

Dependability

Dependability was promoted by conducting inductive coding, in-depth methodological description, and audit trail (Ahmed, 2024; Korstjens & Moser, 2018). Inductive coding involved using participants’ verbatim responses to answer the research questions. The action guarantees the reader that the responses are based on the data provided by participants and not the researchers’ imagination (Ahmed, 2024).

I provided in-depth descriptions and transparent explanations of the methodology (Ahmed, 2024; Korstjens & Moser, 2018). An in-depth methodological description promotes dependability because it helps readers understand, assess, and potentially replicate the research process. In the findings section, I provided a detailed explanation of how the data analysis was performed to enhance the transparency of the process.

I used an audit trail to systematically record the research process (Ahmed, 2024; Korstjens & Moser, 2018). This audit trail included systematic documentation of the decisions related to methodology, data collection, and data analysis. This promoted dependability by offering a transparent account of the research process. As such, performing an audit trial allowed others to verify the appropriateness and consistency of the research procedures.

Transferability

The transferability of the findings can only be assessed and determined by the readers themselves (Ahmed, 2024; Korstjens & Moser, 2018). In this study, transferability was enhanced by providing detailed descriptions of the sample, data collection, and analysis process. I provided a detailed description of the interviewed participants in Chapter 3 to give the readers an understanding of who was interviewed in this study. A detailed description of the data collection and analysis processes helps readers determine whether the results' contexts apply to their situations.

Confirmability

Confirmability ensures that the findings will be perceived as reputable by others (Ahmed, 2024). I promoted the confirmability of the findings by maintaining a reflective journal (Ahmed, 2024; Korstjens & Moser, 2018). In the reflective journal, I recorded the reasons for the choices made, including the methodology and study design selection, determining the sampling technique, and selecting the data collection tool. The rationale I recorded for choosing a basic qualitative design was that it is the most suitable for supporting answering the research questions and achieving the study purpose (Ellis & Hart, 2023). I recorded my choices during data collection, analysis, and interpretation to promote confirmability (Ahmed, 2024).

Ethical Procedures

The proper handling of study participants and data were ensured throughout this study by following several ethical guidelines. Each study participant was asked for their written, informed permission. The goal, the procedures for involvement, the voluntary nature of participation, and the risks and benefits of participating were all explained to study participants in the written informed consent. Participants in the study did not get tokens of appreciation for participating.

Individual participants' identities were not disclosed. Additionally, information like the study's location that could be used to identify participants was not to be published. I did not use a person's personal information for anything but this study. For example, study data were appropriately disposed of, destroyed, or deleted. Access to identifiable information was restricted. Data were stored in a locked space in my home, and computerized documents had security codes. Data will be stored for at least five years, following the university's requirements.

Researching students with SLD is a delicate matter that necessitates several authorizations to ensure confidentiality, anonymity, and informed consent. Student identities were unnecessary for this study, were not used or implied, and did not require parental permission. Confidentiality denotes a situation in which the researcher knows the identity of a research subject but takes precautions to prevent outsiders from de-identifying them (Kaiser, 2009). Informed consent implies that participation in the study must be voluntary and that participants must have been informed of the study's specifics, risks, and benefits in advance. Therefore, informed consent was sought by completing a form for each educator.

Summary

A basic qualitative research design guided this study. A qualitative methodology supported data collection using an 11-item interview protocol containing open-ended semistructured questions and follow-up prompts. Using a purposive sampling technique promoted recruiting 17 middle school special education math teachers, from whom data were collected up to saturation. The findings' trustworthiness was achieved by promoting credibility, dependability, transferability, and confirmability. The next chapter provides a discussion of the analysis and findings.

Chapter 4: Results

The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions of the use of QPTS to improve standardized test scores for students with SLD. The research questions were:

RQ1: What are special education middle school math teachers' perceptions of QPTS, which are intended to improve assessment scores in math for students with SLD?

RQ2: Which QPTS are currently being used in co-taught and small group classrooms to address the low assessment scores of students with SLD?

In this chapter, I discuss the setting, demographics, data collection, and data analysis. I also examine the evidence of trustworthiness and the results. The chapter concludes with a summary.

Setting

The participants in this study were special education teachers recruited from middle schools in a large Georgia school district (GSD, a pseudonym).. The personal and organizational conditions could have influenced special education teachers' perceptions of QPTS. The implementation of EBPs has been supported to promote efficiency for teachers, enhancing learning outcomes (Basckin et al., 2021; Casale-Giannola et al., 2023; Lukins et al., 2023). The use of EBPs is influenced by teachers' primary knowledge of the practice. If participating teachers perceived QPTS as effective but lacked professional development to effectively adopt the EBPs in a co-taught or small group setting, their perception may have been compromised. Acknowledging that the availability or lack of professional development could have influenced teachers' perception of QPTS may have affected the interpretation of the findings.

Data were collected from 17 participants, and data saturation was achieved during the 15th interview. Data saturation is the point where collecting more data does not result in gaining additional insights for answering the research questions (Hennink & Kaiser, 2022; Subedi, 2021). Achieving data saturation facilitates the understanding that enough data has been collected to answer the research questions (Rahimi, 2024). During data analysis, I realized that participants' responses started becoming redundant at the 15th respondent. Subsequently, when reading the 16th and 17th respondents' transcripts, I realized that the participants' responses did not provide any new insights into middle school special education math teachers' perceptions of the use of QPTS. By only analyzing data up to the 15th participant, I decreased redundancy when reporting the data.

Participants were assigned random pseudonyms to protect their confidentiality. In qualitative research, ensuring confidentiality is a crucial ethical practice (Dougherty, 2021; Hwang, 2023). Confidentiality protects participants against social, legal, and psychological harm (Laryeafio & Ogbewe, 2023). In this study, I protected participants' confidentiality by not collecting any personally identifiable data. Instead of personal names, I assigned each participant a pseudonym to promote confidentiality. Also, I was the only one who had access to the participants' responses. Although I included some verbatim responses from the participants in the results section, I ensured that the information could not be used to de-identify the teachers. Confidentiality was promoted throughout the study.

Table 1 presents the participants' demographic information. The demographic information collected was years of experience as a special education teacher and a list of disabilities the teachers typically observe among the math students they teach in middle school. ANL and LJ had the same number of years of experience (2), with ET having the most (17). The teachers had experience teaching students with different processing, behavioral, and functioning disabilities. The disabilities included attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorder (ASD), and dyslexia (See Table 1). The demographic information can be used by readers to understand that the interviewed participants had experience and knowledge about the use of QPTS in improving low assessment scores of students with SLD. The knowledge can assist the reader in comprehending the reliability of the findings.

Table 2

Demographic Information

Participant	Years of Experience as a Special Education Teacher	Disabilities typically observed in middle school mathematics students
AL	3	ADHD, Specific Learning Disabilities (SLD)
ANL	2	Processing, behavioral, and functional disabilities,
CC	5 1/2	SLD and Other Health Impairments (OHI)
CE	5	ASD (mild and high functioning), SLD, OHI, and emotional behavioral disorders
EJ	12	Learning disabilities, attention deficit, health deficit, and behavioral problems
ET	17	SLD, OHI mainly ADHD, and ASD
GT	6	ADHD, SLD
JC	10	ADHD, dyslexia, and students on the ASD spectrum.
JM	4	SLD
KAM	6	Specific learning disabilities directly related to mathematics include computational errors, lack of organization in problem-solving, and difficulty with math reasoning, which includes difficulty in determining the next steps based on the problem.
KW	3	OHI, SLD, ASD, and ADHD
LGC	11	Learning disabilities, typically SLD
LJ	2	ASD and blanketed learning disability dyslexia
MR	4	ASD, ADHD, and dyslexia
PC	4	Emotional behavior disorder

Data Collection

In this basic qualitative study, I collected data from the interviews of 17 participants. Interviews were the only data source. The use of interviews in qualitative research supports collecting in-depth data for answering the research questions (Dunwoodie et al., 2023). Semistructured interviews support the use of follow-up prompts to collect in-depth data on the topic (Busetto et al., 2020). The continuous probing when collecting qualitative data using semistructured interviews enables researchers to clarify, elaborate, and explain their responses (O.C. Robinson, 2023). The probing and follow-up enabled me to encourage participants to share their experiences and perspectives. Interviews are a valuable method for collecting comprehensive qualitative data, as they allow researchers to explore participants' perspectives, experiences, and insights in depth.

I did not experience any issues during the purposive sampling used for identifying suitable participants. Purposive sampling is used by researchers to intentionally choose individuals who have the experience and knowledge needed to address the problem statement and answer the research questions (Campbell et al., 2020). The use of purposive sampling results in the recruitment of targeted individuals, reducing the collection of irrelevant data (Busetto et al., 2020; Campbell et al., 2020). I used purposive sampling to recruit special education teachers knowledgeable in QPTS.

Individual interviews were conducted using a Plaud note audio recorder (https://www.plaud.ai/), with durations ranging from 45 to 60 minutes (see Table 2). The duration of the interview varied based on the participants' level of detail. Interviews for participants who provided detailed responses lasted longer than for those who offered brief explanations. At the beginning of each interview, I reminded the participants that the data collected would be recorded. Audio recording interviews supports transcription and data analysis because researchers can confirm what participants indicated (Hopfner & Promberger, 2023). Data collection lasting 45 to 60 minutes is suitable for ensuring a researcher asks the interview questions and probes accordingly. (Barnwell, 2025; McMullin, 2023). I listened to the audio recordings before beginning the coding process, which supported my understanding of the collected data. The use of Plaud notes audio recorder (https://www.plaud.ai/), supported methodological consistency.

The only data variation was the way the collected data were transcribed. Initially, I planned to perform transcription using Zoom. Conversely, I used Plaud (https://www.plaud.ai/) transcription instead. There was no need to recruit additional interview participants using *User Interviews* (https://www.userinterviews.com/) because the initial recruitment plan resulted in recruiting enough participants to achieve data saturation. There were no unusual circumstances during data collection.

Table 3

Duration of Data Collection

Participant	Duration of Data Collection
AL	48
ANL	49
CC	45
CE	51
EJ	56
ET	48
GT	59
JC	45
JM	47
KAM	46
KW	43
LGC	51
LJ	52
MR	45
PC	54
DD	46
PH	47

Data Analysis

I conducted a thematic data analysis to gain a comprehensive understanding of participants' responses. I identified themes and patterns from the collected data, promoting new insights and understandings (see Braun & Clarke, 2023; Naeem et al., 2023). I used Saldaña's (2021) four-step thematic data analysis process, including: (a) identifying the codes, (b) creating categories, (c) reviewing the categories and combining them to develop themes, and (d) using the themes to answer the research questions. I identified the recurrent and common ideas by first reading and rereading the transcripts to understand the participants' responses. When I was reading the transcripts, I noted the common and recurrent concepts in participants' responses, which enabled me to identify the participants' responses as relevant to answering the research questions.

After re-reading all the transcripts and identifying the recurrent and common ideas I exported all transcripts into MAXQDA to facilitate data management and coding. The use of computer-aided data qualitative data analysis software such as MAXQDA enables qualitative researchers to organize, assess, and find insights into the collected qualitative data (Guetterman & James, 2023; Paulus, 2023; Wiesner, 2022). By using the MAXQDA software, I gained a structured approach for organizing the codes, categories, and themes for the data sets. I chose to use MAXQDA in alignment with best practices in qualitative research, ensuring transparency throughout the data analysis process.

I identified the codes by reading each transcript to find recurrent and emergent ideas from segments of participant responses. Coding in qualitative research supports assessing data by assigning labels or text segments to the collected data (Bingham, 2023; Coates et al., 2021; Saldaña, 2021). The codes created are representations capturing the salient features of the core ideas emerging from the collected qualitative data. I used inductive coding, which involved reviewing codes, categories, and themes from the data. As such, I identified the codes that I deemed relevant to the three research questions. In addition to the focus on recurrent ideas in participants' responses, I coded the singular yet insightful contradictions, remarks, and contextual responses that supported gaining an enriched understanding of the research questions. I used inductive coding to move beyond the surface level, supporting in identifying the layered meanings in participants' responses and promoting answering the research questions.

In addition to the focus on recurrent ideas in participants' responses, I coded the singular yet insightful contradictions, remarks, and contextual responses that supported gaining an enriched understanding of the research questions. I coded insightful contradictions and remarks using deviant analysis, which resulted in identifying instances where participants challenged the dominant patterns or offered differing perspectives. I used deviant case analysis to identify instances where participants' responses differed from the majority (see Burton et al., 2023; Hard, 2024; Sale, 2022). Coding defiant cases supported in disconfirming evidence to refine emerging themes.

Table 3 presents the codes identified from the participants' responses. For instance, the code on intentionally and with fidelity, emerged from responses such as ANL who posited that "if used intentionally and with fidelity, they can be extremely useful when aiding in student growth." In the response, ANL emphasized the importance of QPTS being structured, and deliberately adopted. Similarly, ET supported the importance of "giving students the full picture when delivering a lesson." The response supports the code's intentionality and fidelity by supporting the importance of QPTS being implemented intentionally and with fidelity.

Improving math performance is another example of the codes generated. I identified the code for the participants' responses, specifically, KAM who explained that "I do find that students have improved their memorization of problem-solving processes and math." The response supports that the use of QPTS improves and promotes memorization, resulting in tangible academic gains. The codes represent segments of the data that I identified as suitable for answering the research questions. I identified a total of 54 codes from the collected data (see Table 3).

The codes provided a foundation for categorizing data into manageable units that supported making sense of participants' responses. Categorizing involves grouping the codes based on shared attributes (Bingham, 2023; Coates et al., 2021; Saldaña, 2021). Categories are a collection of similar data related to the respective research questions. For example, I categorized the codes (a) intentionally and with fidelity, (b) extremely useful, and (c) giving students the full picture and understanding of the concept into the effective implementation of teaching strategies category. I combined the codes into 11 categories (see Table 3).

In qualitative research, themes are created to provide answers to the research questions. Themes are essential in qualitative research because they represent broader patterns, narratives, and ideas that emerge from the collected data (Braun & Clarke, 2023; Mishra & Dey, 2022; Naeem et al., 2023). The themes identified should go beyond the simple categorization to facilitate gaining a deeper connection in participants' responses (Braun & Clarke, 2023). Themes provide a structured approach for presenting qualitative data, supporting the coherence of the results (Mishra & Dey, 2022). Appropriately defined themes support systematically inking the results to research questions (Naeem et al., 2023). The three themes were identified from the 11 categories. The themes are (a) positive perceptions - improved performance in mathematics is a characteristic of implementing QPTS; (b) negative perceptions – implementation of QPTS are limited by the lack of adequate support and scarcity of resources; and (c) QPTS were often misaligned with students, which resulted in the need to modify the practices (see Table 3). The themes enabled me to present the data effectively, supporting in directly answering the three research questions.

I retrieved sub-themes from the three themes. Sub-themes are more specific topics related to the main themes (Braun & Clarke, 2023; Mishra & Dey, 2022; Naeem et al., 2023). Sub-themes enable researchers to identify deeper patterns under the broader thematic categories. The identified sub-themes are (a) results in better understanding, (b) improved math performance, (c) promotes active participation, (d) student engagement issues, (e) time constraints, (f) limited support and resources, (g) curriculum materials misalignment, (h) vaguely implemented, (i) modeling and practicing, (j) concrete representation, (k) differentiated instruction, (l) multisensory instruction, (m) data-driven instruction, (n) strategic application of technology, and (o) peer assisted learning were reported. In the results section, I explain each theme, which is supported by verbatim responses from participants.

Discrepant cases in qualitative research contradict the emerging patterns in a study. An analysis of discrepant cases in qualitative research prevents researchers from considering alternative explanations, promoting the results' credibility (Coleman, 2022; Hays & McKibben, 2021; Micacchi et al., 2025). The only discrepant case I identified was that while respondents such as CE indicated a lack of support from the administrator, ET reported the contrary. ET stated, *"We are fortunate to have the support of our administration, as they are generally receptive to our initiatives and efforts."* The discrepant case highlights that the findings of this qualitative study are not generalizable. In the results section, I acknowledged that the reported lack of administrative support may not apply to every school within the district.

Table 4

Codes, Categories, and Themes

Codes	Categories	Themes	Sub-themes
Intentionally and with fidelity	Effective Implementation of Teaching Strategies	Positive perceptions: improved performance in mathematics is a characteristic of implementing QPTS;	Results in better understanding
Extremely useful			
Giving students the full picture and understanding of the concept			
Improving math performance	Student Performance Outcomes		Improved math performance

Codes	Categories	Themes	Sub-themes
Enhanced student assessment scores			
Improved memorization of problem-solving processes			
Self-confidence in their skills	Student Engagement and Confidence		
Motivation			
Actively participating and confidently answering.			Improved math performance
Managing time constraints ensures that we have time for practice.	Implementation Challenges	Negative perceptions QPTS are limited by the lack of adequate support and scarcity of resources	Time Constraints
We do not have time			
Struggle with having time.			
Lack of support for managing the varying disabilities			Limited Support and Resources
Lack of paraprofessional support			
Limited administrative support			
Lack of resources available that present real-world scenarios			
More handholding in the case management			
Students' engagement	Engagement Difficulties		Student Engagement Issues
Struggle to remain engaged.			
Kids missing out			

Codes	Categories	Themes	Sub-themes
Need to be modified	Instructional Adaptation Needs		Curriculum Material Misalignment
Scaffolding must be done.			
Lessons are not flowing properly.			
Biased toward one type of student			Vaguely Implemented
Too vague to implement			
Adaptation of strategies			
Consistent modeling	Instructional Strategies	QPTS were often misaligned with students, which resulted in the need to modify the practices.	Modeling and Practice
Practice			
Questioning			
Repeat concepts			
Visual aids			Concrete Representation
Graphic organizers			
Number lines			
Highlighters			
Colored pencils			
Videos			
Visuals			
Visual content			
Different materials for feedback			Differentiated Instruction

Codes	Categories	Themes	Sub-themes
Commitment to differentiation			
Key parts/vocabularies			Multisensory Instruction
Vocabulary evaluation			
Depending on each student			
Data-driven approach			Data-Driven Instruction
Gather data to gauge individual and group progress.			
Review annual data			
Conduct data dives			
Desmos			Strategic Application of Technology
Delta Math			
iReady			
Flipped math websites			
Amplify Desmos			
Partner weaker and stronger students lead.			Peer-assisted learning
Group them with mid-level and lower-level students.			

Results

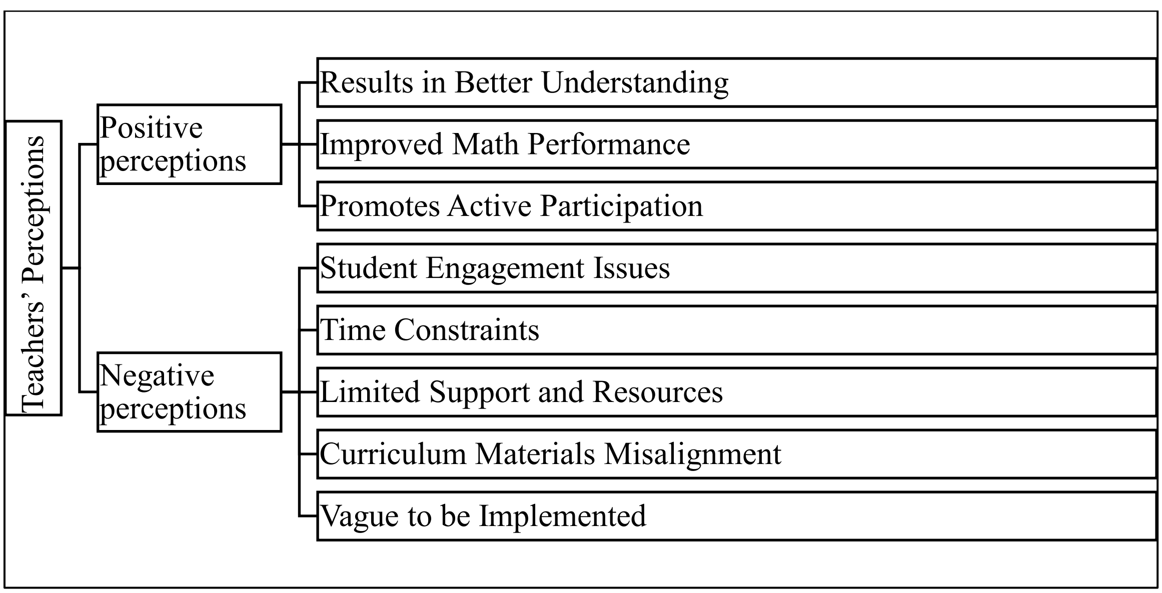
In this section, I present the results for each research question, organized by theme. Each theme is supported with verbatim responses from the participants. To help interpret the findings, I included figures and tables, which display 3 main themes and 15 sub-themes. I also included a discussion of the discrepant cases following the presentation of the findings.

Research Question 1: Teachers' Perceptions

The first research question I explored was: What are special education middle school math teachers' perceptions of QPTS, which are intended to improve assessment scores in math for students with SLD? My goal was to understand how these teachers perceive QPTS. I found that their perceptions of evidence-based practices (EBPs) varied, falling into both positive and negative categories. Figure 1 illustrates these positive and negative perceptions of QPTS.

Figure 1

Perceptions of QPTS



Positive Perceptions

I found that the positive perceptions of QPTS included improved student understanding, enhanced math performance, and increased active participation. According to the participants, these benefits highlight the value of QPTS in supporting learning for students with SLD. In the following section, I discuss each of these positive perceptions in detail, using the participants' own words to illustrate their experiences.

Results in Better Understanding. Participants indicated that the use of QPTS enhances students' understanding, especially when the interventions are implemented with fidelity. ANL posited that "if used intentionally and with fidelity, they can be extremely useful when aiding in student growth." The ANL emphasized that QPTS, such as modeling and practice, are essential for enhancing students' understanding. ANL explained that "modeling and practice is a strong one to use as students need to see the teacher work through problems and experiment with problem-solving on their own and having the guide can help them understand tremendously."

Like ANL, ET explained that QPTS improved students' understanding. The teacher stated,

> I believe it is important to give students the full picture when delivering a lesson. We cannot focus on modeling and practice at the board, or we cannot focus on independent practice. I think what the county does with its QPTS is to make sure we are touching all of those or as many as we can in a lesson.

ET elaborated by explaining that the QPTS promotes understanding of whether it is a co-taught or small class. ET explained,

> In a co-taught class, I move around to check their notes and see if they understand the concept by solving a quick, fast formative assessment. In my small group/resource class, we might skip the warm-up and focus on a problem or topic we did not grasp the day before.

The QPTS allows teachers to spend extra time on concepts that students do not understand based on the assessment outcomes. ET responded, “If we are reviewing most missed concepts, I move into re-teaching the most missed questions on an assessment, or most missed concepts during a CFA [common formative assessment] quiz.” GT added that modeling promotes understanding. The teacher asserted, “Modeling helped them visually understand the concept. For example, in geometry, when we are modeling different types of 3D shapes, they understand it more effectively.” Modeling, a QPTS that is commonly used, helps students with SLD understand the concept more clearly.

Improved Math Performance. Teachers supported the use of QPTS to improve math performance among students with SLD. Improved performance is achieved if the strategies are implemented intentionally and consistently. CE indicated *that* “in my experience as a special education teacher, the Quality-Plus Teaching Strategies (QPTS) have been effective in improving math performance for students with learning disabilities when implemented intentionally and consistently.” The teacher reported the efficacy of different strategies such as modeling, scaffolding, and graphic organizers in assisting teachers with clear and structured frameworks to process and apply mathematical concepts. CE elaborated that “my observation of modeling, guided practice, and teacher-directed questioning significantly enhance student assessment scores by addressing individual instructional needs." Modeling is used by teachers to provide students with clear examples of the expected tasks by providing a reference point for independent practice. The use of these strategies promotes deeper conceptual comprehension, which supports student success and assessment.

Scores.

JC added to CE's perception by explaining that implementing QPTS improves students' math performance by promoting repetition. JC stated that "drill-and-repetition helps many of them get the facts into the long-term storage and makes solving problems more efficient. The increase in success can improve students' self-confidence in their skills, which motivates them to work harder on the basics." JC noted that the improvement in performance level because of QPTS differed across grade levels. Specifically, the researcher noted, "Older middle schoolers are usually more motivated as they are headed to high school, where the stakes are higher than the younger middle schoolers. Once the younger students understand that it all matters, I have seen growth."

Improving math performance was reported to occur because QPTS promoted memorization and problem-solving processes. KAM stated, "I do find that students have improved their memorization of problem-solving processes and math. I see improvement in test scores or AKS [Academic Knowledge and Skills]." The use of QPTS provides teachers with structured approaches for delivering their teaching, which improves students' math performance. ET explained, "We follow a consistent model every day, which includes the minilesson, collaborative work, summarizing, and formative assessment. Our test scores were very good, ranking the highest in the county for all subjects. This suggests that our approach is effective." Applying QPTS enables students with SLD to gain knowledge and experience growth, which increases their achievement scores. The improved performance enabled students to be at par with the requirements, which is an indicator of growth. PH provided an example of how they perceive that QPTS improves students' math performance. PH argued that

> We offered a Saturday school for failing students and two students started showing up. The extra practice had a huge effect on their overall math performance. The one who struggled the most gained more confidence in math and the ability to raise his/her hand in class.

Promotes Active Participation. Teachers believed that QPTS enhances students' active participation. Active participation can be ascribed to enhanced knowledge and confidence among students. CE related, "I have seen a shift in classroom dynamics, with more students actively participating and confidently answering teacher-driven questions during lessons." The increased participation indicates that students are becoming more confident in their math skills, reflecting the positive effect of the QPTS on both their academic performance and engagement in the classroom. The use of strategies such as stop, and jot assists teachers in ensuring students' active participation. LJ stated, "We do the quick little sticky note, stop and jot to figure out what students know and what they don't know."

Negative Perceptions

In contrast, the teachers shared their negative perceptions of QPTS, which were mostly related to the challenges they faced when trying to implement these evidence-based practices. The concerns they reported included low student engagement, time constraints, limited support and resources, misalignment with curriculum materials, and unclear implementation guidelines. In the next section, I discuss each of these themes in detail, supported by the participants' verbatim responses.

Student Engagement Issues. Issues of student engagement were reported by teachers who perceived QPTS negatively. The perception of the prevalence of student engagement issues. ANL responded that "student engagement and ensuring that I am constantly using various strategies as opposed to limiting myself to what I am comfortable with is an issue." Student engagement is essential because it ensures that learners do not lose interest or are exposed to different materials that hinder learning. Limited engagement makes it challenging.

CE argued that "an observed challenge in implementing QPTS in a special education classroom is adapting the strategies to meet the diverse needs of students with disabilities while managing time constraints and varying levels of student readiness." Student engagement issues arise especially if QPTS does not recognize that students with SLD often experience anxiety and low social skills. CE elaborated that:

> For instance, during a lesson on solving equations, a special education teacher attempted to use collaborative learning, a QPTS strategy, to help students discuss and solve problems in small groups. While some students benefited from peer

> interactions and were able to share ideas effectively, others faced barriers because of low social skills, anxiety, or difficulties in processing information quickly. One student with autism became overwhelmed by the group setting and struggled to stay engaged, while another with a learning disability required extensive one-on-one support to contribute meaningfully to the activity.

The challenges highlight the need for teachers to offer additional scaffolding to ensure that all students can participate effectively and provide individualized support without disrupting the flow of the lesson. The implementation of QPTS requires teachers to modify the lessons to better accommodate the diverse needs of students. When using QPTS strategies like collaborative learning or guided practice, teachers have learned to provide more individualized support and adjust their pacing to ensure that students can engage with the material at their level. CE provided an example:

> One experience involved a student with an emotional behavioral disorder who struggled with impulse control and staying focused during group work. In a lesson using a QPTS strategy that included peer collaboration, the student was initially distracted and disruptive. In response, I modified my instruction by breaking the group into smaller, more manageable units, allowing me to work more closely with the students while providing more structure and clear expectations. I also incorporated more frequent check-ins to ensure that the student remained engaged and understood the task. This adjustment helped students remain on task and contributed to a more positive classroom environment.

Accordingly, QPTS learners must be adaptable and flexible, especially when teaching students with disabilities. The lack of engagement highlights the importance of being responsive to student needs and willing to modify strategies to ensure that all students have access to the curriculum and feel supported in their learning.

Time Constraints. I noticed that participants reported that time was an issue that hindered the implementation of QPTS among students with SLD because of their diverse needs. Time constraints limit opportunities for reteaching and reinforcing the QPTS approach for students who require more practice or repetition. For example, CE asserted, "An observed challenge in implementing QPTS in a special education classroom is adapting the strategies to meet the diverse needs of students with disabilities while managing time constraints and varying levels of student readiness." CE elaborated that when lessons are limited to 50 minutes, the time hinders teachers from effectively implementing all QPTS components such as summarizing. CE's response was that.

> One QPTS I would like to implement more effectively is summarizing lessons learned, as I believe it would provide valuable insight into students' understanding and help them articulate what they have learned. However, due to time constraints, with only 50 minutes for each lesson and the need to manage clean-up and dismissal, it is challenging to allocate sufficient time for students, especially those with disabilities.

Consistent with CE, ET added that summarizing the lesson was challenging. ET outlined that "our lessons last between 60 and 70 minutes. We want to ensure we have time for practice and working together (collaborating). Summarizing is always tough." A lack of time to implement QPTS among students with SLD makes it challenging for learners to master the competencies. JM perceived that it is important to have adequate time to effectively implement QPTS. JM explained,

> We do not have time. This is our biggest issue, especially with the district. In special education with our students with LDs, we need to be able to stop, practice, and drill. Most children with SLD have memory problems. So, this is something that you cannot give them just once and move on. Even if they practice it a few times that day or they do homework, it is not enough. The QPTS are not beneficial for our students because they have not been built over time.

The lack of sufficient time was a challenge, which resulted in KW perceiving that the QPTS was more suitable for students in general education. KW argued, “I think that quality plus teaching strategies are more aimed at children who are learning general education.” I often struggle with having time to do the SDI (specially designed instruction). KW added context on the challenges of a 50-minute lesson for students with SLD. KW elaborated,

> They are always pushing for a 50-minute lesson. My children cannot complete a 50-minute lesson because I must add in my FDI [Functional Disability Inventory]. I must go further in my steps when I am showing them how to do things that normal teachers do not have to. They must work on our multiplication facts, our adding, addition, subtraction, you know, all the things that a general education teacher may not necessarily have to do. So, I very much struggle with that, and it very much makes me angry.

Another aspect of time constraints is that some students with SLD have a limited attention span. KW explained,

> It makes it difficult to follow the quality plus teaching strategies because I must go so far back. I only have their attention for so long before they zone me out. Especially, with groups with ASD are usually done 10 minutes after they walk into my class.

Limited Support and Resources. The limited availability of resources and support resulted in negative perceptions among teachers, which limited the efficacy of the QPTS. The lack of support from administrators and parents was reported, which makes it challenging for teachers to manage students' disabilities, particularly in the absence of paraprofessionals. CE stated that "a significant barrier to effectively implementing QPTS is the lack of support for managing the varying disabilities and behaviors. The classroom setting includes students with a range of needs, but there is no paraprofessional support to assist the teacher." The lack of support disrupts learning because when behavioral issues arise or defiant students require a redirection, the teacher must pause the lesson to address these issues, which causes disruptions and impedes the learning process for other students. The lack of structured support to manage behaviors makes it difficult for all students to thrive.

CE acknowledged that a lack of administrative support is another problem that makes it difficult to adopt QPTS. CE noted that "the limited administrative support and absence of adequate consequences for maladaptive behaviors make it difficult to maintain a consistent and productive learning environment." The lack of adequate support for teachers, which is an administrative issue, makes it challenging for professionals to implement QPTS. The challenge is more prevalent among novice educators or newly employed teachers who lack an understanding of QPTS. PH explained,

> I am trying to think. It took a while to feel comfortable with them, and I do think that they need to. More handholding for new teachers on it [QPTS]. We had a great curriculum instructional coach, but there was not enough support. It would have been nice if, in my first few years in the County, I had something like that to support me.

ET added to the discussion by acknowledging that the lack of support from the family hinders the adoption of QPTS. The respondent stated, “The children in standard resources and small groups do not receive much help from their parents. They lack a clear plan. They do not care much.” The lack of parental support makes it challenging to motivate children.

I identified a lack of educational resources as a limitation to fully adopting the QPTS. The lack of resources reported by KAM indicated that “there is a lack of resources available that present real-world scenarios that meet the reading level and math computation level of students with disabilities, which are directly related to the AKS that we are teaching.” ET added to the issue of the lack of resources by explaining that there is a deficit of educators, which limits the use of QPTS. ET explained, “we experience constraints with special education resources. Our current framework limits the flexibility to transition students between small group instruction and co-teaching, as I am the sole co-teaching section available.” The lack of support and resources in the interrelated classroom hinders the effective use of QPTS because it is difficult to maintain focus on instruction when disruptive behaviors are not adequately addressed.

Curriculum Materials Misalignment. The teachers reported their negative perception toward QPTS, specifically because they considered that some aspects of the approaches were misaligned with the curriculum materials. The misalignment resulted in the need to modify the approaches to promote learning. ANL stated, “At times they [QPTS] need to be modified to better support the needs of my classroom. Sometimes problems do not seem to be aligned with the AKS or can be a bit confusing to work through.” A consequence of curriculum materials misalignment is the need for the teacher to perform a lot of scaffolding. JM explained,

> They [QPTS] are not written for students in an SLD classroom. There is a lot of scaffolding that must be done, and there is a lot of information that must be taught that should have been included in the student’s background. We are always playing catch-up.

The misalignment resulted in QPTS being more suitable for general education learners than for students with SLD. KW responded,

> We do use them [QPTS], and do they meet our learning needs?” No, because there is no SDI in it. So, these kids are missing out on that aspect of it. I would love to have some lessons that are specifically designed for students with disabilities.

Misaligned students make it essential to provide students with specialized support. The use of QPTS is problematic for students. CE posited that

> For students with learning disabilities, it is essential to pair QPTS with individualized support, such as differentiated instruction, targeted interventions, and accommodations like extended time or the use of manipulatives. The combination of QPTS and personalized strategies helps address the diverse needs of these learners, allowing them to build confidence and demonstrate progress in math performance.

Based on CE's response, it is evident that while QPTS can be a valuable foundation, ongoing collaboration among teachers, data-driven decision-making, and flexibility in instructional methods are key to maximizing their effectiveness for students with SLD.

Vague to be Implemented. Participants explained that some QPTS are too vague to be adopted in classrooms. The vagueness and lack of concrete and concise instructions make it challenging to adopt. KAM explained, "Some QPTS are too vague to implement in a math classroom every day. A lot of math required concrete direct instruction as opposed to some of the explorative instruction from the QPTS." MR added to the discussion by explaining that the vagueness of the QPTS limits their implementation and often results in bias toward students. MR argued that

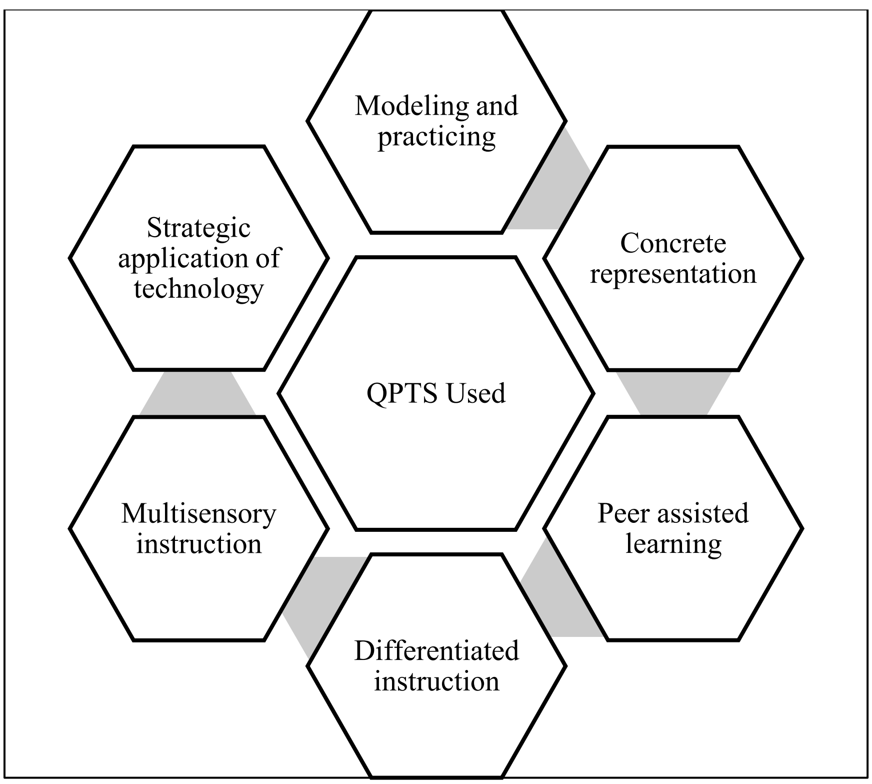
> QPTS sometimes helps with teachers who know nothing about teaching. The County's policies are biased toward one type of student, and it is the teacher's job not just to read a given script. I feel the lessons are not flowing properly most of the time because of the expectation of what the students should have learned in the previous grade compared to what they know.

Research Question 2: What are the QPTS?

The second research question I explored was: Which QPTS are currently being used in co-taught and small group classrooms to address the low assessment scores of students with SLD? In this study, I aimed to identify the QPTS strategies that teachers use in their practice. Based on my analysis, I found that teachers reported using five main strategies: modeling and practicing, concrete representation, differentiated instruction, multisensory instruction, strategic application of technology, and peer-assisted learning (see Figure 2).

Figure 2

QPTS Used



Modeling and Practice

In reading their responses, I noted that the participants supported the application of modeling and practicing in co-taught and small-group classrooms to address low assessment scores among students with SLD. Modeling and implementing support teachers to provide clear and direct instruction. Modeling and practice enable teachers to provide students with targeted support that meets individual needs. Through modeling, teachers can ask explicit questions to guide learners. JC reported that

> When I am modeling a problem on the board or in a small group, I "talk" my way through it as if I were the student and have someone ask me some guiding questions. I will ask explicit questions regarding the steps required to solve the problem. I also create step-by-step guides that require some type of reading and repetition.

Similar to JC, KAM explicitly stated that “modeling and practice is the most commonly used method in my math classroom.” CE added to the discussion by stating, “Consistent modeling and practice is essential for students with disabilities, as it provides them with structured examples of the concepts being taught.” Students must be given sufficient time to practice what has been modeled to internalize and apply these skills effectively. The use of modeling and practicing enables teachers to support their students with SLD, ultimately assisting them to improve their math performance and achieve greater success. CE elaborated that “while modeling, I ask intentional questions to guide students and assess their background knowledge. If students are struggling with specific steps or concepts, I may pause to provide additional explanations.”

Modeling practice is effective for students with SLD because learners see a teacher solve math problems several times. Repetition, which allows students to practice, promotes increased knowledge and understanding. LDG responded that

> In a co-taught manner, we model and practice vocabulary, collaboration, problem-solving, questioning, background knowledge, and technology. When we are teaching math, we must model how to do it, and then we try to stop, especially if it is a word problem that we are trying to explain and show them how to set up an equation from a word problem. We will describe that vocabulary or ask questions.

PC added to the discussion by elaborating, “The one I use the most in my small groups is modeling and practice. I do a lot of modeling, and then I allow them to work with me on the next problem.” In essence, modeling and practice provide students with SLD with an opportunity to perform and attempt problem-solving.

Concrete Representation

Teachers reported using physical objects and manipulatives to help students understand abstract mathematical concepts. The reported physical objectives and manipulatives included graphic organizers, number lines, and Amplify Desmos. CC explained, “Students with SLD need concrete representation to see the “how.” Discovery is not a strength for most students with disabilities.” Another respondent CE added to the discussion by stating, “I use visual aids such as graphic organizers or number lines to help clarify the process. Students have time to try a math question with a peer or independently with teacher monitoring.” Concrete learning assists teachers to be flexible and respond to students' needs, enabling them to adjust pacing and provide extra support when necessary. The application of concrete learning fosters a learning environment in which students can increase their understanding, translate concepts into long-term memory, and improve their assessment scores over time.

The teachers I interviewed emphasized the importance of incorporating concrete instruction to support mathematical learning. They shared that using concrete representation helps enhance students' understanding of math concepts. ET explained the introduction:

> Last year, we piloted Amplify Desmos and preferred it significantly over basic Desmos. It is now our default for videos, lesson add-ons, and digital learning day lessons, alongside Delta Math. We primarily use Delta Math for extra practice or to assess students' learning skill levels. For additional practice, especially at home, we also create custom problems by altering numbers in existing review/lesson questions.

Differentiated Instruction

Differentiated instruction involves using approaches that are consistent with students' needs, strengths, and interests. The teachers also reported that the use of differentiated instruction in small groups was more effective. The application of differentiated instruction supports diverse learning needs and promotes deeper understanding. The ANL posited that "utilizing different materials for feedback (exit tickets) speaking to them about which strategies helped them best."

Another participant, CE emphasized the importance of flexibility in implementation, thoughtful grouping, and ensuring that QPTS are paired with accommodation and modifications to address the specific needs of students with SLD. Focusing on strategies that address learners' specific needs enables students to acquire the specific competencies needed to succeed on tests/ CE responded that:

> Balancing the use of QPTS with individual student needs requires flexibility, ongoing assessment, and a commitment to differentiation. The key is to apply QPTS in a way that ensures that all students are provided with equal access to the learning material while addressing their specific challenges. This often involves modifying strategies or providing additional support based on each student's unique needs.

An example of differentiated instruction was reported by CE, who explained,

> If a student with SLD in math computations struggles with processing information under timed conditions, I use QPTS-like explicit instruction to break down test-taking strategies, focusing on how to approach the math steps and solution efficiently. After modeling these strategies, I provide scaffolding by breaking the problem down into management steps for the student and giving feedback.

Differentiated learning is essential for ensuring that learning is contextualized to students' needs. JC's response related to differentiated instruction was,

> I try to activate background knowledge as much as possible to help put the situational context into something they can picture in their minds. I try to ask

guiding questions to help a student find their way to an answer versus just telling them where to go.

Differentiated learning ensures that students are provided with knowledge at the appropriate level to promote success. JM explained:

> I will ask for volunteers because lack of support for student with SLD can cause a whole new level of anxiety. If I will do a cold call, I will warn the student. I will be like, I know this is something you can do. I am going to be looking at you for this next time. That way, it still gets them involved, but it is not exactly a cold call.

When in small groups, teachers can provide students with specialized teaching. Having small group support enabled teachers to apply differentiated learning, which enabled teachers to address students' individual needs. KW responded,

> It depends upon what each student's deficit or disability is. I treat every student individually. For example, if a student whom I know can solve equations, I do not give them as much help. For a student who, I know, can barely read, get more support in my class than somebody who can read and is just being lazy or is there for behavioral reasons and not academics.

Teachers can apply differentiated learning by reviewing the learners' individualized education plans. LGC explained,

> When I get students in class, especially at the beginning of the year or mid-year, I read their IEPs to try to get a better understanding of how they learned or what their strengths are. Then I try to find out what type of learner they are in the

> classroom, which determines how I deliver the content. If a student is not successful, I will try to show them another way. If they are still struggling, that is when I call the parents.

Differentiated instruction allows me to adjust my teaching based on students' individual needs, helping me identify when learners may benefit from small group support. Differentiated learning assists students in addressing their diverse needs, allowing them to improve their confidence and demonstrate progress in math performance.

Multisensory Instruction

The teachers I interviewed reported using multisensory instruction as a QPTS to engage learners' visual, auditory, tactile, and kinesthetic senses, which helps improve learning and memory. These multisensory methods included gathering manipulatives, practicing print work, and creating models. The ANL explained that they use "much support such as highlighters, colored pencils, clear language, and repetition." ANL elaborated,

> I first look through the lesson and identify key parts/vocabulary that are essential for students to know/understand. I work through the notes and highlight/indicate different things as I would in the lesson, then as I am delivering the lesson, I pay very close attention to my students' responses and their participation to determine what may need further explanation or what can be moved past.

The use of multisensory instruction assists students with SLD in gaining knowledge in mathematics. CE responded,

> I begin each lesson by activating students' prior knowledge through various methods such as videos, vocabulary evaluation, or a spiral review of previously learned material. This helps students connect new concepts to what they already know. If I notice that a student or group of students struggles with prior knowledge, I may adjust the review activity to provide more targeted support, such as offering more time for discussion or providing additional scaffolding.

The use of visuals and repetition helps students gain and retain knowledge. EJ responded, "because students have difficulty retaining information, I keep up visuals, repeat concepts often, spiral concepts, review vocabulary, and constantly question them." The use of multisensory instructions promotes understanding among students because they can relate to the content better. JC responded,

> In the past, I have tried to implement more real-world situational content into the daily math lessons. When I can incorporate scenarios that the students are familiar with (sports, games, books/movies), their success rate increases to a point. For vocabulary, I try to teach very explicitly.

The use of pictures and videos enhances students' understanding and knowledge. GT responded that "as a whole class, I use generally the visual content (non-verbal representations), that is videos that are helpful for both types of learners who are, who understand without visual things and who need them."

Data-driven Instruction

Data-driven instruction involves educators using data about students to inform and improve their teaching practices, thereby fostering a focus on students' needs and progress. The use of data enables teachers to determine what best works for each student and promotes learners' engagement. CE stated, "In my classroom, I use a data-driven approach to target the improvement of low assessment scores. I carefully analyze each student's classwork, practice, and assessments to guide my instructional decisions." CE continued

> I use students' data to gauge individual and group progress. If I notice dips in scores or comprehension, I adjust my instructional strategies, such as providing additional practice, simplifying the material, or using alternative methods to support understanding (e.g., peer tutoring or small group instruction).

Data are applied in collaborative meetings to develop tests and ensure that classwork fulfills learners' needs. The use of data from assessments helps teachers provide students with the additional support they need. ET explained,

> Our math team is lucky to have a math coach. During our weekly planning meetings, she will lead the data discussion. We reviewed annual data, examined our test questions, and determined what we could change while taking notes. We adjust every year. After every unit test, we review each question and percentage. We compare teaching methods to understand differences in performance and discuss results for each test question.

The use of data assists teachers in identifying areas where students need additional support or need to be placed in small groups. PC responded,

> At my school, we do data dives after pretty much every common assessment, and we go in and identify which were the most missed questions to determine how we can drill in those concepts. We discuss the most missed questions and present them as practice problems.

Strategic Application of Technology

Teachers also indicated that they strategically incorporated technology into their teaching to improve student outcomes. The use of technology is particularly helpful in enabling teachers to deliver learning and support students in the process. JC explained that,

> In several cases, the use of technology has been very helpful in keeping the students motivated and engaged with the content. I give basic skills tests at the beginning of each year and then conduct twice-weekly quizzes. I will use a technology-based application to help me with the drill-and-repetition piece.

MR posited that "technology allows me to modify and alter assignments in real-time." KW stated that they were incorporating technologies such as Desmos, Delta Math, and i-Ready. The teacher stated, "I do use a lot of Desmos. I use Delta Math, i-Ready, and the flipped math website." Similar to KW, LGC elaborated that the technology they applied includes the Chromebook, Desmos, and Math Worksheets. LGC stated that

> They use their Chromebook, specifically the Desmos calculator, because now they can use a calculator even for testing. I have a website called Math Worksheets for Kids, or something like that. There are a couple of them that you can go into and generate math worksheets.
>
> PH added on the use of Demos by explaining.
>
> I mean, you talked about technology. We use technology by letting them see how to do it and then teaching them how to use it, which must be intentional. For example, they have Desmos scientific and graphing calculators built into the assessments, but if they do not know how to input the information correctly, they are not going to get the right answer.

PCs supported the importance of technology hardware in fostering teaching. The teacher stated, “I went, and I bought an iPad so that I could support my students better.”

Peer-assisted learning

Peer-assisted learning was reported as an approach for helping students learn from and with each other, which promotes collaboration in a learning environment. EJ stated, “I also encourage them to help each other. I partner with weaker and stronger students together.” CE added to EJ’s discussion by explaining that “once practice is completed, I review the problems with the class, guiding them through the correct steps. I have students lead the explanation, when possible, which helps reinforce their understanding.” PC explained, “Some students do well. So, what I do is when I know that they are all done, I group them with mid-level and lower-level students which support learning.”

Evidence of Trustworthiness

In qualitative research, promoting trustworthiness increases readers' confidence in the findings presented. Ensuring that the findings have trustworthiness prompts decreasing bias and promoting results' accuracy (Ahmed, 2024; Korstjens & Moser, 2018; Stahl & King, 2020). Trustworthiness ensures that qualitative research conducted is consistent with standard practices, to improve outcomes (Stahl & King, 2020). In the subsequent sections, I discussed how I promoted the findings' credibility, dependability, transferability, and confirmability.

Credibility

Trustworthiness can be promoted by ensuring credibility. Credibility refers to the concept of the findings' truth value (Ahmed, 2024; Korstjens & Moser, 2018). I promoted credibility through data saturation. I achieved data saturation by collecting interview responses until no new information emerged (Rahimi, 2024). Data saturation was achieved during the 15th participant interview; assessing responses from the 16th teacher did not reveal any new insights into the research questions. Based on the analysis conducted, data from 15 participants were enough to derive the answers to the research questions. Therefore, I did not identify the need to analyze data beyond the 15th participant.

Dependability

I promoted dependability by ensuring stability in the findings. Dependability refers to consistency. This is a focus on an analysis that is conducted in a manner that is within accepted research standards (Ahmed, 2024; Korstjens & Moser, 2018; Stahl & King, 2020). I promoted dependability by maintaining an audit trail in which I recorded all decisions related to data collection and analysis. Documenting the research steps promoted transparency while I included rationales for the respective actions, enhancing the study's consistency.

Transferability

I ensured that the study could be applied to other contexts. Transferability is related to the degree to which research findings can be applied to other situations and contexts (Ahmed, 2024; Korstjens & Moser, 2018; Stahl & King, 2020). I supported transferability by including a description of the participants, data collection process, and data analysis. I provided detailed information so that readers will have the opportunity to determine whether the results apply to their contexts.

Confirmability

Confirmability ensures that the results are objective, impartial, and minimally influenced by researcher bias. I ensured confirmability by explaining how the findings emerged from participants and not from my biases (Ahmed, 2024; Korstjens & Moser, 2018; Stahl & King, 2020). I kept a reflective journal. In the reflective journal, I wrote down all the choices I made associated with data analysis and interpretation. When coding the interview transcripts, I realized that I was more likely to categorize participants' statements if the responses were consistent with mine. I noted the bias in my journal and countered the tendency by ensuring that I considered the varying participants' responses during coding. The other instance when I noticed my bias was when I was categorizing codes into themes. Initially, I had dismissed peer-assisted learning as a QPTS strategy because I had not witnessed it in my classroom. Conversely, after I re-read the raw data, deliberately searching for the mention of peer-assisted learning, I identified the theme to be pervasive that I had acknowledged initially. Keeping a reflective journal decreases bias by enabling me to systematically document the cases and re-assess the outcomes.

Member-checking is used to promote confirmability by having participants review and confirm the findings. The use of member-checking enables participants to assess and validate the findings' accuracy, promoting the level of results confirmability (Ahmed, 2024; Korstjens & Moser, 2018; Stahl & King, 2020). I performed member-checking by sending participants copies of the analyses so that they could provide their opinions on whether the analyses accurately represented their responses. All 15 participants responded that the analyses accurately represented their perceptions of QOTS' use in improving students and the strategies applied.

Summary

The answer to the first research question was that middle school math teachers had positive and negative perceptions of EBPs. Based on the findings, it was identified that special education middle school math teachers perceive that QPTS results in better understanding, promotes active participation, and improves math performance. Conversely, issues such as time constraints, lack of support and resources, curriculum misalignment, and vague implementation adversely affect the adoption of QPTS. Different QPTS have been adopted, specifically modeling and practicing, concrete representation, differentiated instruction, multisensory instruction, data-driven instruction, strategic application of technology, and peer-assisted learning.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions of the use of quality plus teaching strategies to improve standardized test scores for students with SLD. The purpose of the study was achieved by applying a qualitative methodology. In this basic qualitative study, data were collected through interviews. A thematic analysis of the collected data resulted in the identification of three themes and 15 sub-themes. The three themes are (a) improved performance in mathematics is a characteristic of implementing QPTS; (b) QPTS are limited by the lack of adequate support and scarcity of resources; and (c) QPTS were often misaligned with students, which resulted in the need to modify the EBPs. The 15 sub-themes are: (a) results in better understanding, (b) improved math performance, (c) promotes active participation, (d) student engagement issues, (e) time constraints, (f) limited support and resources, (g) curriculum materials misalignment, (h) vaguely implemented, (i) modeling and practicing, (j) concrete representation, (k) differentiated instruction, (l) multisensory instruction, (m) data-driven instruction, (n) strategic application of technology, and (o) peer assisted learning were reported. In the subsequent sections, a discussion on the interpretation of findings, limitations of the study, recommendations, and implications is provided.

Interpretation of the Findings

In this qualitative study, participants reported positive perceptions of the use of QPTS among students with SLD. Teachers perceived that the use of QPTS results in better understanding among students with SLD, improves their math performance, and promotes students' active participation. The findings are consistent with those in published literature in which the use of EBPs has been supported to result in improved performance and achievement among students with SLD (Campbell et al., 2020). The adoption of EBPs is thought to improve math test scores among students with SLD (Myers, Witzel et al., 2021; Myers, Brownell et al., 2021). The findings of this study expand the existing literature by adding that the interviewed teachers perceived that the use of QPTS results in a better understanding of students with SLD. Conversely, some participants argued that improved understanding is achieved if the QPTS is implemented intentionally and with fidelity.

The interviewed special education teachers indicated that improved performance in mathematics is a characteristic of implementing QPTS. Explicit instruction results in improved effectiveness when used in teaching mathematics to students with SLD (Lein et al., 2020; Myers, Brownell et al., 2021; Myers, Witzel et al., 2021). Similarly, the interviewed teachers perceived that the use of QPTS improved math performance among students with SLD if the strategies were adopted intentionally and consistently. According to the teachers interviewed, the use of QPTS promotes active participation among students with SLD because the strategies improve students' knowledge and confidence. The findings of this qualitative study expand the existing literature by adding data that some teachers perceive that QPTS assists a shift in classroom dynamics, where students actively participate in the learning process and confidently respond to teachers during mathematics lessons.

Among some of the teachers interviewed, the implementation of QPTS with intentionality and fidelity is limited by the lack of adequate support and scarcity of resources. Alhossein (2021) reported a lack of support as a barrier to the implementation of EBPs for SLD. Limited support from the administration is an environmental factor that hinders the adoption of EBPs (Jez, 2020; Strnadova et al., 2024). Similarly, some teachers in this qualitative study reported that the implementation of QPTS is affected by limited support and resources. The limited support from administrators and parents made it challenging for some teachers to manage students with disabilities, particularly in schools that did not have paraprofessionals. The lack of support makes it challenging for teachers to adopt QPTS, especially when students have varying disabilities and behaviors. Notably, the researcher acknowledged that the lack of administrative support is not transferable to every school in the district. The reported lack of special education resources was perceived by the participants to be a deterrent to teachers adopting QPTS.

A misalignment of QPTS and SLD needs has been reported in the literature. In their study, Kittelman et al. (2020) identified that aligning EBPs with students' needs is problematic. A misalignment between the needs of students with SLD and an implemented EBPs is thought to hinder the achievement of outcomes such as improvement in mathematics performance (Stevenson et al., 2020; Talbott et al., 2023). Similarly, in this qualitative study, the interviewed respondents reported that QPTS were often misaligned with students, which resulted in the need to modify the EBPs. Some special education teachers perceived that QPTS were more suitable for general education learners than those students with an SLD.

Participants reported that time is often a challenge when teaching their students with SLD. In most cases, students with SLD experience difficulties managing their time, which is a challenge that can be attributed to their learning disabilities (Kreider et al., 2019; Lushin et al., 2020). Time limits prevent special education teachers from effectively implementing EBPs among students with SLD (Basckin et al., 2021). In this study, some teachers reported that time constraints hindered the adoption of QPTS among students with disabilities. Time constraint is an issue due to learners' disabilities. For instance, lessons last for approximately 50 minutes, which limits the implementation of all the QPTS aspects, specifically, proactive, collaborative, and summarizing. Another perspective is that for students with ASDs, teachers only have approximately 10 minutes before learners lose their attention.

Some of the interviewed teachers reported that a lack of clarity on the adoption of EBPs limits them from using the interventions. Vagueness in EBPs, particularly when being implemented in the context for students with SLD, becomes a barrier in adopting with fidelity (Al-Ali & Gaber, 2023; Basckin et al., 2021; Witzel et al., 2024). In this qualitative study, I identified that some teachers perceived that QPTS can result in student engagement issues and that approaches are often too vague to be implemented. Student engagement issues were reported by teachers, who indicated that QPTS can often result in limited engagement because of the diverse needs of students with SLD. Based on some of the interviewed teachers' perceptions, when QPTS are too vague to be implemented, the programs lack concrete and concise instructions. The vagueness is an issue because math requires concrete direct instruction instead of exploration provided in the QPTS.

Different EBPs can be implemented to promote learning among students with SLD. The commonly reported and implemented EBPs in the published literature are graphic organizers, systematic instructions, manipulatives, instructional procedures of TAIs, and explicit instructions (Alhwaiti, 2022; Spooner et al., 2019). Findings by Alhwaiti (2022) and Spooner et al. (2019) regarding EBPs confirmed the results of my qualitative study because the QPTS used in the County by special education middle school math teachers where this qualitative study was conducted are (a) modeling and practice, (b) concrete representation, (c) differentiated instruction, (d) multisensory instruction, (e) data-driven instruction, (f) strategic application of technology, and (g) peer-assisted learning. The QPTS that the teachers reported being implemented are similar to those discussed in the published literature.

Modeling allows teachers to demonstrate the process of solving problems and practicing offers students with SLD the opportunity to apply the concepts learned. Modeling and practice involve providing clear and direct instruction to students with SLD (Kandemir & Eryilmaz, 2025). The use of modeling allows teachers to teach students how to complete math problems. Practicing allows students with SLD to work on math problems independently, which supports knowledge retention (Alhwaiti, 2022; Spooner et al., 2019). Modeling enables teachers to assist SLD in understanding the step-by-step problem processes. The emphasis on practice supports the transition from teacher-led instruction to independent work (Kandemir & Eryilmaz, 2025). The findings of my qualitative study advance the existing literature by providing insights that the interviewed teachers acknowledge the importance of modeling and practicing in teaching for their students with SLD, especially in mathematics.

Some of the interviewed teachers explained that the use of physical objects can help students actively interact with materials. Concrete manipulation provides students with SLD with a hands-on approach to understanding concepts and solving problems (Farra et al., 2024; Siller & Ahmad, 2024). Spooner et al. (2019) supported the concept that concrete manipulation promotes learning among students with SLD. In this study, different teachers reported using concrete representations such as manipulatives and physical objects to help students understand abstract mathematical concepts. The respondents indicated that through concrete learning, teachers can create environments where their student with SLD can understand concrete concepts and translate them into long-term memory, which in the long term can result in better math performance.

Differentiated instruction involves adjusting instruction to fulfill students' diverse needs. Applying differentiated instruction enables teachers to tailor content, products of instruction, and processes to be consistent with students' strengths, interests, and challenges (Kupers et al., 2023; Pozas et al., 2020). The results of this study expand the existing literature by providing perspectives from teachers that differentiated instruction involves providing pedagogy using approaches consistent with students' needs and interests. The QPTS approach was reported by some educators to be more suitable in small groups where teachers can offer learning to support students' diverse needs. Some of the interviewed teachers acknowledged that when learning is differentiated, students gain a deeper understanding. According to the teachers interviewed, flexibility in providing learning is important for ensuring that students' special needs are met.

The interviewed teachers reported multisensory instructions as one of the QPTS used. The use of multisensory instructions provides students with multiple approaches to learning and retaining information (Fujita, 2024; Supriatna & Ediyanto, 2021). The incorporation of multi-sensory instruction can promote learning through hearing, seeing, and movement (Diaudin et al., 2024). The expansion to published literature because of the study finding is that multisensory instruction allows teachers to engage learners' visual, auditory, tactile, and kinesthetic senses to enhance attention and knowledge retention. The reported multisensory strategies by the teachers included applying manipulation, modeling, and performing print practice. Teachers explained that multisensory instruction assists in tailoring learning approaches for students, thus supporting engagement.

Data-driven instruction according to the respondents involved teachers interpreting information from classroom observations and test scores to promote teaching and learning. An assessment of students' learning requirements is a prerequisite for performing data-driven instruction (Karst et al., 2022; Karvonen et al., 2024). The use of data enables teachers to decide how to intensify an intervention to promote students' learning (Kim & Choi, 2021). The findings in my qualitative study expand the existing literature by providing information some special education teachers perceive that data-driven instruction results in informed decision-making. Per the teachers' response, informed decision-making assists special education educators in fulfilling the needs of students with SLD. The use of data assists teachers in identifying students who require additional support or who need to be placed in small groups.

Based on the educators' responses, technology-aided instruction can complement an understanding of learners' goals. The use of TAIs can support learning, especially among students with SLD who have complex communication needs. The reported TAIs in the published literature include augmented reality and virtual objects (Gecu-Parmaksiz & Delialioglu, 2019; Kellems et al., 2020; Spooner et al., 2019). In this study, some teachers indicated that they strategically applied technology. The strategic application of technology in teaching is intended to improve learners' outcomes. The technology that the participants indicated they have used were Desmos, Delta Math, Chromebook, and iReady. Applying technology assists some teachers in delivering learning and supports students in the process.

Teachers indicated that peer-assisted learning enables students to learn from each other. The use of peer-assisted learning allows students with SLD to receive tutoring and reciprocal teaching from peers, promoting understanding (Ala et al., 2021; Bhat et al., 2022; Santhanalakshmi & Naomi, 2021). According to the teachers interviewed, peer-assisted learning involves assisting students in gaining knowledge from one another. The result extends the existing literature by offering additional information from teachers' experiences that peer-assisted learning promotes collaboration in learning. The use of peer-assisted learning reinforces knowledge among students, which in the long term can result in improved mathematics performance.

In this qualitative study, Piaget’s theory of constructivism was used to provide a theoretical underpinning. According to this theory, humans gain knowledge through interactions of ideas and experiences (Arpentieva et al., 2021; Noddings, 1990). The findings in this study support Piaget’s theory of constructivism because it was identified that teachers create classroom settings by incorporating QPTS to help students gain knowledge in mathematics. Based on the teachers’ responses in this study, the use of modeling and practicing, concrete representation, differentiated instruction, multisensory instruction, data-driven instruction, strategic application of technology, and peer-assisted learning enables educators to create an environment where their students with SLD can increase their understanding of mathematical concepts.

Limitations of the Study

A limitation is that researcher bias might have occurred during data analysis. Researcher bias can occur when there is selective attention to the data, ensuring alignment with study objectives (Saharan et al., 2024) underscores the importance of scrutinizing researcher bias in qualitative research to ensure honest and authentic data interpretation. Reflexivity, the critical examination of researchers' positionality, assumptions, and potential biases, is essential for ensuring transparency and rigor in the research process. In the absence of reflexivity, interpretations may be distorted by unexamined viewpoints that could affect data gathering and processing. Olmos-Vega et al. (2023) contend that recognizing and addressing research bias is essential to maintain the credibility of qualitative results. They suggest pragmatic solutions such as journaling reflexive notes, engaging in peer debriefing, and doing member checking to identify and mitigate biases. This crucial self-awareness helps ensure that interpretations more accurately reflect participants' perspectives rather than the researchers' personal biases. Researcher bias may have occurred because the data collected were interpreted to answer the research questions. The focus on answering the research questions meant that all other data were ignored. Ignoring the data could have resulted in researcher bias.

Recommendations

The first recommendation for future researchers is to design and conduct quantitative studies analyzing the effects of QPTS on students’ math performance, against standard instructional approaches. Researchers have assessed the effectiveness of EBPs (Alhwaiti, 2022; Shin et al., 2023; Spooner et al., 2019) like those found in the list of QPTS. As such, future researchers can use a controlled experimental design to strengthen the validity of the research. In the study, one group can receive tailored QPTS-based instruction, while the control cohort is provided with standard or traditional teaching practices. Researchers would then assess the difference between the two groups to determine causality. An assessment of the comparison and intervention data can assist researchers in quantifying the causal relationships between QPTS and math performance.

A second recommendation for future researchers is to collect data on how the reported negative perceptions about QPTS can be mitigated. Researchers have focused on the positive outcomes associated with similar EBPs (Myers, Witzel et al., 2021; Myers, Brownell et al., 2021; Spooner et al., 2019). Qualitative studies to understand the time constraints, lack of support and resources, curriculum misalignment, and vague implementation can support understanding how QPTS can be adopted. Additional knowledge enables an enhanced understanding of how QPTS can be implemented effectively in a project setting. The identification of solutions can support the implementation of QPTS.

A third recommendation is that future researchers should replicate this study and add two other data sources. Additional data sources could promote collecting more insights from the sampled participants (Barnwell, 2025; Hopfner & Promberger, 2023; McMullin, 2023). Having interviews, focus groups, classroom observations, or document analysis can promote the credibility of the findings. Three data sources can result in data saturation. Additional data sources could also provide more insights into data collection, improving an understanding of teachers' perspectives of QPTS and the approaches suitable to improving learners' math performance.

The fourth recommendation is for future researchers to conduct qualitative studies from the perspective of parents of students with SLD. In the published literature, researchers have conducted their studies mainly from teachers' perspectives (Alhossein, 2021; Kittelman et al., 2020; Leko et al., 2019). Collecting qualitative data from parents may result in gaining a perspective of how QPTS have influenced their children's performance. The findings from parents can be compared with the teachers' promotion in gaining a comprehensive understanding of QPTS. Additional understanding of QPTS can support changes in classrooms to improve math performance.

A fifth recommendation is for future researchers to assess the long-term effect of QPTS on math performance, past and present, for students with SLD. Researchers have mainly assessed the effect of QPTS on math performance among students with SLD over a short period (Myers, Brownell et al., 2021; Myers, Witzel et al., 2021; Spooner et al., 2019). The study can be quantitative, where data can be collected over five years. The data can then be assessed to determine the long-term effect of QPTS on math performance. Assessing the longevity of the teaching approaches could promote an understanding of the sustainability of QPTS in math performance.

Implications

Promoting positive social change supports the importance of conducting research. It is essential for research to address societal needs and challenges (Reupert, 2023). The focus on social change can promote obtaining solutions to issues (Heucher et al., 2024; Hietschold et al., 2023). A possible positive social change of the findings is that an increase in the use of appropriate QPTS can result in better understanding, improved math performance, and promote active participation among students with SLD. The increased understanding can support parents in being actively involved in their children's education.

A positive social change for schools is relevant because of the study's focus. Research should be conducted to promote effective outcomes (Heucher et al., 2024; Hietschold et al., 2023; Reupert, 2023). This study supports positive social change by increasing special education teachers' knowledge of which QPTS are relevant and appropriate for improving comprehension, participation, and high-stakes math assessment performance among GSD middle school students with SLD. The potential positive change for GSD is that QPTS could promote creating an inclusive and equitable environment where students can learn, thus supporting the success of students with SLD in math. The findings of this study could also have the potential to inform educational policies and guidelines on QPTS for students with SLD. The data on the effectiveness of QPTS can help focus on how math performance for students with SLD can be improved.

Teachers can promote learning among students with SLD by applying the principles of constructivism. Constructivists support inquiry-based learning, encouraging students to actively gain knowledge (Arpentieva et al., 2021; Noddings, 1990). The theoretical implication was that by applying Piaget's theory of constructivism, teachers play a role in creating an environment for students to learn. The findings show the notion that teachers can provide students with an opportunity to learn based on the learning approaches used. The results of this study advance the application of this theory in educational research.

Implementing QPTS supports active learning, personalized support, and collaboration among teachers. The implementation of EBPs has been supported to promote performance (Alhwaiti, 2022; Shin et al., 2023; Spooner et al., 2019). The empirical evidence is that the results add to the understanding of special education middle school math teachers' perceptions of QPTS, which are intended to improve assessment scores in math for students with SLD. The results add to the understanding of the QPTS that are currently being used in co-taught and small-group classrooms to address the low assessment scores of students with SLD. Accordingly, the findings expanded the existing literature.

Teachers need professional development to improve their competencies in implementing QPTS among students with SLD. Professional development enables teachers to gain competencies on how to enhance their pedagogical teaching standards (Almutlaq, 2022; Leko et al., 2019; Scheibel, 2023). The recommendation is that teachers should be aware of students' needs to ensure alignment with the QPTS. As such, teachers need professional development to ensure that QPTS care is appropriate for their learners. Another practical recommendation is for administrators to provide more support for all middle school math teachers, especially paraprofessionals and special education teachers. The additional support may enhance learning outcomes and help improve math assessment scores for students with SLD.

Conclusion

Based on the assessed qualitative data, special education teachers perceive the implementation of QPRT as positive and negative. The implementation of QPTS is perceived to promote outcomes such as better understanding among special education students, improved math performance, and active participation. Notably, there is a need to resolve student engagement issues, time constraints, limited support and resources, curriculum material misalignment, and vagueness to improve the adoption of QPTS. The QPTS used in co-taught and small groups included modeling and practicing, concrete representation, differentiated instruction, multisensory instruction, data-driven instruction, strategic application of technology, and peer-assisted learning. In essence, QPTS is perceived as important for enhancing learning among students with SLD.

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Appendix A: Recruitment Message/Script/Email

Subject: Requesting Your Participation

My name is Lisa Williams Taylor, and I am a student at Walden University studying for an Ed.D. in education. I am studying *Middle School Special Education Math Teachers' Perceptions of the Use of Quality Plus Teaching Strategies to Improve Standardized Test Scores for Students with Learning Disabilities*. The purpose of this basic qualitative study was to explore middle school special education math teachers' perceptions regarding the use of QPTS at GSD to improve standardized test scores among students with SLD. This study is a partial degree fulfillment of the Ph.D. program. I am contacting you to seek your voluntary participation in the study; I am seeking middle school special education math teachers. The study is based on an interview and only requires approximately 60 minutes of your time. The process will involve answering 11 semistructured questions based on your perception and experiences that will help me understand (a) the special education middle school math teachers' perceptions of EBPs, which are intended to improve assessment scores in math for students with SLD and (b) the EBPs currently being used in the co-taught and small group classrooms to address low assessment scores of students with SLD. Your responses will be confidential. You are eligible to participate if you (a) are special education math teachers, (b) have at least two years of experience teaching students with SLD using EBPs, (c) work within the United States, and (d) have their contact information publicly available. Kindly respond to the following demographic questions if you think you are an eligible participant and wish to participate in this study. After responding, please email me, I will subsequently contact you to inform you about the next stage.

1. What is your professional title?
2. How long have you been a middle school special education math teacher?
3. What grade level do you teach?
4. What is your highest educational qualification?

If you need additional information, you may contact me at lisa.taylor7@waldenu.edu. Also, you can contact Walden University's IRB (Institutional Review Board) at irb@mail.waldenu.edu or Walden University's IRB director, Dr. L E (Dr. L G). At leilani.endicott@waldenu.edu or Phone number 1-866-492-5336

Appendix B: Screener Tool

Criteria	Yes	No
Is a special education math teacher?		
Has at least two years of experience teaching students with SLD using EBPs?		
Works in the United States?		

Appendix C: Interview Guide

Introduction

Thank you for agreeing to participate in this interview. My name is Lisa Taylor, and I am interested in understanding how special education teachers use quality plus teaching strategies (QPTS) to improve the math performance of students with Specific Learning Disabilities (SLD) in middle school. Our interview is entirely confidential, and your responses will be used for research purposes only.

Interview Questions

Introduction Questions

1. What is your experience as a special education math teacher?
2. Describe the learning disabilities you typically observe in middle school math students.

Perceptions of EBPs (RQ1)

3. In your experience, how well is EBP improving the math performance for students with SLD?
    a. Tell me more about what you meant when you said that______
    b. Share some specific examples or experiences?
4. What challenges do you experience implementing EBPs in your classroom?
    a. Elaborate on the types of challenges and how they influence your teaching.
5. How do you balance the uses of EBPs with students' individual needs?

   a. How do you adapt or modify EBPs to cater to each student's unique needs?

6. What do you prioritize for your students when considering the EBP for improving standardized test scores?
   a. What do you consider when selecting an EBP for this purpose?

Current practices (RQ 2)

7. Describe some specific EBPs you currently use in your co-taught or small group math instruction to address low assessment scores in students with SLD.
   a. Provide some examples of these practices and how they specifically address low assessment scores.
8. For the EBP you mentioned, how do you usually implement it in your classroom?
   a. Explain to me the steps you take from planning to execution.
9. What have you observed from using these EBPs on your students' math performance?
   a. What specific improvements or changes have you noticed?
10. What EBPs would you like to implement but have been unable to because of resource limitations or other factors?
    a. Elaborate on these EBPs and the specific challenges preventing their implementation.

11. Closing

11. Is there anything else you would like to add to the topic?

12. Do you use the county-provided math lessons and resources?

Thank you for your time.

Appendix D: Collaborative Institutional Training Initiative Certification

CITI PROGRAM

Completion Date 02-Jul-2024
Expiration Date N/A
Record ID 63682724

This is to certify that:

Lisa Taylor

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Student's
(Curriculum Group)
Doctoral Student Researchers
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Walden University

CITI
Collaborative Institutional Training Initiative

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