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Fourth-Grade Teachers Use of MTSS-RTI to Teach Mathematical Word Problem-Solving

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Abstract

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MS, Touro College, 2007

Med, University of Sheffield, 1998

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of the Requirements for the Degree of

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Special Education

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Abstract

Schools in Florida used the multitiered system of support response to intervention framework to help students achieve the state and national standards but, in the national report card, 61% of the fourth-graders assessed in mathematics failed to achieve proficiency. Research indicated that the students lacked mathematical word problem-solving skills. The purpose of the qualitative study was to discover how fourth-grade special and general education teachers used the response to intervention framework evidence-based curriculum, instruction, intervention, assessment, and student data to teach math word problem-solving skills to children who have persistent and significant difficulties. Welner's zone of mediation framework and Vygotsky's sociocultural theory form the conceptual framework for the study. The teachers provided data through in-depth interviews, math intervention program, training document, teachers' guides, assessment tools, and observation. All the data was uploaded to the latest version of NVivo and analyzed based on the research questions. The study findings showed that participants used all the features of the response to intervention framework to teach math word problem-solving skills and address the needs of at-risk students. Teachers should continuously reinforce math vocabulary, terminology, and math reading comprehension skills of students. Administrators and teachers should be able to use the findings of this study to improve the use of the response to intervention features to develop the math word problem-solving skills of students and influence teachers' pedagogical practices.

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Dedication

I dedicate my doctoral study to my children Gerard Frederick, Denis Frederick, Blair Frederick, Diana Frederick, and Colette Elwin-Frederick for their encouragement and support. I dedicate my study to my grandchildren Menelyk Frederick, Sarabi Frederick, and Caelen Frederick as an example to show that they can achieve the goals they set for themselves. I dedicate study to my deceased Mother may she rest in peace, Dr. Joyce Barry-Hogan for her inspiration. I dedicate it to my deceased husband, Lenford Blake may he rest in peace, for his financial and physical support during the doctoral journey. I dedicate my study to my sister Sharon St Clair for her support and encouragement. Thank you for being there when I needed a push.

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Chapter 1

Introduction

Mathematics is a logical, hierarchical, collection of interconnected concepts and competencies. It involves the development of computation skills, conceptual understanding of numbers, their relationships, combinations, operations, reasoning, and word problem-solving skills (Bryant et al., 2014). Many fourth-grade students are having difficulties developing mathematical proficiency and word problem-solving skills because of deficits in computation fluency and reading comprehension skills. Comprehension skills are essential to understanding the elements of mathematics (math) word problems (Bjorn, Aunola, & Nurmi, 2016). Through math word problem-solving, learners apply fundamental knowledge, concepts, and skills to real-world situations (Swanson, Lussier, & Orosco, 2015). Word problem-solving is critical to determine mathematics proficiency, as evident in the national assessment (Krawec, 2014; Krawec & Huang, 2016). According to the National Assessment of Education Progress [NAEP], (2015) National Report Card, an overall 40% of fourth-graders achieved math proficiency. The National Report Card also indicated that in the state of Florida 39% of fourth-graders achieved math proficiency. Developing mathematics word problem-solving skills are essential to students' progress in elementary, middle school, high school, college, and acquiring life skills (Nurlu, 2015). Students must be able to purchase items and services that require applying mathematics concepts and procedures using word problem-solving skills (Nurlu, 2015).

Word problem-solving is an essential skill for college preparation as evident in the Common Core State Standards for Mathematics [CCSS-M] (Krawec, 2014; Krawec & Huang, 2016). The focus of CCSS-M is students' learning of mathematical thinking, reasoning, conceptual understanding, and word problem-solving (Jitendra, 2013). Of the eight CCSS-M, six are explicitly linked to word problem-solving. Moreover, the CCSS-M require students' engagement in understanding and applying mathematics knowledge and skills in school and society (Kingsdorf & Krawec, 2014). The reauthorized Individual with Disabilities Education Act (IDEA) of 2006 and The Every Student Succeeds Act (ESSA), of 2015, do not explicitly mandated that the States use the multi-tiered response to intervention model to provide students with early intervening services. However, many students do not acquire the skills taught to them in the general education classroom through the CCSS-M core instruction (Kingsdorf & Krawec, 2014).

The Individual with Disabilities Education Act (IDEA) of 2006, regulation 34CFR 300.307, (c) mandated that the States "must permit the use of a process based on the child's response to scientific, research-based intervention" to determine that a struggling student has a specific learning disability (p.11). The reauthorized Elementary and Secondary Education Act of 1965 cited as ESSA (2015) mandated the use of whole school programs to address the needs of students at-risk of not meeting state academic standards. Included in the strategies recommended for addressing the needs of struggling students are the "implementation of a schoolwide tiered model and early intervening services, coordinated with similar activities and services carried out under IDEA, 20 U.S.C. 1400 et seq" (p. 65). The United States Department of Education [USDOE]

(2007) guidance for early intervention services, evidence-based interventions and the provision of special education services for students with learning disabilities. The USDOE explained that the States criteria permit the use of the multi-tiered response to intervention model in addition to other assessment tools and strategies to provide early intervening services to determine that a struggling student has a disability and not at-risk for failure because of inadequate instruction.

Musgrove, Director of the Office of Special Education Programs in 2011, defined the response to intervention model as a multi-tiered instructional framework. It is a three-tiered school-wide approach used to address the needs of all students, including struggling learners and students with disabilities. According to the USDOE (2007), in tier one (Primary intervention) all students in the general education classroom receive high-quality scientific research-based instruction. In tier two (Secondary intervention) small groups of students who are at-risk for academic failure receive specialized instruction. In tier three (Tertiary intervention) students with intensive needs receive specialized, individualized instruction. The USDOE recommended that all students participate in the schoolwide multi-tiered response to intervention model. The multi-tiered response to intervention model components are

- all students receive high-quality scientific research-based instruction;
- continuous monitoring of their progress;
- screening of all students for academic and behavioral problems;
- also, multi-tiered levels of instruction and intervention in the general education setting.

Background

In 2006, the Florida Department of Education (FDOE) partnered with the University of South Florida to facilitate and implement a multi-tiered response to intervention model in the state. The mission of the project was to provide support, technical assistance and training across Florida on the multi-tiered response to intervention model; and systematically assess the impact of the multi-tiered response to intervention model implementation in 34 pilot schools in seven demonstration school districts across the state during 2007 to 2010. The statewide training element provides school-based teams and teachers with the knowledge and skills necessary to implement the multi-tiered response to intervention model (Stockslager, Castillo, Hines, & Curtis, 2013). In 2008, the Florida Department of Education published a *Response to Instruction/Intervention (RTI) Implementation Plan.* The plan was the preliminary, official state-level framework to assist districts with the essential components, definitions, and applications to develop and support schoolwide multi-tiered response to intervention model implementation. The goal of the plan was to integrate data-based problem-solving and the multi-tiered response to intervention system with various elements of Florida's education system to create a multi-tiered system of support. FDOE adopted the multi-tiered system of support-response to intervention (MTSS-RTI) model in response to the reauthorized Elementary and Secondary Education Act of 1965, cited then as No Child Left Behind Act (NCLB) of 2002 and Individual with Disabilities Education Act (2004). According to Stockslager et al. (2013), the No Child Left Behind Act included the use of scientific research-based curriculum, data-based decision making,

and evidence-based practices to increase students' performance on the statewide assessment.

The MTSS-RTI model is described as a comprehensive, integrated approach to address the behavioral, academic and social-emotional needs of all students (Stockslager et al., 2013). Throughout the state of Florida, Trained specialists provided technical assistance and training on data-based problem-solving within a multi-tiered system in schools. These specialists collaborated with other content specialists (e.g., math and reading) to provide internal professional development to improve teachers' pedagogical practices (Florida Department of Education, 2017). In addition to addressing students' academic needs, the MTSS-RTI model included instruments to assist schools in using the available resources more efficiently (Castillo et al., 2016). The purpose of this qualitative single-case study was to discover how fourth-grade special and general education teachers used the MTSS-RTI model evidence-based curriculum, instruction, intervention, assessment, and student data to teach math word problem-solving skills.

The MTSS-RTI framework incorporates a combination of whole-class scientific research-based instruction and additional small-group and individual intervention (Griffin, League, Griffin, & Bae, 2013; Hunt & Little, 2014; Powell et al., 2015). The aim is to ensure that every child has access to scientific research-based curricula based on the common core state standards and instruction regardless of their cultural and linguistic backgrounds, abilities, or disabilities. The MTSS-RTI model is a practical system for teachers to use to address the academic needs of each child in the general education setting.

According to Cavendish, Harry, Menda, Espinosa, and Mahotiere (2016), there is limited literature on classroom teachers' implementation of the MTSS-RTI model in the natural school environment. Teachers face many challenges in teaching students from diverse cultural and linguistic backgrounds, with different abilities and disabilities, and behavior issues. Tyler (2016) posited that teachers must reevaluate their misconceptions and negative perceptions of racial, linguistic and socioeconomic diversity in the school environment. Therefore, general and special education teachers with different knowledge and expertise work collaboratively to design instruction, co-teach and evaluate student outcomes. General and special education teachers used co-teaching with the MTSS-RTI strategies to help the students accessed and progress through the general education curriculum. General education teachers are responsible for instruction and work collaboratively with special education teachers to address the needs of struggling students from diverse cultural and linguistic backgrounds, with and without disabilities. Special education teachers provide explicit, intensive instruction for, small homogeneous groups and individual students struggling with academic skills (Meyer & Behar-Horenstein, 2015).

Cavendish et al. (2016) listed teachers' requirement to implement the MTSS-RTI framework, using the CCSS-M and solving the problems that occur in the classroom daily. To successfully implement the MTSS-RTI methods and standards teachers must understand the MTSS-RTI purpose, be knowledgeable about math content and the standards and believe in their students' ability to be successful. Teachers must participate in long-term intensive professional development opportunities, so they can be prepared to

use appropriate instruction, intervention, and assessment and analyze and interpret students' results. Additionally, they should have adequate resources to encourage them to utilize the MTSS-RTI framework to support student learning. It was necessary to discover if these MTSS-RTI features are available in the targeted school for fourth-grade teachers to successfully address the needs of students struggling with mathematics word problem-solving.

Research on teaching solving word problems is limited to early elementary, middle school and high school classes. Most research focused on word problem-solving in Kindergarten through grade three or five (De Knock & Harskamp, 2014), or the middle and high school grades (Doabler & Fien, 2013; Krawec & Hauang, 2016). The researchers (De Knock & Harskamp, 2014; Doabler & Fien, 2013; Krawec & Hauang, 2016) used research teams instead of classroom teachers to provide intervention to students during their investigations of mathematics intervention effectiveness. They provided support for interventionists who implemented intervention and the monitored students' progress for making instructional decisions (Jitendra, 2013). Other research focused on instructional strategies utilized during the intervention for Kindergarten through grade three or five (De Knock & Harskamp, 2014). They also focused on middle and high school grades (Doabler & Fien, 2013; Jitendra et al., 2015; Krawec & Huang, 2016; Orosco, 2013). The lack of research on teachers' use of MTSS-RTI practices to develop fourth-graders mathematics word problem-solving skills in a natural classroom environment created a gap in the current research literature.

Included in this chapter is the background of the study that describes word problem-solving skills students need to develop mathematics proficiency. Also included is an explanation of the requirements of IDEA (2004) and the ESSA (2015) policies that support schools use of the MTSS-RTI model to address the needs of all students with academic issues. Additionally, the next section described the MTSS-RTI tier two intervention followed by the problem statement, the purpose of the study, the research questions, and the conceptual framework. The chapter also included the nature of the study, definitions, assumption, Scope and delimitations, limitations, significance, and summary.

Children from different linguistic and cultural backgrounds, with and without disabilities struggle with developing mathematics word problem-solving strategies. Word problem-solving requires students to have reading comprehension skills and knowledge of mathematics concepts, procedures, and operations. Solving word problem demands that students can read, decode and understand the vocabulary, recognize the problem structure, extract relevant information, and select and apply the appropriate arithmetic algorithm (Wilson, 2013; Zheng, Flynn, & Swanson, 2013). Additionally, word problem-solving methods also require students to convert the information into arithmetical equations, graphics or symbols and use a detailed solution strategy to solve it. The complexity of the stages and procedures in solving math word problems could be challenging for most students. Students with language deficits, learning disabilities, low-performance and lack critical prerequisite math skills experienced challenges in interpreting and solving math word problems (Wilson, 2013).

Teachers need to know and understand the problems students encounter in the general education classroom if they lack the prerequisite skills for mathematics word problem-solving and have other learning deficits. An understanding of the characteristics displayed by students with significant difficulties in solving word problems can help educators plan and implement appropriate interventions (Bryant et al., 2014). Griffin, League, Griffin, and Bae (2013) explained that children have problems developing accuracy and automatic retrieval of mathematics facts to choose and apply appropriate procedural strategies. Additionally, Powell, Fuchs, and Fuchs (2013) explained that learners do not understand the basic number combination which is crucial for developing other mathematical skills such as computations. Children with math word problem-solving difficulties have many learning deficits which included understanding the language of the problem, and not recognizing irrelevant information. The students also lack the skills to apply multiple steps; and experiencing difficulties in choosing and using the appropriate algorithms to solve the problem (Pfannenstiel, Bryant, Bryant, & Porterfield, 2015).

According to Boonen, Koning, Jolles, and van der Schoot (2016), children have difficulties solving complex word problems, because they lack reading comprehension skills that help students identify and interpret the meaning of the vocabulary, phrase, sentence, and language within the word problem statement. Additionally, De Kock and Harskamp (2014) explained that students need skills to read, analyze a problem, determine the type of problem, develop an equation, solve the problem, and verify the answer. Additionally, teachers must have a comprehensive knowledge of the word

problem-solving processes, and prerequisite skills, as well as how the lack of prerequisite skills is revealed in students' work.

Moreover, students may fail to attain mathematics proficiency because of insufficient opportunities to develop reasoning skills, concepts, and word problem-solving skills. Students might also have difficulties making useful connections with previous mathematics knowledge to understand new concepts in real-world situations (Doabler et al., 2014). Additionally, Jitendra et al., (2015) explained that children struggling to solve word problems display poor metacognitive and cognitive skills, deficiencies in language, concentration and working memory deficits that affect their learning. Similarly, Van Garderen, Thomas, Stormont, and Lemnke (2013) stated that learners have deficiencies in their prior knowledge, lack confidence in their mathematics skills. They also have language deficits, attention issues, impulsivity, memory difficulties, and motivation problems. Teachers must put structures for instruction in place and provide appropriate opportunities for students to acquire skills in solving word problems, to build a solid foundation for future learning.

The aim of teaching mathematics in schools is to develop children's practical knowledge, word problem-solving and application skills for employment, higher education and functioning in society (Ernest, 2015; Nurlu, 2015). Children must be able to use mathematics to solve practical, real-world problems. Teachers must provide them with the foundational understanding and competencies needed to build further specialist knowledge and skills, which they can use beyond school (Ernest, 2015). Therefore, teachers use the MTSS-RTI to provide early identification, prevention, and intervention

for children in the classroom (Averill, Baker, & Rinaldi, 2014). The absence of well-structured instruction and intervention might be the reason for students' failure to achieve mathematics proficiency. The IDEA (2004) and ESSA (2015) require that highly qualified general and special education teachers provide all school-aged children with scientific research-based curricula, instruction, multi-tiered response to intervention tier two intervention, and assessment (King Thorius, Maxcy, Macy, & Cox, 2014). In the general education classrooms, there may be students with disabilities, students from the low socioeconomic background, English learners, African Americans, Native Americans, Asian, Hispanic and blended heritage children and White children (Averill et al., 2014). The IDEA (2004) and ESSA (2015) further require teachers to assess students continuously during their instruction and intervention to monitor students' progress (King Thorius et al., 2014; United States Department of Education, 2007). The aim is to give teachers a framework to provide all students with instructional opportunities to master mathematics knowledge, concepts, and skills.

Multi-Tiered Response to Intervention

The MTSS-RTI tier two intervention provides students who are having difficulties with the core mathematics instruction in the general education classroom with intervention to diminish their deficits. Hunt, Valentine, Bryant, Pfannenstiel, and Bryant (2016) determined that MTSS-RTI tier two level instruction should be explicit, systematic, and aligned with the mathematics core curriculum content. Hunt et al. (2016) suggested that schools develop a learning environment that supports building children's mathematical foundation skills, procedures, concepts, and word problem-solving skills.

The tier two intervention should also include the scaffolding of learning, problem-solving strategies, provision of purposefully constructed evaluations and feedback. Bryant et al. (2014) also suggested that teachers pace instruction and provide multiple opportunities for students to participate in their learning. The evidence-based intervention should address the specific needs of the individual student.

The MTSS-RTI tier two intervention should address the task, with monitoring assessment, student practice items, and mastery benchmark. Teachers should model the new concepts and skills; provide guided and independent practice, and corrective feedback, with frequent review of the content during the period of instruction (Valenzuela et al., 2014). Similarly, Jitendra et al. (2015) reviewed past studies and found that explicit strategy instruction was very efficient in helping children learn and remember problem-solving strategies and skills. They explained that effective mathematics interventions combine various cognitive and metacognitive instructional procedures resulting in positive effects on students' learning. Students must be taught to monitor their thinking, question their answers to the problem, and review the process. Teachers' pedagogical practices are essential in determining whether students are making adequate progress or have an innate disability.

Education policies make provisions for states and districts to utilize the MTSS-RTI model as one of the methods to promote whole-school interventions for subgroups of children with persistent academic underachievement (United States Department of Education, 2007). The goals of the MTSS-RTI framework are to ensure the success of all learners and decrease the achievement gap between minorities and White students.

Minorities refer to students with disabilities, students from the low socioeconomic background, English language learners, African Americans, Native Americans, Asians, Hispanics and blended heritage children (Averill et al., 2014; United States Department of Education, 2007); Hughes & Brady, 2015). The fundamental principle of the MTSS-RTI model is all students can learn with the appropriate instruction and assessment monitoring structures (Brown, 2016).

The MTSS-RTI model is a systematic method, utilizing the analysis of student data to identify, define, and resolve students' academic difficulties and behavior issues (Meyer & Behar-Horenstein, 2015). The findings of the qualitative case study revealed the structure and contents of the mathematics curriculum, the intervention program, and assessment tools fourth-grade teachers used to address students' word problem-solving deficits. The research findings focused on how the teachers used scientific-based curricula, instruction, MTSS-RTI tier two intervention and assessment, and the analysis and interpretation of student data to decrease students' math word problem-solving difficulties. The study findings described teachers' perception of the effectiveness of the instruction, the intervention program, and assessment tools used for monitoring student progress in the classroom and intervention groups. The study findings also revealed the teachers' perception of the effectiveness of the MTSS-RTI tier two intervention they used to address students' difficulties in solving math word problems.

Problem Statement

Although many states and school districts have been implementing the MTSS-RTI as one of the whole-school strategies to address the academic difficulties of students;

many fourth-graders are failing to achieve proficiency in the core mathematics curriculum content (Kingsdorf & Krawec, 2014). The National Assessment of Educational Progress (NAEP) (2015), the National Report Card showed that only 40% of the fourth-graders assessed in mathematics achieved proficiency. The NAEP report indicated that 19% of Blacks, 36% of Hispanics and 16% of students with disabilities achieved mathematics proficiency. This qualitative case study originated in Florida, where 39% of fourth-graders attained mathematics proficiency, according to the NAEP report. Table 1 indicates how MAC Elementary School (pseudonym) fourth-graders performed on the 2018 Florida Standards Assessments.

Table 1

Fourth-Graders Performance Levels on 2018 State Assessment

	Number	Percentage in Each Achievement Level				
Grade	of Students	Level 1 Inadequate	Level 2 Below Satisfactory	Level 3 Satisfactory	Level 4 Proficient	Level 5 Mastery
4	143	41	18	24	11	6

Table I is a record of the results of the 143 fourth-graders who participated in the 2018 Florida Standards Assessments. Of the 143 students, 58 or (41%) students performed at level 3 or above the Satisfactory level, while 85 (59%) students failed to reach Satisfactory. The students needed a MTSS-RTI tier two intervention to improve

their mathematics performance (Florida Department of Education, 2018). The school-based leadership team (SBLT) determine the placement and instruction for the 85 (59%) students who performed below the benchmark. Gonzales and Krawec (2014) stated that there are significantly more word problem-solving items in state assessments (e. g. Florida Standards Assessments) and national assessments (e. g. National Assessment of Educational Progress) than in the previous state and national assessments. Furthermore, Kingsdorf and Krawec (2014) specified that students' performance on standardized achievement tests signified that students are having difficulties with the development of mathematical word problem-solving skills.

Faulkner and Cain (2013) attributed students' failure to achieve mathematics proficiency to conditions within the school environment. Additionally, Wagner and Foote (2013) and De Kock and Harskamp (2014) indicated that teachers might lack the content and pedagogical knowledge needed to differentiate and teach math word problem-solving efficiently to diverse groups of students from different cultural and linguistic backgrounds. The National Council of Teachers of Mathematics (2014) report indicated that many teachers have inadequate access to scientific, research-based instructional materials, assessment tools and the technology needed for instruction. Additionally, many teachers do not have the benefit of supportive structures and coaching, and mathematics professional development opportunities related to teaching and learning.

Ottmar, Konold, Berry, Grissmer, and Cameron (2013) explained that research findings revealed inequalities in mathematics education with regards to minority students' exposure to diverse content. The authors discovered that year-after-year

elementary school teachers deprived minority students of opportunities to learn different and complex mathematics concepts. Ottmar et al. (2013) indicated that teachers who teach African American and Hispanic students focused on primary numbers and operations, and computational skills with limited instruction in the other content strands and problem-solving.

The NAEP (2015) report and research findings indicated that there is a need for strategic intervention in fourth-grade classrooms to develop and strengthen the mathematics skills of children with and without learning difficulties. The qualitative single-case study findings revealed how fourth-grade general and special education teachers' practices in the regular classroom environment were similar or different from findings in the research literature.

Purpose of the Study

The purpose of this qualitative single-case study was to discover how fourth-grade special and general education teachers used the MTSS-RTI evidence-based instruction, intervention, assessment, and student data to teach math word problem-solving skills. The participants were five fourth-grade general and special education teachers charged with instructing children from diverse cultural and linguistic backgrounds, with different abilities and disabilities. The study findings identified and described the strategies teachers employed in teaching mathematics concepts, procedures, skills instruction and intervention, and how teachers helped children develop strategies to solve real-world problems (Nurlu, 2015). The findings described the resources, socio-cultural, and pedagogical practices, teacher training, and support system in place for

fourth-grade teachers to implement the MTSS-RTI system. The findings explored the obstacles, challenges, and the successes the teachers experienced using the MTSS-RTI. The research revealed the roles and responsibilities of the special and general education teachers, and their perceptions of the MTSS-RTI model. The goal was to discover how the teachers utilized the MTSS-RTI components of evidence-based curricula and intervention programs, differentiated instruction, and a comprehensive assessment system data to make instructional decisions.

Research Questions

An understanding of fourth-grade special and general education teachers' perception of how they used the MTSS-RTI frameworks to teach math word problem-solving skills can help identify best teaching practices. The goal of the qualitative case study was to discover how fourth-grade teachers used MTSS-RTI practices to teach math word problem-solving to students using the following research questions.

- How do fourth-grade teachers use the MTSS-RTI for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties?
- What strategies do teachers adopt when teaching mathematics concepts, procedures, and skills instruction and intervention to fourth-graders?
- How do teachers help fourth-grade children solve real-world problems and to develop strategies based on different problem-solving approaches?

- What professional training, resources, support, and coaching has the district school provided for teachers to implement the MTSS-RTI framework to address fourth-graders mathematics word problem-solving difficulties?

Conceptual and Theoretical Framework

Welner's (2001) zone of mediation (ZOM) framework and Vygotsky's (1978) sociocultural theory will be the conceptual and theoretical frameworks for this qualitative case study.

Vygotsky's (1978) sociocultural theory illustrated how learners varied social and cultural backgrounds and experiences impacted and shaped children learning and how they interpreted and comprehended concepts. Vygotsky believed that an individual's learning is a collaborative, social activity through which the individual created meaning because of his or her interactions with other people. Vygotsky's Zone of Proximal Development (ZPD) described the ways participatory and social learning takes place. Teachers and peers who are more knowledgeable scaffold individuals learning of concepts and skills until they can work independently.

The ZPD assumed that students could produce their knowledge when teachers and peers provided them with guidance and meaningful, authentic learning experiences that replicated real-world situations and problems. The teacher's role is to guide, assist, monitor, coach, facilitate learning, and inspire learners to take ownership of the learning process. In this study, the ZPD was used to illustrate how teachers utilized a small group and individual instruction and intervention to scaffold the learning of students who are having difficulties with math word problem-solving. Furthermore, the qualitative study

revealed the strategies teachers used to scaffold, facilitate and motivate student learning (Schreiber & Valle, 2013). This study provided evidence of how teachers scaffold student learning and help them develop their knowledge base, connect and organize new information with their prior education and experiences.

Welner's zone of mediation (ZOM) framework offers a way of highlighting the dynamic forces impacting the implementation of the policy to provide equal educational opportunities for all students. Policy implementation is a collaborative, social-cultural procedure that included teachers discussing, understanding and implementing the legislation. The sociocultural processes involved educators' experiences, interpretations of the policy, the school's administrative structure, cultural and teaching practices that influence implementing the MTSS-RTI framework (King Thorius et al., 2014; King Thorius & Maxcy, 2015).

Additionally, the conceptual approach focuses on educators' interpretation of multi-tiered response to intervention procedures, processes, and practices, their subject knowledge, and pedagogical skills (King Thorius et al., 2014; King Thorius & Maxcy, 2015). The conceptual approaches also focused on how schools organized and managed staffing, training, and resources that are available for teachers' participation in decision-making. Moreover, the ZOM illustrated the traditional and instructional practices in the school. In practice, ZOM comprised of the criterion used in assessing and grouping students for instruction. ZOM included inclusive practices, planning, instruction, staff collaboration and the delivery of services in general education classrooms. The ZOM

involved the schools' arrangement for classroom instruction, general and special educators co-teaching, planning, communication, conflict resolution, and collaboration.

Furthermore, King Thorius and Maxcy (2015) explained that the ZOM influenced the strategies teachers used to determine students' eligibility for intervention and special education. Subsequently, King Thorius et al. (2014) recommended that educators focus on the quality of the curriculum, teachers' pedagogy and other environmental factors that can impact children's learning, instead of focusing on deficits within the learner. Additionally, the ZOM described the school operational functions and organizational capacities. School resources comprised of finances, assignment of teachers, curriculum and high-tech tools; curricular and co-curricular activities scheduling, professional development activities and student support services.

The ZOM was used in this study to illustrate how the elementary school's administrative structure, cultural and pedagogical practices influence the MTSS-RTI framework implementation. Additionally, identifying the strategies teachers used to determine students' eligibility for intervention. The ZOM also determined educators' awareness of the beliefs, values, and cultural-linguistic practices of the children they teach, to provide appropriate instruction for all students and how teachers used the components of the MTSS-RTI to make educational decisions.

Nature of the Study

Merriam and Tisdell (2016) identified five qualitative approaches: a case study, ethnography, narrative inquiry, grounded theory, and phenomenology. After reviewing the quantitative, mixed methods, and the five qualitative research methods for this study,

the case study approach within the qualitative framework was selected. The narrative approach focused on the individual life story and was not appropriate to this study that focuses on how teachers used the MTSS-RTI practices to teach math word problem-solving (Merriam & Tisdell, 2016). Merriam and Tisdell (2016) indicated that a phenomenological approach was better suited to studying human affective, emotional and often intense experience. The phenomenological approach was not suited to this study that focuses on teachers' pedagogical practices with fourth-graders. An ethnographic approach was inappropriate because this research focused on the description of a specific culture, behaviors, social events, and institutions over time. The grounded theory was also considered and found to be inappropriate as the intention was not to develop a theory from the opinions, actions, and interactions of the participants (Merriam & Tisdell, 2016). Therefore, the qualitative single-case study was selected to discover how teachers used the MTSS-RTI tier two intervention to develop the mathematics word problem-solving skills of fourth-graders with significant learning difficulties.

Yin (2014) defined a case study as "an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world context especially when the boundaries between phenomenon and context may not be…evident" (p.16). Merriam and Tisdell (2016) explained that a case could be a phenomenon, a group, a single person, an institution, a community or specific policy. The case in this study is the fourth-grade special and general education teachers using the MTSS-RTI model to teach math word problem-solving to students with math difficulties. The qualitative single-case study approach provided an in-depth analysis of how fourth-grade

special and general education teachers used the response to intervention universal screening, intervention, and progress monitoring system to remediate students' mathematics word problem-solving difficulties. Additionally, the case study approach provided an understanding of the use of the MTSS-RTI model within the complex social setting of the general education classrooms with students from diverse background and with different abilities or disabilities. It also described the school's socio-cultural environment, teacher training, student assessment, data collection, analysis, interpretation, and decision-making system in place for fourth-grade teachers to implement the MTSS-RTI.

A variety of sources of evidence (example: interviews, observation, documents, and artifacts) is used in the qualitative single-case study approach to ensure the validity of the findings through triangulation of the data (Yin, 2014). Interviews, the teachers' unit, and lesson plans, intervention programs, district training document, teachers' guides, and assessment tools were the sources of data for this study. In-depth, open-ended interviews with five general and special education teachers provided the evidence in answer to the research questions.

The NVivo computer software program was used to managed, organized, and coded the interview transcripts, teachers' unit, and lesson plans, intervention program, district training document, teachers' guides, observation notes, and assessment tools. I entered each transcript into the latest version of NVivo computer software program for the final coding, analysis, and interpretation of the data. The interviewees' exact words

and information from the district and professional development documents were included in the writeup of the research findings.

Definitions

*Diagnostic assessm*ent – testing to determine students' strengths and weaknesses in a subject area topic. Teachers use diagnostic tests to identify the specific skill a student lack or is having difficulties with to prepare an appropriate intervention to remediate the problem (Danielson & Rosenquist, 2014).

Formative assessment - testing to determine students' mastery of the skill or concept taught in a lesson. After explaining the skill or concept to the children, a test is given to determine if the student has mastered the skill or concept or need further instruction or practice (Jitendra, Dupuis, et al., 2014).

Inclusion - Students irrespective of ability, disability or language skills are educated together in the general education classroom. All students in the general education classroom participate in the curricula and co-curricular activities, screening, intervention, and assessment. (DeMatthews, 2015).

Intervention – instruction or training is given to a small group or individual students to remediate skills deficits for students with academic and behavioral difficulties. Students with problems in mathematics word problem-solving skills are assessed to identify the area of need. The teacher develops a plan for instruction to remediate their problems (Powell et al., 2013).

Math word problem – a mathematical exercise or story in which meaningful contextual information on the math topic is in the text. It is a combination of language

and numbers in which children apply math computation, cognitive and metacognitive processes to solve a problem (Orosco, 2014).

Professional development – is in-service knowledge and pedagogical skills training for educators. Through professional development, educators keep abreast of the changes in education policy, teaching strategies and curriculum content (Bocala, 2015).

Progress Monitoring – is frequent testing of students to gather information about their deficits and mastery of a targeted skill or concept, and the suitability or efficacy of the intervention. The result of the progress monitoring test is used to determine if the student needs more instruction or practice or do not need further guidance (Danielson & Rosenquist, 2014).

Response to Intervention – A multi-tier instruction delivery system that incorporates a combination of whole-class evidence-based education and supplemental small-group intervention, and assessment for academically struggling students. All Students are screened three times during the school year. Students who failed to meet the benchmark received small group tier two intervention, and their progress monitored. Students who fail to make adequate progress by the second screening received tier three individual intervention and their progress monitored (Danielson & Rosenquist, 2014).

Research-based, or scientific-based instructions – are an accumulation of research on how children learn and how teachers must teach to ensure student achievement. The curriculum and instruction developed by researchers are then explained to educators during profession development undertakings (Averill et al., 2014).

Universal screening – testing administered multiple times during the school year to all children to identify children who achieved proficiency and those at-risk for academic failure. The tests are curriculum based and cover the content and skills student should have at that specific time in the school year (Powell et al., 2013).

Assumptions

The assumptions explained aspects of the study that are believed but cannot be demonstrated to be true. Included are those assumptions that are relevant to this study (Walden University, 2012). One premise of this qualitative case study was the targeted school implements the MTSS-RTI with fidelity to ensure all students from different backgrounds with and without disabilities receive an evidence-based math education and intervention when they need it. Another assumption was the school has a functioning school-based MTSS-RTI team that implemented the MTSS-RTI principles, provided the training for teachers, scheduling, and resources. Also, fourth-grade special and general education teachers are following the CCSS-M and used evidence-based instructional materials and assessment tools to teach math word problem-solving skills. Another assumption was the school provides teachers with the instructional materials, tools, technology, and professional development opportunities related to the MTSS-RTI model and teaching and learning math. These assumptions were the focal point for discovering how fourth-grade special and general education teachers used the MTSS-RTI practices to provide tiered intervention to students with math word problem-solving difficulties.

Scope and Delimitations

The delimitations define the boundaries of the study by identifying the population, and the theories and conceptual frameworks related to the area of research that was investigated (Walden University, 2012). The evidence-based common core state standard in mathematics and the MTSS-RTI are an essential part of instruction in the elementary schools, yet 60% of fourth-grade students are failing to achieve proficiency in mathematics (NAEP, 2015). There are significantly more word problem-solving items in the Florida Standards Assessment and the NAEP than in previous year's state and national assessments (Kingsdorf & Krawec, 2014). The state and school districts require schools to implement the MTSS-RTI screening, tiered intervention, and progress monitoring system to provide instructions to students who are experiencing math word problem-solving difficulties. Math word problem-solving skills are essential for developing math proficiency. It is important to discover why fourth-grade students are failing to achieve math proficiency. Also, whether fourth-graders are receiving the kind of intervention and instruction with the appropriate material and assessments to achieve math proficiency. It is also essential to find out if the teachers have the knowledge and teaching skills they need to teach math word problem-solving.

Five fourth-grade special and general education teachers in an elementary school provided information about the use of the MTSS-RTI model for teaching math word problem-solving in the general education classrooms. Interviewing fourth-grade special and general education teachers provided the opportunity to discover teachers' understanding of the MTSS-RTI process, and their perception of how they used their

knowledge and skills to teach math word problem-solving. Interviews, teachers' lesson plans, intervention programs, observation of tier two intervention, district training document, and teachers' guides and assessment tools were the sources for the inquiry and the results of the research questions. The research focused on how five fourth-grade special and general education teachers used the MTSS-RTI mathematics materials, and assessment tools available to them to address students' math word problem-solving difficulties. The research findings may be generalized, in the districts and the schools with similar populations in the state.

Limitations

There are a few limitations to this study. The study focused on how five MAC Elementary School fourth-grade special and general education teachers used MTSS-RTI to teach math word problem-solving to students from different backgrounds with and without disabilities. The school established five years ago, received a D grade in the 2017-2018 school year. The research findings may not be generalized, in states, districts, and schools that do not have similar populations. To address this issue a detailed description of contextual information about the school; a detailed description of the fourth-grade population, teacher qualification, training, and beliefs, how the student data is collected, analyzed and interpreted was included so readers can determine the extent to which the findings are transferable (Merriam & Tisdell, 2014). All efforts were made to research how the teachers used the MTSS-RTI to teach math word problem-solving with fidelity and without bias because of a genuine interest in discovering how teachers achieve their goals.

Significance

The qualitative case study findings were used to document and describe how the special and general education teachers used the MTSS-RTI instructional delivery system tier two intervention to remedy deficits and develop fourth-graders mathematical word problem-solving skills. The study findings also documented the kind of structure, training, and support systems that are in place for teachers to utilize the MTSS-RTI model to diminish the math word problem-solving deficits of fourth-graders with significant math difficulties. The study findings described the challenges, obstacles, and successes fourth-grade teachers experienced as they used the MTSS-RTI practices to teach math word problem-solving.

Schools serve minorities, English language learners, students with disabilities, and children from the low socioeconomic background, who are experiencing word problem-solving difficulties. The MTSS-RTI model ensured that teachers provide equal and first-class education opportunities to all students, with appropriate research-based instruction and intervention for children with learning problems (King Thorius et al., 2014). The study findings added to the literature showing the implementation of MTSS-RTI processes by general and special education teachers in the authentic classroom environment to teach math word problem-solving to students with learning difficulties.

Social Change

The research findings provided a better understanding and appreciation of the MTSS-RTI screening, intervention, and progress monitoring assessments used in addressing fourth-graders math word problem-solving difficulties. Teachers analyzed the

effectiveness of their training, the use of MTSS-RTI instruction, intervention, assessments, data analysis, decision-making and time management. Through the interview process, teachers reflected on their classroom practices and determined what was needed to improve instruction, intervention, and assessment for students with learning difficulties in their math classes. Teachers gave learners with learning difficulties more opportunities to learn complicated math word problem-solving concepts and develop and practice these skills. General and special education teachers worked collaboratively to develop a learning environment that supports building children's math foundation and procedural skills, concepts and word problem-solving skills. The study findings added to the MTSS-RTI framework and mathematics research. The study findings provided readers with an in-depth account of how fourth-grade special and general education teachers interpreted and used the MTSS-RTI tier two intervention to decrease students' mathematics word problem-solving difficulties.

Summary

The chapter described the research problem and purpose of the study, implementing the policy, MTSS-RTI to develop fourth-graders mathematics word problem-solving skills. The chapter also included a summary of recent research that impacted how teachers used MTSS-RTI procedures, practices, and processes in providing math word problem instruction and intervention. Also, added was the Welner's zone of mediation (ZOM) used to describe the infrastructure, administrative structure, resources, and practices that should be in place for the effective implementation of the MTSS-RTI framework. Vygotsky's sociocultural theory described the utilization of the MTSS-RTI

delivery system to develop fourth-graders skills in applying math knowledge to solve word problems. Also, included were the study's background, problem statement, the purpose, research questions, and nature of the research, conceptual framework, definitions, limitations, the significance, ethical concerns, and summary.

Chapter 2 covers the review of literature which provided the conceptual framework used to analyze and interpret the research findings of this study. The research was used to examine the use of the MTSS-RTI instruction delivery system to develop the mathematics word problem-solving skills of fourth-graders. The literature review provided informed data-driven decision-making practices that formed the foundation for the study. The literature was sourced from Walden University's library databases, government and professional websites. The information collected covered a range of topics such as math education, math difficulties, the CCSS-M, MTSS-RTI practices and the organization theory supporting MTSS-RTI.

Chapter 3 presented the research design and methodology. Included is a description of the district and elementary school population; the criterion used to select participants for the study, ethical concerns, and methods of collecting, analyzing data and addressing bias in the study. All research methods were explored, and the qualitative case study was determined to be the most appropriate to answer the research questions.

In Chapter 4, I wrote the summary of the findings from interviews, teachers' units, and lesson plans, intervention programs, district training document, and teachers' guides and assessment tools that were the sources for the inquiry and answers to the research questions.

In Chapter 5, I discussed the results of the research based on the literature and conceptual framework, made recommendations and write the conclusion.

Chapter 2

Introduction

The mathematics curriculum is highly procedural, organized in strands, and adds different components across, and within each grade level. It continually builds on the previous knowledge and skills for successful learning. Thus, deficits in word problem-solving not remediated in the early grades can have lasting effects on future learning (Doabler et al., 2014; Kanive, Nelson, Burns, & Yesseldyke, 2014). Additionally, solving word problems is critical to helping students apply mathematics concepts and procedures to resolve real-world issues (Nurlu, 2015). Solving math word problems is an essential component of mathematics competency and the most challenging section for learners with difficulties (Driver & Powell, 2016; Jitendra, 2013; Jitendra et al., 2015, Krawec, 2014; Powell et al., 2013). Also, teaching mathematical word problem-solving to learners from different backgrounds, with and without disabilities can be very challenging for teachers who lack relevant mathematics knowledge and pedagogy skills (Van Garderen et al., 2013).

In the United States, many fourth-graders have difficulties solving math word problems. Students' performance on standardized achievement tests reflected their difficulties with the development of mathematical word problem-solving skills (Kingsdorf & Krawec, 2014). The National Assessment of Educational Progress (NAEP) (2015), National Report Card indicated that overall 60% of the fourth-graders assessed in mathematics did not achieve proficiency. The NAEP report indicated that 81% of Blacks, and 64% of Hispanics, and 84% of students with disabilities did not achieve mathematics

proficiency. The case study originated in a southern state, where 61% of fourth-graders did not achieve mathematics proficiency. It was important to discover how the targeted school is remedying students' mathematics deficiencies. The study findings revealed how fourth-grade special and general education teachers used the MTSS-RTI instruction to address the math word problem-solving deficits of students from the diverse cultural and linguistic background, with different abilities and disabilities.

The students with mathematics difficulties have problems comprehending and solving simple one-step and complex multi-step word problem (Jitendra et al., 2015). Students with problems in the math word problem-solving exhibit a lack of deciphering and reading comprehension skills, poor vocabulary growth and attention to details and limited organizational skills. Furthermore, the students struggle with mathematics calculation, writing, planning, organizing and implementing the plan to solve the word problem (Wilson, 2013). Also, Gonsalves & Krawec, (2014) stated that in the era of CCSS-M, there are significantly more word problem-solving items in state assessments (e.g., Florida Standards Assessments) and national assessments (e.g., National Assessment of Educational Progress) than in the previous state and national assessments. Additionally, of the eight CCSS-M, six are explicitly linked to word problem-solving (Kingsdorf & Krawec, 2014).

Faulkner and Cain (2013, and King Thorius et al., (2014) attributed students' failure to achieve mathematics proficiency to conditions within the school environment. Additionally, Wagner and Foote (2013) submitted that students fail to reach proficiency because teachers have limited mathematics content knowledge and pedagogy skills which

are crucial to educating children from diverse backgrounds. Moreover, De Kock and Harskamp (2014) implied that teachers might lack the content and pedagogical knowledge needed to differentiate, modify and teach word problem solving effectively to diverse groups of students. Furthermore, De Kock and Harskamp explained that teachers must teach students reading skills, how to analyze the problem, determine the type of problem, develop an equation, solve the problem, then verify the answer. Teachers need to know the mathematics curriculum and assessment, math instructional strategies, and knowledge of how students learn mathematics.

Teachers' knowledge of math content and pedagogy influenced children learning (McGee, Polly, & Wang 2013; Polly, Neale, & Pugalee, 2014). De Kock and Harskamp (2014), and Van Garderen et al. (2013) suggested that teachers' might not have the math content knowledge and MTSS-RTI practices to teach word problem-solving in inclusive classrooms. The authors suggested that teachers have a limited understanding of teaching and learning mathematics, which may result in an overemphasis on teaching techniques, low-level skills and reduced use of resources. According to Battey and Franke (2015) research findings, some educators in urban schools believe that African-American, Hispanic, low-income learners and girls do not have the innate abilities to learn mathematics. Therefore, those teachers did not see the need to use different instructional techniques to provide the children with high-quality instruction.

Several researchers (King Thorius & Maxcy, 2015; Marsh & Farrell, 2015; Regan et al., 2015; Werts, Carpenter & Fewell, 2014) indicated that teachers complained about their lack of training for teaching students with diverse abilities and disabilities in the

classroom. Those teachers the researchers interviewed had difficulties implementing the MTSS-RTI system, evidence-based curriculum, and using pedagogical practices to ensure the improvement of student outcomes. Werts et al. (2014) stated that teachers complained about their lack of skills in interpreting students' assessment results, analyze the data and using the findings to make instructional decisions. Teachers had difficulties coping with the new additional responsibilities in implementing multi-tiered response to intervention practices. The study findings revealed the type of training teachers received to improve their mathematics content knowledge and pedagogical skills, the multi-tiered response to intervention, instruction methods, data analysis, and decision-making. The study findings also detailed teachers' perceptions of their training, use of the multi-tiered response to intervention, curriculum, intervention, assessments, data analysis, decision-making and time management.

Mathematics education reform emphasized excellence and equity education for all students (Van Garderen et al., 2013). Therefore, states use them as a blueprint for mathematical instruction and practices for grades K-12 learners with and without difficulties in general education classrooms to thrive in school and prepare for college, career, and life (Common Core State Standards for Mathematics, 2014; Powell et al., 2013). The goals of the CCSS-M are to give all students a strong mathematics foundation, including an understanding of concepts, procedural skill and fluency, and the capability to apply them to solving word problems. The fourth-grade standards provide guidelines for the mathematics concepts, procedures, and multi-step word problem-solving skills that student needs to acquire (Common Core State Standards for

Mathematics, 2014; Powell et al., 2013). The CCSS-M contains broad statements of the knowledge and skills learners are to achieve at each grade level. The mathematics standards do not include pedagogical guidance and instructional practices. Therefore, educators must deconstruct the state standards, differentiate instruction and improve assessment practices. Many states deconstructed the mathematics standards for teachers, providing teaching goals and student learning objectives. The learning goals and objectives are lesson guides for developing appropriate instructional activities, aligning assessment systems for monitoring student progress, and communicating the data to other stakeholders (Konrad et al., 2014). Through CCSS-M, teachers shifted from the assessment of learning to assessment for learning. Teachers implemented instructional practices and integrated formative and diagnostic assessment practices into the preparation and delivery of instruction (California Department of Education, 2015).

According to the IDEA (2004) and ESSA (2015), school districts and schools have to use a multi-tiered instructional delivery model to provide quality, evidence-based education for every child and intervention for learners with academic struggles. MTSS-RTI is a whole school multi-tiered model that incorporates whole-class differentiated instruction combined with small-group and individual intervention. The components of the MTSS-RTI model are universal screening, continuous progress monitoring, high-quality core instruction, and evidence-based tiered interventions. Three times during the school year, educators assess all students (universal screening) to detect math proficiency and mathematics deficits. Teachers pinpoint the skills in which students who failed to reach the benchmark are deficient and provide the MTSS-RTI tier two supplementary

evidence-based intervention. Students who have not mastered skills in MTSS-RTI tier two intervention received an individual tier three intervention (Meyer & Behar-Horenstein, 2015; Regan, Berkeley, Hughes, & Brady, 2015; Sisco-Taylor, 2014). During the MTSS-RTI tier two and tier three interventions, teachers assess students' performance to monitor their progress, determine mastery, or decide who should continue with small-group instruction, or who need more intensive individual intervention (Meyer & Behar-Horenstein, 2015; Sisco-Taylor, 2014).

The qualitative single-case study approach was used to investigate how teachers used the MTSS-RTI model tier two intervention to develop fourth-graders with significant mathematics difficulties, word problem-solving concepts, procedures, and skills. The study findings described the infrastructure, socio-cultural, and pedagogical practices, teacher training, school's decision-making support system and explored the obstacles, challenges, and the successes educators experienced (Harlacher, Potter, & Weber, 2014).

This chapter of the research included the following topics: the conceptual and theoretical frameworks, mathematical word problem-solving instruction, mathematical word problem-solving difficulties, MTSS-RTI model delivery system, and implementing the MTSS-RTI model. The chapter also included MTSS-RTI strategies, challenges, and benefits of MTSS-RTI implementation, roles, and responsibilities of educators co-teaching and the multi-tiered response to intervention process, professional development, gaps in the literature, and summary.

Literature Search Strategy

The literature for this study was accessed from the electronic databases in the university library, such as ERIC, ProQuest Central, Sage Journal, Education Source, Teacher Reference Center, Academic Search Complete, PsycINFO, and the Response to Intervention website, Council for Exceptional journals and government publications. The following keywords provided useful articles: *response to intervention, response to intervention and mathematics difficulties, math research, response to intervention I and math word problem-solving, response to intervention, educators' perceptive of response to intervention. Also included are keywords math coaching, school improvement and response to intervention, math achievement gap, school leadership, and response to intervention, Vygotsky's zone of proximal development, general education and response to intervention, co-teaching, professional development, sociocultural theory, and mathematics education.*

Theoretical Foundation

Vygotsky's (1978) sociocultural theory illustrated how children learn from their social and cultural interaction and how they interpret these experiences. Vygotsky believed that an individual's learning is a collaborative, social activity through which the individual created meaning because of his or her interactions with others. Vygotsky's zone of proximal development (ZPD) described the ways participatory and social learning takes place. Teachers and peers that are more knowledgeable scaffold individuals learning concepts and skills until they can work independently. The multi-tiered response to intervention system follows the same process as used in Vygotsky's

zone of proximal development in theory and practice. Instructions and intervention begin with the assessment of the student's skill level, followed by core instruction and intervention, progress monitoring, and further instructional support (Re et al., 2014).

The education of students with mathematics word problem-solving difficulties required continuous progress monitoring to ensure that the instruction was efficient and students were making adequate progress (Meyer & Behar-Horenstein, 2015; Sisco-Taylor, 2014). Developed from Vygotsky's sociocultural theory, the dynamic assessment framework and instructional scaffolding might provide instructional support for students with academic difficulties (Kong & Orosco, 2015; Orosco, Swanson, O'Connor, & Lussier, 2013). Dynamic assessment is an evaluation technique used to determine whether students made significant progress if they received instructional feedback across a variety of increasingly complex or challenging tasks. With dynamic assessment, the teacher provides activities and instruction that are just beyond what the student can do without assistance to facilitate the learner's ability to build on what the student knows and use this knowledge to internalize new information (Kong & Orosco, 2015). Instructional scaffolding is a process by which teachers gradually decrease instructional support as students develop independent skills. Through instructional scaffolding, the teacher provides students with guidance, support, prompts, advice, directions or resources that enable them to complete a complex task (Wass & Golding, 2014). Dynamic assessment framework and instructional scaffolding are instructional strategies that teachers can use effectively to address students' deficits in mathematics word problem-solving (Kong & Orosco, 2015; Orosco et al., 2013).

Researchers (Kong & Orosco, 2015; Orosco et al., 2013) evaluated the effectiveness of mathematics word problem-solving intervention procedures using the dynamic assessment framework and instructional scaffolding with minority students with math difficulties. The authors concluded that dynamic assessment framework and instructional scaffolding contributed to the significant development of minority students' mathematics word problem-solving skills. Kong and Orosco (2015) defined minority learners as Hispanics, African Americans, English learners, Native Americans, Asian, and blended heritage children based on the United States census. Kong and Orosco (2015) recommended that teachers provide instructional procedures that build on students' background knowledge and connect new learning to their prior experience.

Kong and Orosco (2015) suggested that teachers differentiate and modify instruction to match students' academic language capabilities and use instructional scaffolding to reduce the cognitive demands of multiple step word problems. Teachers must differentiate and change their teaching because students have different learning styles, abilities and disabilities and they learn at different paces. The researchers setting is different from the regular classroom, where teachers may not have the resources or knowledge to implement dynamic assessment framework or instructional scaffolding unless the strategies are part of their math program. This case study findings provided detailed information about the assessment and scaffolding strategies teachers used in the regular classroom to develop students' mathematics word problem-solving skills. Sometimes strategies that were effective in the research setting did not produce the same

effect in the regular classroom because of teachers inability to duplicate the researchers' methods.

Conceptual Framework

Welner's (2001) zone of mediation (ZOM) framework was used to analyze the multi-tiered response to intervention policy that the general and special education teachers used to develop students' math word problem-solving skills. Welner's zone of mediation framework offers a way of emphasizing the dynamic forces that impact the implementing policy to provide quality educational opportunities for students from diverse backgrounds. The zone assists in explaining how technical, nominative, political and inertial forces shaped the school environment. The zone also illustrates how the school mediates the forces throughout the policy enactment process. The framework established education practices as the co-dependent of sociocultural processes, integrating legislation, historical, cultural, individual and contextual factors. Welner's zone of mediation investigates how school personnel interprets, negotiate and implement education policy in the complex school environment (DiGiacomo, Prudbomme, Jones, Welner, & Kishner, 2016).

The inertial forces are the deeply entrenched school cultural practices, commonly held beliefs about students, instruction, learning, and the school's daily routines developed since its inception. Normative forces are the beliefs about intelligence and inherent worth and capabilities of people. The inertial and normative forces determine the grouping of students based on age and ability, special education practices, and instructional services to learners with and without learning problems in the classroom

(King Thorius & Maxcy, 2015). The inertial and normative forces influenced administrative procedures that result in the professional collaborations of general and special educators. Additionally, the degree to which teachers implement the MTSS-RTI procedures and practices may reveal their principles and understanding of students and their education (King Thorius et al., 2014; King Thorius & Maxcy, 2015). The multi-tiered response to intervention framework emphasizes how the curricula, instruction, intervention and other contextual factors influence children's learning before focusing on identifying the children's learning disabilities (King Thorius et al., 2014)

The technical forces refer to the organization and operational functions of the school and the allocation of resources. The technical force illustrates the school's capacities and functions associated with the distribution and utilization of its resources for the implementation of the MTSS-RTI policy. An understanding of how the school distributed its resources is relevant to determining the multi-tiered response to intervention framework's impact on teaching and learning. The school's resources included its staff, physical and financial capital, scheduling, technologies, and curricular resources. The resources also included the arrangement of the classrooms to sustain co-teaching, assignment of teachers, the authenticity, and complexity of professional development opportunities (King Thorius et al., 2014; King Thorius & Maxcy, 2015). Therefore, effective classroom instruction demands that educators have continuous appropriate training, resources, and support to implement education policy (King Thorius et al., 2014). Well-equipped teachers are better able to assess students' needs and provide the intervention or enrichment activities they need to be motivated and thrive in school.

The zone of mediation showed how states, district, and school administrators put in place accountability structures and expectations that determined the successful implementation of the MTSS-RTI model within the school (King Thorius et al., 2014; King Thorius & Maxcy, 2015). The zone of mediation demonstrated how the political forces complement, contradict or complicate the enactment of multi-tiered response to intervention in the school. Schools serving students from diverse backgrounds, living in poverty do not have the needed structures that are available in affluent and middle-class communities. Therefore, low-performing schools are unable to provide similar learning opportunities to students from diverse backgrounds from lower-income families (DiGiacomo et al. 2016). In King Thorius & Maxcy (2015) example of political forces, public schools did not receive an equal distribution of financial resources and highly-qualified educators. Low-performing schools serving students from diverse background might lose their best students, funding, and highly-qualified teachers to high-achieving schools. Accordingly, the political forces examine how limited funding constrained teachers' range of scientific-based materials and instruction within the multi-tiered response to intervention model implementation process. The research findings revealed how the zones of mediation forces interconnect in the targeted school to ensure the effective implementation of the MTSS-RTI instructional delivery system.

Math Word Problem-Solving Instruction

Teaching mathematics to learners from diverse cultural and linguistic backgrounds with different abilities and disabilities in the general education classroom can be challenging to educators (Zheng et al., 2013). Moreover, Zheng et al. (2013)

explained that solving mathematical word problems is very challenging for children of all ages, especially, learners with learning difficulties. Therefore, special and general education teachers must have an in-depth knowledge of mathematics content, evidence-based programs, multi-tiered response to intervention practices, pedagogy and insight into the attributes of different learners (Van Garderen et al., 2013). According to IDEA (2004) and ESSA (2015), all students should have access to scientific research-based education curricula, rigorous standards, quality instruction, and evidence-based intervention. Although there are higher expectations for every child, minority students (example: Hispanics, Blacks, children from the lower socio-economic background, and students with disabilities), continuously underperform in mathematics (Van Garderen et al., 2013). In the National Assessment of Education Progress (2015) National Report Card, 81%% of Blacks, and 64% of Hispanics and 84% of students with disabilities did not achieve math proficiency. Additionally, Van Garderen et al. (2013) suggested that the multi-tiered response to intervention method offers teachers strategies for addressing the academic needs of all students. Teachers can use assessments to identify students with difficulties (e.g., solving word problems) and systematically provide appropriate interventions to remediate the deficits.

According to the IDEA (2004), general and special education teachers should deliver high-quality math instruction to students from diverse social class, racial, cultural background, and with different abilities and disabilities (Jitendra et al., 2015). In practice, educators struggle to provide instructional support for diverse learners to access and progress through the general education curriculum. Many students from different

backgrounds have difficulties developing math word problem-solving skills because of deficits in language and reading comprehension (Kong & Orosco, 2015; Morningstar, Shogren, Lee, & Born, 2015). Solving math word problems is a difficult skill, involving conceptual and procedural knowledge, the integration of several cognitive and metacognitive processes, and English reading comprehension skills (Gonsalves & Krawec, 2014; Jitendra, Petersen-Brown, et al., 2015; Orosco et al., 2013). Therefore, students need to develop reading comprehension skills, self-regulating and self-monitoring capabilities to be able to make proper use of their mathematics knowledge when solving word problems (Gonsalves & Krawec, 2014).

Solving mathematical word problems incorporates instruction and assessment in classrooms to facilitate a deeper understanding and application of core concepts and procedures (Gonsalves & Krawec, 2014). In addition to selecting and applying strategies to solve word problems, students should be able to read, understand the text and decode math vocabulary (Jitendra et al., 2015). Word problems also integrated language used in everyday conversation, with specialized and technical math vocabulary directly and indirectly associated with specific math content areas (Orosco, 2014). Students who lack these prerequisite skills struggle with solving word problems and need instruction that focuses on remediating their difficulties (Jitendra, Petersen-Brown, et al., 2015). Teachers must be aware of these characteristics exhibit by the students with mathematical word problem-solving difficulties to provide appropriate intervention to improve children's learning. The research findings explained how teachers awareness of students

struggle with math word problem-solving translate into more effective instruction and improve student performance.

Effective evidence-based math education must include the direct, explicit, strategic, and methodical instruction with modeling, guided and independent practice, feedback and regular review (Orosco et al., 2013; Van Garderen et al., 2013). Math instruction must also include how to translate word problem information into numerical, graphics or symbolic representation and algebraic equation (Brown, 2016). Additionally, mathematics education must consist of how to identify the categories of word problem structures and the appropriate methods to solve each problem. Therefore, teachers must use real-world content and systematically assess students' progress, provide opportunities for the practice of use of basic facts and algorithms to build fluency (Griffin et al., 2013; Pfannenstiel et al., 2015).

Similarly, students must practice planning and solve word problems by writing an equation and drawing a picture (Pfannenstiel et al., 2015). Teachers must also develop their knowledge of word problem-solving skills while determining how, why, and when to use a range of approaches (Jitendra, 2013). Moreover, Griffin et al. (2013) recommended that in designing lessons, teachers be attentive to defining and using math symbols in different contexts. Teachers used math vocabulary in classroom discourse and created opportunities for discussions and corrective feedback.

Math Word Problem-Solving Difficulties

Learners who struggled with learning mathematics, experience issues with solving word problems. Therefore, teachers should examine the characteristics students manifest

in developing conceptual and procedural skills to provide appropriate, and relevant interventions to strengthen their word problem-solving skills (Bryant et al., 2014). Van Gerderen et al. (2013) posited that research findings showed students with learning disabilities and math difficulties have issues with attention, deficits in language and prior knowledge, difficulties with specific skills, motivation problems, memory challenges, and impulsivity. Likewise, Pfannenstiel (2015) indicated that learners might not understand the language of the problem, and are unable to solve multistep problems. Students experienced difficulties in choosing and using the correct math algorithms to solve the problems. Students could not generalize and transfer approaches across varied types of word problems. Additionally, Re, Pedron, Tressold, and Lucangeli (2014) stated that students' poor performance is also related to their negative attitudes toward math. Some student could experience anxiety and discouragement while exhibiting learned powerlessness because of constant failure.

Students with difficulties in math word problem-solving have problems with working memory (Swanson, Lussier, & Orosco (2015). Swanson et al. (2015) reported that working memory has a significant role in the mathematical word problem-solving solution and causes many problems, as evident in children’s responses. Accordingly, Smith, Sáez, and Doabler (2016) defined working memory capacity as the individual ability to process information to perform a complicated task. Smith et al. (2016) explained that children with poor working memory have difficulties with complex tasks. The children also exhibited greater distractibility and forgetfulness than their peers and need teacher re-teaching or redirection. Additionally, the children have problems keeping

up with peers and efficiently using previous knowledge during lessons. The children required greater and longer support than their peers with stronger working-memory capacity (Smith et al., 2016).

Driver & Powell (2016); Orosco et al. (2013); and Orosco (2014) research findings indicated that English learners have difficulties developing mathematical word problem-solving skills. English learners experienced problems because of limited vocabulary development, mathematics content knowledge, and appropriate problem-solving strategies. Students have problems with the language, and multiple steps processes inherent in word problems (Driver & Powell, 2016; Orosco et al., 2013; Orosco, 2014). The racial and ethnic minorities (African American, Hispanic, and English language learners) are at risk for math difficulties and face challenges with the multi-step nature of word problem-solving development. Additionally, these students have problems learning the language of mathematics, practical strategies for understanding and solving word problems, because of inadequate background knowledge, limited vocabulary, and language development. These students needed early intervention to counteract the lack of background knowledge, inadequate language, and mathematics skills to be able to benefit from classroom instruction (Kong & Orosco, 2015).

Minority learners from lower socioeconomic background have difficulties acquiring mathematics skills in elementary school because of insufficient formal and informal learning opportunities. Morgan, Farkas, Hillemeier, and Maczuga (2016) specified that these students might be easily distracted, have reading difficulties, and

other learning-related behavioral issues that affect the acquisition of mathematics skills. Morgan et al. indicated that research findings showed these students listening and reading comprehension difficulties affect their abilities to understand the teacher's lengthier and more complicated verbal explanation and the interpretation of multiple step mathematics problems.

Several studies (Averill et al., 2014; Gonsalves and Krawec, 2014; Hunt, 2014; Powell et al., 2015) showed that children with learning and mathematics difficulties could benefit from multi-tiered response to intervention small-group intervention on the prerequisite skills necessary for successfully solving word problems. The multi-tiered response to intervention model makes provision for educators to use tier two intervention to remediate the deficit skills of every child. The case study findings showed how teachers determined students' deficits in solving word problems, what were the causes, and how they helped children reduce their deficits. The study findings indicated the extent to which multi-tiered response to intervention small-group tier two intervention addressed the underlying mathematics skills students needed to solve word problems successfully. A description of the school population ethnicity, socioeconomic background and students' performance on the state test should indicate how the instructional practices in the school environment were like those in the research literature.

The Response to Intervention Model Service Delivery System

ESSA (2015) requires that:

- All K-12 schools use the MTSS-RTI instructional delivery model as one of the whole-school strategies, to address students' behavior and academic difficulties.

- Teachers, paraprofessional, and other school personnel participate in professional development activities to improve instruction, assessments, data analysis and using the findings for instructional decision-making.
- The school employs and retain qualified teachers in mathematics and literacy (Every Student Succeeds Act of 2015, Pub. L. No. 114-95, 20 U. S. C. 6314, et seq. p. S.1114-63).

King Thorius et al. (2014) explained that the Individual with Disabilities Education Act [IDEA] (20 U.S.C.1400 at seq.) included MTSS-RTI model for districts and schools in determining which students need special education services because of its focus on early intervention. It focused on evidence-based education for all students with early intervention for learners with behavior and academic difficulties while restricting the overrepresentation of Blacks and Hispanics in special education because of inadequate instruction. Valenzuela et al. (2014) explained that it is a guide for educators to consider instructional factors that might cause students' learning difficulties and a useful tool for developing instruction and making decisions about intervention.

The MTSS-RTI implementation is a complicated process requiring the coordination and integration of evidence-based curriculum, pedagogy, and substantial changes in the practices and procedures in the school. It involves the development of professional teams at the school and grade levels. Administrators, teachers, coaches, counselors, school psychologists, other education specialists, and parents make up the whole-school multi-tiered response to intervention collaborative problem-solving team (Meyer & Behar-Horenstein, 2015). Additionally, Meyer & Behar-Horenstein (2015)

explained that the school's MTSS-RTI team is responsible for examining and adjusting the core curriculum, intervention programs, and progress monitoring assessment tools. Also, groups of teachers and support staff work on each grade level to plan, implement the interventions, monitor student progress, and analyze student scores to determine the next steps to be taken.

The components of the MTSS-RTI model are universal screening, scientific-based core curriculum instruction, tiered interventions, and continuous assessment to monitor learners' progress (Summey & Lashley, 2014; Valenzuela, Gutierrez, & Lambros, 2014). Administrators, general and special educators, and service providers work collaboratively using student test scores analysis to make decisions about evidence-based curricula, assessment, and pedagogical practices. The MTSS-RTI school-based team members worked collaboratively to evaluate the efficiency of the instructional strategies, curricula, interventions, and the procedures used to address individuals' learning difficulties (Summey & Lashley, 2014; Valenzuela, Gutierrez, & Lambros, 2014). The school's MTSS-RTI teams used the assessment data analysis results to make decisions about learning opportunities for all students (Regan, Berkeley, Hughes, & Brady, 2015). Together with teacher teams, the school team determines how, when and why students' intervention should begin, end or continue to the next level (Regan et al., 2015).

The MTSS-RTI system has three tier levels. The tier one level consists of the research-based, differentiated core curriculum, assessment, pedagogy, and accommodations designed for inclusive general education classrooms. At the tier one level, educators administer universal screening tests during early autumn, winter, and

spring to identify students' mathematics proficiency and deficits. Learners who scored lower than the pre-determined standard on the screening assessment received a multi-tiered response to intervention tier two small group evidenced-based intervention (Sisco-Taylor, 2014). Similarly, children who failed to make adequate progress at the tier two level participate in intensive individual interventions at the tier three level to improve their performance. Teachers referred the children who made insufficient progress at the tier three level for further evaluation to receive special education services (Meyer & Behar-Horenstein, 2015). At each tier, teachers assess student progress during and after interventions to measure the effectiveness of the program, students' mastery, and teacher's instruction.

Learners with and without learning difficulties in the general education classrooms struggle with mathematics number processes, and word problem-solving methods (Powell et al., 2013). Additionally, students struggle to identify significant numbers, determining the appropriate math operation(s), the number of steps and the order of the steps, to complete the computations to solve word problems. Therefore, educators used reliable Curriculum-Based Measurement (CBM) universal screening tools that provide valid information on students' mathematics proficiency and identify those with learning difficulties (Jitendra, Dupuis, and Zaslofsky, 2014). Additionally, Powell et al. (2013) and Jitendra, Dupuis, et al. (2014) recommended that teachers use the student scripts to analyze their knowledge of concepts and math skills to plan flexible instructional grouping to remediate learners' problems. The authors indicated that in their research students who scored lower than the predetermined standard on tier one screening

tests received intensive tier two intervention, for 20 to 40 minutes in small-group sessions, four to five times each week for up to 12 weeks.

Using the MTSS-RTI system requires teachers to monitor students' learning continuously during and at the end of the intervention. Jitendra, Dupuis, et al. (2014) mentioned the importance of continually gathering evidence of student achievement and progress. Accordingly, Valenzuela et al. (2014) stated that through the progress monitoring process teachers chart student improvement or unresponsiveness. Teachers also determine whether they should modify the present program, or if there is a need for more intensive intervention. Also, teachers use the data for making decisions about mathematics content, teaching, pacing, reviews, enrichment activities or remediation for struggling students. Similarly, Jitendra, Dupuis, et al. (2014) suggested that teachers use valid and reliable formative assessment and curriculum-based measurement (CBM) to measure student progress. Therefore, teachers can use the results of CBM to evaluate students' development, growth, or proficiency in math word problem-solving, computation and procedural skills.

Teachers used diagnostic assessment to get a deeper understanding of a student's competencies and weaknesses in mathematical word problem-solving. Danielson and Rosenquist (2014) explained that teachers need to understand how students develop and used mathematics concepts, operations, procedures, and problem-solving skills. Subsequently, Powell et al. (2013) recommended Concrete-Representational-Abstract (CRA) Assessment and pattern analysis to assist teachers in discovering students understanding of mathematics word problems. CRA diagnostic tests provide students

with opportunities to show their understanding of concepts or skills at the concrete, symbolic or abstract levels. At the concrete level, students use manipulative or object to solve problems. At the representational level, they use images or other mathematical symbols to solve problems. Students use numbers and signs to resolve math problems. Kingsdorf & Krawec (2014) suggested that teachers used error pattern analysis to find areas in which students need intervention. The teacher analyzed the mistakes students made during the tasks which provide insight into the sub-skills and processes that resulted in the incorrect answers. Then, the teacher developed and delivered the appropriate intervention, to correct the errors in mathematical word problem-solving, and monitored students' progress.

The Florida MTSS-RTI model included evidence-based core teaching practices, universal screening, tiered intervention, and continuing student progress monitoring as part of an ongoing collaborative data decision-making process. The MTSS-RTI model also required continuous professional development for administrators, teachers, other team members, and the competent leadership of principals and school-based team (Castro-Villarreal, Rodriguez, & Moore, 2014). MTSS-RTI is an education delivery system that gives every child in the inclusive general education classroom access to the curricula, and small group and individual intervention. The MTSS-RTI model incorporates collaborative problem-solving, formative assessment method, amalgamated continuing collection of data, and analysis used to make instructional decisions at every tier (Averill et al., 2014; Powell et al., 2015). Additionally, the MTSS-RTI model helps teachers track student progress in class, and from one grade to another to show gains or if

they are falling behind their peers. Through small group and individual instruction, teachers can remediate students' foundational skills deficits using more straightforward language, providing regular practice, and immediate corrective feedback (Cowan & Maxwell, 2015).

The school's leadership team administrates the MTSS-RTI model. The members of the MTSS-RTI team are principals, general and special education teachers, student services providers, coaches, content area specialists, and parents (Castillo et al., 2016). The MTSS-RTI team selects the universal screening and progress monitoring assessment tools, instructional and intervention program and other resources (Averill et al., 2014). Additionally, team members also reviewed universal screening and progress monitoring assessment scores and analyzed the information to make instructional decisions (Shepherd, Fowler, McCormick, Wilson, & Morgan, 2016). The MTSS-RTI team members also determined the professional development needs of the school's personnel to expand the capacity for the delivery of small group intervention.

Moreover, the MTSS-RTI team decided how to use resources, physical space, assign staff, schedule the time for intervention delivery while engaging students who are not participating in the intervention. At each tier, general and special educators collaborated and shared skills and strategies relating to differentiating instruction, and progress monitoring assessment to benefit learners with learning difficulties (Averill et al., 2014). Furthermore, the principal decided how often teacher collaborative teams meet for problem-solving and instructional planning and the delivery of the intervention to their students. The research findings described how closely the teachers and the school-

based MTSS-RTI team follow the process of implementing the MTSS-RTI model for developing students' math word problem-solving skills effectively.

Implementing the Response to Intervention Model

Schools face many challenges in improving equity and fairness in student access to learning and decreasing unnecessary referral to special education. Policymakers developed the MTSS-RTI framework as a solution to the challenges school faced to provide early intervention for students with academic difficulties (Brown, 2016). The MTSS-RTI model included evidence-based core teaching practices, universal screening, tiered intervention, and continuing student progress monitoring as part of an ongoing collaborative data decision-making process. The MTSS-RTI practices required continuous professional development for administrators, teachers, other team members, and the competent leadership of principals and school-based team (Castro-Villarreal et al., 2014).

Swindlehurst, Shepherd, Salembeier, and Hurley (2015) listed competent leadership, professional development, collaboration, evidence-based instruction and interventions as critical elements of the multi-tiered response to intervention model. Swindlehurst et al. (2015) explained that the principal must establish a vision and develop a supportive cultural environment for collaboration, and data-based decision-making. Additionally, Ball and Green (2014) revealed that in the age of inclusive education, school leaders are responsible for maintaining school safety and managing personnel. Also, they are accountable for designing, implementing, leading and evaluating curricula to address the needs of all students and state testing. Furthermore, Ball and Green (2014)

stated that educators must have the necessary resources and access to high-quality ongoing, authentic, interactive professional development focus on change.

Castillo et al. (2016) explained that the key to the successful implementation of the MTSS-RTI framework is a consensus among the stakeholders. Castillo et al. (2016) posited that all school staff including teachers, content specialists, coaches, and student services providers must understand the need for change. Previous policy initiatives failed because educators were not involved in the decision-making process. Similarly, King Thorius and Maxcy (2015) suggested that teachers' repertoire of evidence-based interventions can be improved or hindered because of the available financial resources. Thorius and Maxcy stated that the research results indicated that teachers often do not have the knowledge, skills, and resources needed to implement the policy.

Castro-Villarreal et al. (2014) explained that the effective implementation of the MTSS-RTI model is a complex general education initiative that requires leadership, training, administrative support, and management from the school-based team. Additionally, Castro-Villarreal et al. (2014) stated that to enhance the school's capacity to implement MTSS-RTI practices the following infrastructure is necessary:

- A comprehensive assessment system, with technological facilities for collecting, analyzing and graphically displaying data to be used in evaluating student progress;
- Identify and access tier one, two and three resources for teaching;
- Ensure that school policies and procedures align with the implementation of MTSS-RTI practices across each tier;

- Organize the scheduled time teachers should implement MTSS-RTI practices;
- Scheduled times for continuing professional development activities (i.e., training, follow-up support, coaching, and technical assistance) for every educator implementing MTSS-RTI (Castillo et al., 2016, p. 7-8)

The MTSS-RTI is a proactive approach in which teachers provide differentiated tier one core instruction to all learners and supplementary tier two and tier three intervention for at-risk students to prevent the widening of deficits gaps in their performance (Averill et al., 2014). All students in the classroom, including those with math difficulties and learning disabilities, receive tier one evidence-based instruction. Teachers must screen all students for mathematics proficiency and deficits.

States that adopted the MTSS-RTI instructional delivery system set out guidelines for its implementation. According to the Florida Department of Education (2015), guidelines educators must use reliable, valid and instructional relevant assessment tools for screening, diagnostic testing, progress monitoring, formative and summative assessments. VanDerHeyden and Harvey (2013) recommended that three times each year schools screened all students and used the test results to determine the effectiveness of the curriculum, classroom instructions, interventions, assessment tools and the need for systemic improvements. The screening process revealed the number of students who attain expected levels of proficiency. Similarly, their research revealed if there were grade-wide or class-wide achievement problems; or if there was a distinct pattern among the low-achievers in each class or grade. Risk (2014) recommended that the screening

data, students' classroom performance, and diagnostic and state assessment be used together to make instructional decisions. In addition to determining proficiency and identifying deficits, screening assessment also indicated the reliability of classroom instruction.

The MTSS-RTI model provided a framework for incorporating formative assessment for progress monitoring to inform general education classroom instruction and additional intervention. Formative assessment may be used to guide the multi-tiered response to intervention process, providing teachers with a better understanding of students' learning difficulties. It can be used to determine whether they need further diagnostic assessment (Koellner, Colsman, & Risley, 2014; Sisco-Taylor et al., 2015). Educators also used ongoing formative assessment throughout the teaching and learning processes to monitor students' progress and adjust instruction as needed to improve students' learning (Goldman & Pellegrino, 2015). Similarly, formative assessment incorporates informal and formal practices that teachers use to collect evidence for improving teaching and scaffolding student learning (Florida Department of Education, 2015; Graham-Day, Fishley, Konrad, Peters, & Ressa, 2014). The study findings described how teachers incorporate assessment results to plan, revise, and evaluate instructional activities and strategies in their daily classroom practices; the information will be useful.

Curriculum-based measures (CBMs) are time-efficient, standardized assessment tools that can repeatedly deliver reliable, valid, low-inference data (Sisco-Taylor et al., 2015). The Curriculum-based measures focus on the knowledge and skills of the student

on a specific topic in the mathematics curriculum (Gillum, 2014). Teachers can review the evaluation data generated from word-problem CBMs to identify errors in students' problem-solving processes, then modify and differentiate instruction to remediate the targeted areas. Additionally, the math CBMs can be used to screen learners with difficulties in solving math word problems and in need of targeted intervention (Jitendra et al., 2014); Sisco-Taylor et al., 2015). Subsequently, teachers review students' scripts to identify mistakes in the problem-solving assignment and revised their teaching to focus on correcting the errors.

An efficient progress monitoring system is an integral component of the multi-tiered response to intervention practices for identifying students with the mathematical word problem-solving difficulties and determining the effectiveness of the intervention. School teams used progress monitoring data for adjusting the intervention (Danielson & Rosenquist, 2014). Teachers used CBMs assessment tools to evaluate their instruction and make decisions about improving teaching and learning, and the effectiveness of word problem-solving strategies in the standard-based elementary mathematics curriculum (Jitendra et al., 2014). Additionally, Jitendra et al. (2014) replicated previous research on the use of word problem-solving CBMs assessment tools to investigate both performance and the monitoring of students with mathematics difficulties progress in a standards-based program. The researchers found CBMs assessment tools are useful in monitoring students' progress and improve teachers' instructions. Teachers can also use diagnostic assessments to determine student strengths and weaknesses, identify the skills for development and to discover the reasons for the difficulties. Similarly, Teachers might

use standardized diagnostic assessment tools, error analysis, and student work samples data to identify specific areas of challenges. The goal of teachers' efforts is to ensure that the intervention program targets student specific needs and remove barriers to student learning.

Students who are experiencing difficulties receive additional targeted support in MTSS-RTI tier two small group instruction and intervention solving word problems on different mathematics concepts. Therefore, classroom teachers and trained interventionists instruct students on how to represent word problems graphically and visually and build their fluency in retrieving mathematics facts. Teachers used explicit, systematic and strategic instruction to deliver mathematics concepts and principles. Additionally, teachers monitored students' progress to determine whether they achieved mastery of the skills and no longer needed intervention, or the children have not mastered the skills and need continuing or more intensive intervention (Griffin et al., 2013). Students who are not showing improvement at tier two received more intensive tier three instruction to increase the rate of their progress.

Response to Intervention and Math Teaching Strategies

At the MTSS-RTI tier one, teachers provided a range of evidence-based differentiated core instruction on mathematics skills, concepts, and procedural knowledge, children must understand and learn in grades K-12 (e. g. CCSS-M). Also, adequate differentiated core instruction could address the academic needs of 80-90 % of the students in the regular classroom (Meissner, 2016). Teachers provided guidance using a commercially prepared mathematics curriculum. A well-designed mathematics

curriculum provides appropriate pacing, incorporates teaching models of new content, guided instruction, and independent student practice (Doabler et al., 2015).

Additionally, the curriculum is the primary source of knowledge and skills for learners with and without disabilities and includes how and when children progress through the mathematics content. Therefore, practical mathematics instruction must consist of the use of manipulatives and technology, combining skills development with problem-solving, posing challenging questions, and making mathematics relevant to students. Teachers must teach so students can transfer math skills to novel problem types, beginning with concrete to representational or pictorial to an abstract level. Also, teachers must teach students mathematics concepts, develop their procedural literacy, and promote their strategic skills through meaningful problem-solving inquiries (Council for Exceptional Children, 2014).

The MTSS-RTI tiered interventions should be evidence-based programs and approaches used to supplement the core curriculum and instruction. The goal of the MTSS-RTI framework is to make the learning of difficult or complex tasks that are beyond the learner's capabilities, achievable with tiered intervention support (Meissner, 2016). Teachers identified academic difficulties early and provided intervention to address the deficits and gaps in the knowledge of students who were having problems (Hunt et al., 2016; Meissner, 2016). Teachers may use readily available intervention programs prepared by publishers. An intervention required a plan for implementation, evidence-based mathematics curriculum, teaching methods, standards for a favorable response, and assessment tools to monitor student progress (Averill et al., 2014). Math

tier two intervention should be a sequenced program that logically builds on students existing skills includes visual representations and opportunities for students to practice newly learned skills with and without direct support, and cumulative review of lessons (Council for Exceptional Children, 2014). Additionally, the teachers or interventionists assessed, collected and analyzed the data about students' progress regularly and made instructional decisions using the information.

Researchers identified several methods for providing mathematics instruction to students with mathematical word problem-solving difficulties. Among the methods recommended for teaching word problem solving was systematic and schema-based instruction (Jitendra et al., 2013). Other approaches are cognitive strategy instruction (Pfannenstiel et al., 2015), explicit, systematic instruction (Krawec & Huang, 2016), Dynamic assessment and instructional scaffolding (Kong & Orosco, 2015) and clear and direct instruction (Orosco, 2013). Each teaching methods have proven to be useful in small group and individual instruction.

Small group and individual intervention designs should be aligned with the CCSS-M and use several kinds of scaffolds (e.g., conceptual, strategic procedural, and metacognitive). Additionally, teachers provide prompts and suggestions using thinking aloud to assist the students in focussing on crucial conceptual elements when solving word problems. Teachers use procedural scaffolding support for students with many complicated tasks (e.g., multiple steps word problems) by modeling how to utilize diagrams, equations, and problem-solving checklists (Jitendra, 2013). Metacognitive

scaffolding helped student self-regulate the learning process, and strategic structure makes students aware of the different solutions.

Researchers (Powell et al., 2013; Krawec & Huang, 2016) explained that it is crucial for teachers to provide explicit and systematic instruction for learners struggling with mathematical word problem-solving during the MTSS-RTI tiered intervention. Explicit instruction comprises of step-by-step teacher-modeling of a problem-solving procedure, teacher-guided practice, and independent student practice. Also, Krawec and Huang (2016) defined explicit instruction as structured and organized lessons, with scaffolding support, (i.e., cueing, rehearsing, modeling), guided and distributed practices with immediate, corrective feedback on student learning, and constructive reinforcement. Similarly, Powell et al. (2013) advocated that math instruction emphasize conceptual and procedural knowledge and visual representation to help students understand the fundamental concepts.

Teachers used continuous progress mentoring to determine when and how to modify and differentiate the program for acceptable student learning. Furthermore, Powell and Driver (2015) suggested that students with mathematical word problem-solving difficulties should receive explicit instruction in mathematics vocabulary terms. The teachers ought to activate students' background knowledge and related the new words meaning to the vocabulary and concept the learners understand. Additionally, Powell and Driver proposed that teachers introduce the unknown words, discuss unclear technical terms, and motivate students to use mathematics vocabulary in discussions, confirming their mastery. Explicit instruction or cognitive strategy instruction

incorporates cognitive and metacognitive processes to help students transfer word problem-solving strategies to novel problems (Pfannanstiel et al., 2015). Additionally, Krawec and Huang (2016) suggested that during instruction, students should learn how to apply strategic tools when solving word problems (e. g. note-taking, paraphrasing, summarizing, estimating).

The MTSS-RTI tier two intervention aligned with the tier one core curriculum supplements and supports the goals and objectives of the instruction for students with math difficulties who failed to meet the grade-level benchmark. Teachers use the multi-tiered response to intervention tier two intervention to prevent students' mathematical word problem-solving challenges from escalating. MTSS-RTI tier two intervention is designed to alleviate the problems students are experiencing (Pool, Carter, Johnson, & Carter, 2013). Researchers (Orosco et al., 2013; Orosco, 2014) suggested that the teacher might modify and differentiate the instruction for clarity, provides more practice, cues, hints, or prompts for students experiencing mathematics difficulties. The teachers also provided small group intervention for those who need assistance to move from failure to success. During mathematics intervention, teachers pre-teach concepts, vocabulary, terminology, and comprehension strategies that integrate concepts and procedures, and scaffold student learning. Scaffolding involved teachers modeling mathematical word problem-solving, guide students' practice and engage students in independent practice.

The schema-based instruction approach is a teacher-mediated instruction, known to be useful in developing children's understanding and retention of the mathematical word problem-solving process (Driver & Powell, 2016; Jitendra et al., 2013).

Additionally, Jitendra et al. (2013) research study revealed that schema-based instruction is useful in providing small group tuition to students with mathematical word problem-solving difficulties. The schema-based instruction approach incorporates teacher thinking aloud and discussions with learners, to assist in the interpretation of mathematics word problems, using schematic diagrams and procedural strategy checklists. Moreover, the teachers taught students to transfer their word problem-solving skills to different multi-step questions, and how to identify relevant information presented in graphs, charts, tables, or pictures. Bottge et al., (2015) explained that special educators use SBI to guide students with and without mathematics difficulties through a sequence of steps to assist them in identifying the essential parts of the problem, develop a solution, and assess the answer. The research findings indicated that teachers in the complex school environment were integrating these instructional strategies into their teaching.

Roles and Responsibilities of Educators

The MTSS-RTI special education policy is used to address the academic and behavioral challenges in changing the demographics and characteristics of the K-12 population. In the K-12 schools, there is an increase in the number of cultural and linguistic diverse students, increasing poverty, changes in family structure, and challenges related to mental and physical health (Shepherd et al., 2016). Doabler and Fien (2013) reported that research findings indicated that general and special education teachers and mathematics interventionists are key personnel in the implementing of MTSS-RTI. In the implementation of multi-tiered response to intervention, the specific responsibilities of special and general educators vary. General education teachers are

responsible for providing tier one instruction and tier two intervention in general education classrooms.

Diversity in the classroom required that special educators develop additional skills and roles, involving knowledge of how to differentiate between disabilities and language acquisition among English language learners. Additionally, these teachers must be able to incorporate culturally responsive practices into intervention and instruction. Special education teachers are required to co-teach and collaborate with general education teachers, social workers, and family advocates to address the needs of students from culturally and linguistically diverse backgrounds. Therefore, to provide specialized instruction, special educators must have extensive knowledge of content areas, interventions, assessment, and evidence-based instructional practices. Special education teachers are also responsible for assessing students for eligibility, developing individual education programs (IEPs), collaborate with families and community agencies, supervise paraprofessionals, facilitate transition services and manage large caseloads of students (Shepherd et al., 2016).

The MTSS-RTI practices place increasing demands and changing roles for special education teachers which include higher expectation and support for all students, focus on new instructional and assessment technologies, and using data to make instructional decisions. Similarly, the multi-tiered response to intervention framework has created an opportunity for teachers to share expertise and engaged in preventive and intervention practices (Shepherd et al., 2016). Teachers collaboratively, design, and implement instructional tasks for every child in an inclusive classroom. Furthermore, Morningstar et

al. (2015) underscored the need for the school-based team to ensure that the teachers have opportunities to collaborate and plan to use different teaching strategies. The school-based team supports students' learning with individualized modifications, accommodations, and adaptations of the curriculum, using co-teaching strategies and positive behavior supports.

Ketterlin-Geller, Baumer, and Lichon (2014) described how administrators facilitate and develop a school culture of collaboration that will positively impact students' academic achievement. Ketterlin-Geller et al. explained that teacher collaboration across grade levels, in content areas and support services, can maximize planning time, share effective practices, and resources, to increase efficiency and satisfaction. Additionally, administrators focus on executing and sustaining organizational structures to schedule common planning time, enabling teachers to use their collective expertise in designing and delivering instruction using various strategies. The MTSS-RTI team ensures that the organizational structures facilitate and support the execution and continuity of evidence-based, coordinated instructional program and assessment practices. The research findings revealed how the administrators and MTSS-RTI team support teachers' collaboration, planning, instruction, and student learning. The research findings revealed teachers' perceptions of their responsibilities and the challenges teachers experienced in implementing the MTSS-RTI framework to develop students' math word problem-solving skills.

Co-Teaching and Response to Intervention Practices

General and special education teachers with different types of knowledge, skills, and expertise work collaboratively to design instruction, co-teach and evaluate student outcomes (Meyer & Behar-Horenstein, 2015). McLeskey, Waldron, and Redd (2014) indicated that general educators worked collaboratively with special education teachers and paraeducators to provide explicit, intensive instruction for small, homogeneous groups of students struggling with basic academic skills. Other researchers (Bottge et al., 2015; Conderman & Hedin, 2013; Shepherd et al., 2016) confirmed that general and special education teachers collaborated using co-teaching strategies too effectively and efficiently help all learners' access and progress through the general education curriculum.

The five co-teaching structures are (1) one teaches one assist, (2) parallel, (3) station, (4) team, and (5) alternative teaching. In the first structure, the general educator leads instruction while the special educator observes and assists students as needed. For station teaching, both teachers shared the content between them, with each teacher being accountable for presenting a component to the class. In parallel teaching, the teachers plan collaboratively but separately teach the material to small groups of students. In the alternative structure, the general educator works with the large group while the special educator teaches a small group of students. Both teachers share instruction in team teaching (Shaffer & Thomas-Brown, 2015).

Co-teaching is a cooperative partnership of special and general educators that includes shared planning, instruction, intervention, and assessment in a shared classroom

(Pratt, Imbody, Wolf, & Patterson, 2016). Special and general education teachers provide differentiated instruction, using evidence-based instructional practices to the whole-class (Conderman & Hedin, 2013). Also, successful co-teaching implementation is dependent upon continuing collaboration between the general and special educators, adequate planning time, appropriate professional development activities and administrative support (Shepherd et al., 2016). Accordingly, Pratt et al. (2016) stated that both teachers faced many challenges, including differing philosophies about teaching and learning, instructional approaches, and adequate planning time. MTSS-RTI present the opportunity for collaboration among staff members to maximize the use of the school's human and material resources through co-teaching and cooperation.

Each special and general education teacher co-teaching in the same classroom educational philosophies, styles, and expertise complement the other, as both teachers operate as partners in their roles and responsibilities. In the beginning, both teachers have explicit conversations about factors that will influence the cohesive delivery of instruction and intervention, including their beliefs relating to differentiation, modification, accommodation, and assessment of students. Additionally, Ploessl and Rock (2014) explained that general and special educators' engagement in co-teaching is an essential aspect of both inclusion and the multi-tiered response to intervention framework. Co-teaching involved a variety of skills, including communication, interpersonal skills, classroom management, collaborative lesson planning, assessment, and differentiation of instruction, data collection and analysis, and self-advocacy.

Pancsofar and Pettroff (2013) observed that the co-teaching literature showed co-teachers were not able to have practical and efficient shared planning time within the constraints of their teaching schedules. Across the research, literature co-teachers used interactive online solutions, shared responsibilities, roles, and expertise. During biweekly shared planning teachers develop goals, objectives, benchmarks, and determine how to assess student learning and growth. During daily preparation and communication, they made needed adjustments based on students' needs. The study findings revealed the level of teachers participate in co-teaching in the targeted school; the training they received, available resources and the challenges they experienced during their planning and instruction.

Professional Development

The MTSS-RTI instructional delivery model used data from mathematics standard aligned curriculum-based assessments to shape and guide its implementation. Furthermore, successful implementation required that implementors be motivated, understand the curriculum and have all the necessary materials. The MTSS-RTI model also required that educators receive professional training, performance coaching, reinforcement, and systematic minimizing or eliminating barriers. Additionally, VanDerHeyden & Harvey (2013) stated that teachers achieve intervention validity by combining scientific-based practices and decision-making. Evidence-based practices provide a framework for selecting math standard aligned co-instruction, interventions, and assessments.

The challenges districts and schools faced in implementing the MTSS-RTI model were preparing staff, allocating resources, defining staff roles and responsibilities and budgeting resources (McInerney, Zumeta, Gandhi, & Gersten, 2014). Castillo et al. (2013) recommended that educators acquire or improve their attitudes, beliefs, knowledge, and skills essential to implementing the MTSS-RTI of service delivery through professional development. The MTSS-RTI model required extensive professional development for district leaders, administrators, teachers, and support services personnel. Therefore, the ongoing professional development activities should be intensive, sustainable, cooperative, backed by coaches modeling knowledge and skills, and collective problem-solving. Similarly, Bocala (2015) quoted research that acknowledged the sociocultural nature of learning, indicating that teachers learn through interactions with colleagues in the school community. Bocala stated that individuals learning is developed and shaped by their cooperation and participation in mathematics professional development opportunities. Furthermore, teachers' collaborative communication in teams contributed to their examination and interpretation of mathematics instructional practices when they engaged in inquiry and discussions.

Marrongelle, Sztajn, and Smith (2013) recommended that districts and schools provide a substantial number of intensive, ongoing math professional development activities. Subsequently, to develop teachers' collaborative relationships, facilitators must align professional development objectives with school improvement goals, and priorities. Similarly, professional development activities should bring about some changes in educators' philosophies about teaching, student learning, instructional practice, and

improve students' achievement. Researchers (Pancsofar and Pettroff, 2013; Ploessl and Rock, 2014) indicated that the scope of professional development programs should include training in co-teaching models, more efficient use of planning time, and problem-solving. The researchers explained that both special and general education teachers who received in-service training, developed high interest and positive attitudes because they developed greater confidence in their co-teaching capabilities.

Battey and Franke (2015) stated that teachers in urban schools believe that low-income Hispanic and African American students could not learn mathematics. Battey and Franke explained that teachers failed to develop different instructional approaches to teaching children with mathematics difficulties. Therefore, mathematics professional development activities must address teachers' beliefs about the learning of students from diverse backgrounds, as well as, providing them with the needed math content knowledge, skills, pedagogy and intervention strategies (Battey and Franke, 2015). PD will develop teachers' understanding of the students' cultural and social development, as well as the mathematics knowledge they bring to the classroom.

An essential component of the multi-tiered response to intervention model is an evidence-based intervention to instruct students with academic challenges. Hinton, Flores, and Shippen (2013) stated that to teach students from different background with learning difficulties, teachers needed a range of supplemental instructional knowledge. Therefore, professional development activities must provide teachers with a variety of intervention strategies to address student difficulties in mathematical word problems solving and computation. The professional development activities must also involve

direct instruction in schema training, self-regulation methods, prompt devices, and multi-sensory approaches for implementing interventions to help students in solving math word problems.

Researchers (Bocala, 2015; Polly, Algozzine, & Mraz, 2013) supported school-based math professional development activities for teachers to improve teaching and learning. Polly et al. (2013) found that mathematics coaches could be active facilitators of school-based professional development and teachers' work of analyzing and interpreting student test scores, formative assessment data, and student work samples. Thus, mathematics coaches are supposed to be experts in content, standards, evidence-based curriculum, and pedagogical. The coach should develop trusting and collaborative relationships with teachers and cooperate with them in planning and implement instruction. Additionally, Kraft and Blazar (2016) reported that coaches conducted a two-year school-based coaching program on mathematics curriculum, content knowledge, and pedagogy that positively affect students' scores on standardized tests. Both, Castillo et al. (2013) and Kraft and Blazar (2016) indicated that coaching improves teachers' successful implementation of the multi-tiered response to intervention practices.

As McInerney et al. (2014) stated, school staff members have varying levels of expertise, exposure, and experience to engage in rigorous intervention practices. Administrators must assess the staff training needs and provide appropriate professional development activities to develop their capabilities. The principal responsibility is to ensure that the teachers have the skills necessary for the efficient implementation of the MTSS-RTI tier two intervention. Ketterlin-Geller et al. (2015) recommended that

administrators provide structured, differentiated professional development activities to facilitate building teachers combined expertise. The professional development activities must incorporate discussions on scientific-based instructional programs and methodology, assessment tools, and the analysis and interpretation of student scores to make instructional decisions to improve teaching and learning.

Initially, district and university personnel handle the implementation of MTSS-RTI, but, Burns et al. (2013) advocate for teacher involvement in all aspects of planning and implementation of the MTSS-RTI model. Teachers must be involved in making decisions about instructional practices, intervention, and assessment. Burns et al. (2013) suggested that training includes a variety of situations and contexts in which teachers applied the core components of the MTSS-RTI model. Additionally, training must integrate the MTSS-RTI strategies and tools that teachers can readily access across situations and contexts. Burns et al. (2013) also suggested the use of professional learning communities on grade levels, utilizing peers to stimulate and sustain teachers' MTSS-RTI practices, through building a collaborative culture. Teachers working in their small groups analyze and improve their pedagogies to increase student learning. The study findings revealed teachers' participation in ongoing professional development and coaching to develop their pedagogical and collaborative skills, mathematics knowledge and MTSS-RTI practices and strategies. The findings also revealed how teachers transfer their professional learning to their practice and show that they have the skills and knowledge necessary to address the diverse learning needs of all students.

Challenges and Benefits of Response to Intervention Implementation

Regan et al. (2015) explained that MTSS-RTI adoption was regularly facilitated and monitored by university faculty researchers in partnerships with school districts and schools. University researchers provided professional development and coaching for teachers who participated in the tiered intervention implementation process. Following the pilot period, school districts use trained educators to provide professional development and support for classroom teachers without the backing of university faculty researchers. Additionally, Warren and Robinson (2015) explained that classroom teachers need professional development activities, adequate resources, and distinct steps for implementing MTSS-RTI successfully. However, the research findings indicated that many elementary school teachers lacked enough knowledge of evidence-based content areas, pedagogy, problem-solving and data analysis and interpretation to make instruction decision. Furthermore, in Regan et al. (2015) research teachers reported being overwhelmed by the amount of information. Other challenges included inadequate training, insufficient time for effective intervention, the inability to collect and analyze data and coping with the new additional responsibilities.

King Thorius and Maxcy (2015) reported that research findings indicated that the teachers did not implement intervention and progress monitoring programs with fidelity. Additionally, the school problem-solving teams failed to assess the effectiveness of the interventions. In Werts, Carpenter, and Fewell (2014) research, participants listed as challenges to the implementing of MTSS-RTI practices, a limited number of special education teachers, resources, the teachers lack training and knowledge about the MTSS-

RTI processes. Werts et al. (2014) reported that most general education teachers complained of limited training in the proper use of intervention strategies, progress monitoring assessment tools, collecting and analyzing student responses or whom to contact for assistance. Furthermore, Marsh and Farrell (2015) explained that educators have a broad range of data and lack the skills to analyze, interpret and use the data to design instruction to improve student achievement. Some school districts do not have enough coaches to help teachers analyze, understand and use data to plan instruction in response to student needs. Therefore, Marsh and Farrell concluded that lack of training, meeting times, and leadership impacted how teachers use information in the classroom.

Other challenges listed in Werts et al. (2014) research were the lack of capable special educators and service providers that affected the provision of student services and teacher collaboration. Additionally, other challenges were the lack of communication and cooperation among teachers and prompt feedback from administrators. Their work is affected by scheduling problems, lack of instructional guidelines, transient children, and students' attendance problems. Most teachers agreed that they needed additional resources, finances, instructional programs, and assessment tools and data analysis software to assist in tracking student, and other staff to help with the paperwork.

Students in the general education classroom benefit from the implementation of MTSS-RTI practices of tiered instruction and intervention. Werts et al. (2014) reported that special education teachers believed that students were receiving higher levels of education with MTSS-RTI practices. Additionally, General education teachers were accountable for differentiating instruction and implementing intervention strategies for

struggling students. Students who failed to reach the universal screening benchmark were receiving intervention and better differentiate instruction based on their needs. Furthermore, there were fewer referrals for special education services as general education teachers were making better professional decisions. The collection and analysis of data improved, and teachers used data to track instruction and student growth, to ensure the fidelity of the interventions. Additionally, Regan et al. (2015) noted that general education teachers reported that there was an efficient use of school resources. This study revealed the challenges and barriers listed in the research exemplified those teachers experience in their daily practices.

The Gap in the Literature

Although schools have been implementing MTSS-RTI for more than ten years, the National Assessment of Education Progress (2015) report card showed that 60% of fourth-graders continue to have difficulties with mathematics concepts, procedures, and skills. Mathematical word problem-solving is a crucial skill to determine mathematical ability (Krawec & Huang, 2016). Today's classroom teachers face many challenges in teaching students from diverse cultural and linguistic backgrounds, with different abilities and disabilities, and behavior issues. Cavendish et al. (2016) explained that there is limited literature on classroom teacher implementation of the MTSS-RTI model in the natural school environment.

Current research on teaching solving math word problems is limited to early elementary, middle school and high school classes. Most research focused on word problem-solving in Kindergarten through grade 3 or fifth (De Knock & Harskamp, 2014),

or the middle and high school grades (Doabler & Fien, 2013; Krawec & Hauang, 2016). Experience research teams instead of classroom teachers provide intervention to students during their investigations of mathematics intervention effectiveness. Team members receive continuous expert support during the implementation of interventions and the use of progress monitoring assessment for making instructional decisions (Jitendra, 2013). Other research focused on instructional strategies utilized during the math intervention for Kindergarten through third-grade or fifth-grade (De Knock & Harskamp, 2014). They also focused on the middle and high school grades (Doabler & Fien, 2013; Jitendra et al., 2013; Kong & Orosco, 2015; Krawec & Huang, 2016; Orosco, 2013). The lack of research on teachers' use of the MTSS-RTI tier two practices to develop fourth-graders mathematics word problem-solving skills in a natural classroom environment creates a gap in the current research literature.

Additionally, Cowan and Maxwell (2015) suggested the need for additional research to clarify the process and support needed at the administrative level for successful implement MTSS-RTI model. Similarly, Hinton, Flores, and Shippen (2013) explained that their research on MTSS-RTI and mathematics instruction indicated the need for continuing research that examines mathematics instruction favorable to the multi-tiered response to intervention framework. Hinton et al. research investigated novel ways of teaching number sense, computation and problem-solving. The research also explored various methods of teaching mathematics in many different contexts, with students of varying capabilities and disabilities.

Griffin et al. (2013) evaluated research studies on how efficient instructional practices impact student learning, but, paid limited attention to teachers' understanding, designing, and delivery of instruction. Griffin et al. suggested that most teachers' teaching methods might not be adequate for addressing the needs of learners from different backgrounds, abilities, and disabilities in general education mathematics classrooms. Thus, leaving a gap in the current literature supporting the need for the use of the MTSS-RTI framework to develop fourth-graders mathematical word problem-solving skills. The research findings provided a better understanding of what is happening in the school that hinders or develop fourth-graders mathematics proficiency. The qualitative case study was significant in discovering how fourth-grade general and special education teachers utilized MTSS-RTI evidence-based screening, intervention, assessment, and student data to make an instructional decision for struggling students.

Summary and Conclusion

This literature review focused on the implementation of the MTSS-RTI delivery system, in teaching students with math difficulties the math word problems-solving processes. Research findings provided valuable information on how the development of appropriate teaching strategies, instructions and intervention, assessment, and data collection can improve teachers' instruction to students with math word problem-solving difficulties. The conceptual framework described the necessary infrastructure, administrative structures, resources, training and practices needed in the school to implement the MTSS-RTI model. The theoretical framework illustrates how teachers can scaffold students learning during small group and individual intervention. The research

findings provided information on the efficient implementation of the MTSS-RTI framework to develop learners' skills in applying mathematics knowledge to solve word problems.

The research findings also provided the foundation for the study. The research literature specified how the MTSS-RTI model processes could be implemented to improve teaching and learning. It provided a framework for discovering the role and responsibilities of educators, the professional development provided for co-teaching and multi-tiered response to intervention practices in the targeted schools. Furthermore, the literature review illustrated while the MTSS-RTI instruction delivery system is beneficial to students with learning deficits teachers faced many challenges.

Although, mathematics word problem-solving skills are essential to mathematics capabilities; the National Assessment of Education Progress (2015) national report showed that 60% of the fourth-graders assessed in mathematics did not achieve proficiency. The literature did not provide information on the implementation MTSS-RTI model to develop mathematical problem-solving in the complex school environment by teachers who work with the students daily. There is a gap in the literature on the use of MTSS-RTI practices to address fourth-graders deficits in mathematical word problem-solving skills. The research materials accessed from the university library search engines, professional organizations and government websites and databases will guide this qualitative case study.

The next chapter included this research design and methodology. The chapter consisted of a description of the district and elementary school population; the criterion

used to select participants for the study, issues of trustworthiness, ethical concerns, and methods of collecting, analyzing data and addressing bias in the study. There was a description of the school district and the process used to identify the target school, its population and the criterion for selecting the research participants. Included was the rationale for the research and the list of research questions. All research methods were explored, and the qualitative case study was determined to be the most appropriate to answer the research questions.

Chapter 3

Introduction

The purpose of this qualitative single-case study was to discover how fourth-grade special and general education teachers used the MTSS-RTI framework evidence-based curriculum, instruction, intervention, assessment, and student data to teach math word problem-solving skills. The data gathered from the research project provided information about the strategies fourth-grade teachers used to teach mathematics concepts, procedures, skills, instruction, and intervention. Teaching mathematics aimed at helping children solve real-world problems and develop strategies based on different problem-solving approaches. The study findings also revealed evidence about the roles and responsibilities of the general and special education teachers, their pedagogical practices, teacher training, and support system in place for implementing the response to intervention system. The study findings provided information about the obstacles, challenges, and the successes educators experienced using the MTSS-RTI instructional delivery system.

The study findings revealed evidence that showed special and general education teachers' perceptions of using the MTSS-RTI model to teach math word problem-solving skills to their students. The goal was to discover how fourth-grade special and general education teachers used the MTSS-RTI components of evidence-based curricula and intervention programs, differentiated instruction, and a comprehensive assessment system data to make instructional decisions.

Included in this chapter is the research design and rationale, a description of the elementary school population; the criterion used to select participants for the study, ethical concerns, and methods of collecting, analyzing data and addressing bias in the study.

Research Design and Rationale

The following are the research questions that guided this study:

- How do fourth-grade teachers use the MTSS-RTI for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties?
- What strategies do teachers adopt when teaching mathematics concepts, procedures, and skills instruction/intervention to fourth-graders?
- How do teachers help fourth-grade children solve real-world problems and to develop strategies based on different problem-solving approaches?
- What professional training, resources, support, and coaching has the district school provided for teachers to implement the MTSS-RTI framework to address fourth-graders mathematics word problem-solving difficulties?

The phenomenon under investigation in this study was the multi-tiered response to intervention method and its use to teach fourth-grade math word problem-solving. The multi-tiered response to intervention model is an instructional delivery system that gives every child in access to the primary math curricula, and small group and individual intervention. The multi-tiered response to intervention model incorporates collaborative problem-solving, formative and summative assessment methods, amalgamate continuing

collection of data, and analysis used to make instructional decisions at every tier (Averill et al., 2014; Powell et al., 2015). Additionally, it helped teachers track student progress in class from one grade to another to show gains or to discover if they are falling behind their peers. Through MTSS-RTI groups and individual instruction, teachers could remedy students' foundational skills deficits using more straightforward language, providing regular practice, and immediate corrective feedback (Cowan & Maxwell, 2015).

After considering the quantitative, mixed methods and qualitative research methods, the qualitative case study approach was found to be the most appropriate for this study. The quantitative research approach is a scientific investigation using the numeric description of attitudes, trends, or opinions of large groups of participants. The quantitative method is not suitable for this study because the process deals with surveys and experiments with large groups of participants (Hoy & Adams, 2016). The survey with different types of questions is given to a large group of participants, to collect and analyze numerical data on a specific topic. In experimental research, the researcher administers a particular treatment for the selected group of participants, and an imitation administers to the control group to determine the effectiveness of the specific treatment (Hoy & Adams, 2016). The mixed method which is the integration of quantitative and qualitative research approaches to data collection and analysis provides a complete understanding of a research problem. The quantitative method is used to examine the relationship between variables by the collection and analysis of numeric data and write the results in numbers or scores. The qualitative approach is used to focus on exploring

individuals' experiences with a phenomenon through the collection and analysis of narrative or text data that is expressed in words and images (Clark & Ivankova, 2016).

Merriam and Tisdell (2016) identified five qualitative approaches: a case study, ethnography, narrative inquiry, grounded theory, and phenomenology. After considering the five methods, I determined that the most appropriate method for this study is the qualitative single-case study. An ethnographic approach is inappropriate because this research will not focus on the description of a specific culture, behaviors, social events, and institutions over time (Merriam & Tisdell, 2016). The grounded theory was also considered and found to be inappropriate as the intention is not to develop a theory from the opinions, actions, and interactions of the participants (Merriam & Tisdell, 2016). The narrative research approach is unsuitable because this study does not document individuals and group conversation about participant life stories and experiences (Merriam & Tisdell, 2016). Phenomenological research is also unsuitable for this study. The phenomenological method is best suited for exploring the individual's response to emotional and intense human experiences (Merriam & Tisdell, 2016).

The qualitative case study is a firsthand in-depth investigation of a current occurrence called "the case" in a complex everyday real-world school environment (Yin, 2014). The qualitative case study approach is used to focus on exploring individuals' experiences with a phenomenon through the collection and analysis of narrative or text data that is expressed in words and images (Clark & Ivankova, 2016). Maxwell (2013) explained that the question posed for the study determine "the case" in the qualitative case study. The question for this study is "How do fourth-grade teachers use the multi-

tiered response to intervention system for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties?" The group of fourth-grade special and general education teachers using the multi-tiered response to intervention practices to teach math word problem-solving is "the case." The qualitative case study provided an understanding of fourth-grade teachers' experiences using the phenomenon multi-tiered response to intervention system within the complex social setting of the classrooms with students of diverse background, abilities, and disabilities.

According to Yin (2014), the qualitative case study approach uses a variety of sources of evidence to ensure the validity of the findings through the triangulation of the data. The sources of data to answer the research questions were interviews, copies of teachers' units and lesson plans, math and intervention programs, training document, and teachers' guides and assessment tools. The qualitative case study focused on processes and changes in the teachers' daily practices within the general education context in rich details (Clark & Ivankova, 2016). The qualitative case study approach is appropriate for developing an in-depth analysis of how fourth-grade teachers used the multi-tiered response to intervention screening, intervention, and progress monitoring system to correct students' mathematics problem-solving deficiencies.

Role of the Researcher

I received approval from Walden University Institutional Review Board (IRB) #11-28-18-0284681, the district official and the principal of the targeted school. The principal provided me with the names and email addresses of the fourth-grade special and general education classroom teachers. I sent introductory emails to each teacher and met

with the teachers individually over two days to explain the purpose of the study and get their informed consent. I explained the benefits and risk of volunteering to participate in the research and explained that there is no financial remuneration for participating. I thanked the teachers for their assistance to reveal how they implement the multi-tiered response to intervention model for developing student mathematics word problem-solving skills. I assured the principals, and teachers that the study would be conducted with a high degree of professionalism, and confidentiality.

I played several roles as the interviewer, data recorder, data analyst, interpreter, and nonparticipant researcher. It was essential to conduct the study with fidelity and without bias to discover how fourth-grade special and general education teachers use the multi-tiered response to intervention framework evidence-based instruction, screening, tiered intervention, assessment, and student data to teach math word problem-solving skills. I retired as a special education teacher from the New York City Department of Education in 2012, never worked in the Florida, district or school, and there is no relationship between me and the school or teachers. All the information on the multi-tiered response to intervention practices came from the research literature, training handouts, response to intervention websites, and textbooks available in the university library, and the state and district websites. Rich, thick descriptions and explanations were used in giving an accurate report of teachers' responses, to reduce bias or preconceived ideas about the multi-tiered response to intervention and its implementation.

Methodology

MAC elementary school in the southeastern United States was the site of this qualitative case study. The school is a large K-5 five-year-old school with 824 students. The school earned a grade D in the 2017-2018 school year. In the 2018-2019 school year, MAC elementary, a Title 1 school listed 89% of the students as economically disadvantaged based on the parent survey. Table 2 is a listing of the students' demographics.

Table 2

Demographic Details of the Selected Research Setting

Ethic Category	Hispanics	Black	White	Multi-Ethnic	Asian
Percentage	57%	20%	18%	3%	1%

The school has a large population of Hispanic (English language Learners), (57%). According to the principal, most of the students' parents do not speak English. As a result, the principal scheduled 90 minutes of Reading and English Language Arts daily, with before and after school intervention for Math, Reading and Writing for fourth-graders. The principal explained that the school's population migrated from within the school district, the state, from other States, and Puerto Rico, and some lived in poor communities, others lived in the new neighboring communities and get to the school by school bus.

The school has a school-based leadership team. The school-based leadership team is responsible for the implementation of the MTSS-RTI to support teachers and ensure that students participate in research-based curricula, universal screening, tier one core instruction, with tier two supplemental instruction and tier three intensive intervention when students need it. The team organizes and supports the systematic collection of data from universal screenings, formative, ongoing progress monitoring, and summative data. The school-based leadership team also determine the school-wide professional development needs of teachers and arranged training aligned with the school's improvement plan goals (Florida Department of Education, 2017).

Maxwell (2013) explained that in determining where to conduct the study, the researcher selects participants with whom he or she can "establish the most productive relationships" (p. 99) and are best able to answer the research questions. Maxwell (2013) suggested that the researcher who is investigating teachers' knowledge and practices develop relationships with the practitioners to reduce defensiveness in discussing their practices. He acknowledged it is easier to establish relationships with proficient teachers who will be eager to share their experiences while less skilled teachers may be concerned about their inadequacies.

The criteria for selecting participants for the study is their involvement with MTSS-RTI processes to teach mathematics in fourth-grade. The selected participants are five volunteer special and general education teachers responsible for teaching mathematics MTSS-RTI tier two intervention to fourth-graders from different linguistic and cultural backgrounds with and without disabilities. The selected participants are

knowledgeable about mathematics word problem solving, the school's data system, MTSS-RTI screening, interventions and student progress monitoring assessment tools.

I received approval for this study from the Walden University Institutional Review Board (IRB), the school district, and the principal of the targeted school. After securing approval from the school district, I made an appointment with the principal. During the visit, I met with the principal to discuss the research and received the principal's approval to conduct the research project in the school. The principal gave me the names and email address of each fourth-grade general and special education teachers. I sent introductory emails to the teachers individually and arranged to meet them on the next visit to the school.

At the first meeting with each teacher, I explained the goals and purpose of the study, procedures, privacy statement, and benefits and answered any questions raised by the participants and collect information as to the best way to contact and communicate with them. Each of the teachers received the informed consent letter with instructions to read, and sign, and return to me on the second visit. At this point, I explained to each participant the need to record the interview and ask each teacher's permission to do so. I asked each teacher to provide a specific date, time, and location for the individualized face-to-face interview within the five weeks of data collection. I gave teachers four options for answering the research questions: face to face interview, via Skype, a conference call or via email. I anticipated that the participants would provide insight into their interpretation and implementation of the MTSS-RTI system and describe truthfully

the strategies, programs, and assessment tools used in developing students' math word problem-solving skills.

During the second visit with each teacher, I requested from each teacher copies of his or her intervention lesson plans, the screening assessment and summative assessment after the intervention. I asked for access to copies of the district response to intervention guide, training guide, teachers' teaching guides, and other teaching tools provided to teachers, and math and intervention programs. The coach provided a copy of the teacher's guide for i-Ready Florida Mathematics, teacher's copies of training booklets and websites where other resources are available for the math resources used in the school. Review of these documents provided an insight into how teachers interpreted their preparation in their daily practice and compared the content of the materials with the current literature on the implementation of the response to intervention method in the teaching of math word problem-solving.

Instrumentation

I developed the teacher interview protocol (Appendix A) with open-ended questions based on the research literature and four research questions to collect data from individual participants. The questions were developed to gain insight into how fourth-grade special and general education teachers used the MTSS-RTI processes to address the students' math word problem-solving deficiencies. Yin (2014) explained that interviews allow participants to discuss a topic in detail and provide information that is not accessible through other means.

The Florida Department of Education tools for examining the integrity of response to intervention implementation (Appendix C) were used to evaluate fourth-grade teachers' implementation of MTSS-RTI to improve students' math problem-solving skills. I used the checklist from the Florida Department of Education *Problem-Solving/Response to Intervention Evaluation Tool Technical Assistance Manual* to analyze the teachers' lesson plans (Appendix B). I made notes from the texts that related to the research questions.

Yin (2014) explained that interviews could provide insight into the organization operations, interviewees' perceptions, and meanings. The study was organized to use open-ended questions in face-to-face interviews with four fourth-grade special and general education teachers. I used face-to-face interviews and email response to interview questions with teachers to get their description and perception of the use of the MTSS-response to intervention framework to address student mathematics word problem-solving difficulties. The interview questions covered such topics as teacher training, MTSS-RTI screening, tiered intervention and assessment, teaching strategies, mathematics and intervention programs, teacher collaboration, data analysis, and decision-making processes. Two of face to face interviews lasting 60 minutes each were conducted during the first three weeks of the study and were scheduled based on the convenience and availability of the participants. Three email interviews were completed during the next three weeks of the six weeks data collection period.

In-depth and open-ended interviews with the five teacher participants provided the evidence in answer to the research questions. In addition to the demographic data, the

teachers provided data on the problem-solving strategies used to identify students who need intervention, the selection of the programs and progress monitoring tools. The interviews revealed information about how the teachers differentiate, modify and adjust mathematics word problem-solving instruction and intervention to educate learners with diverse abilities. The teachers shared their problem-solving and teaching strategies, their perception of their roles and responsibilities in the MTSS-RTI process, and their challenges and successes. The participants also described how MTSS-RTI fits into the school's instructional delivery system, and how the universal screening system, data collection, and analysis featured in the decision-making process. The interview questions also focused on getting explanations of the procedures used to identify students who need intervention. The in-person interviews provided the opportunity to ask teachers follow-up questions to clarify their answers.

I also examined the district MTSS-RTI procedural documents, district training document, intervention program, teachers' math teaching guide, assessment tools and the observation of a tier two intervention lesson. Most of these were in the form of books and used to verify information gathered during the interviews. Also, these books provided information to compare with the practices in the research literature and to examine the practices within the targeted school. I used documents to corroborate information from interviews and other sources (Yin, 2014). I used district and school MTSS-RTI procedure documents available on the district and response to intervention websites (e.g., www.rti.com; www.rti.org) that will provide details of the processes, practices, and procedures.

Data Analysis Plan

After each interview, the transcripts were entered into the NVivo computer program for analysis. Participants reviewed their transcripts and corrected where necessary. I read and reread the answers to each question and underlined relevant words, phrases, sentences or sections. Then, jotted down comments, notes, observations, and queries in the margin of each transcript. I grouped notes and comments into categories and themes and creating a labeled diagram. The coded data focused on patterns and insights related to the research questions and purpose of the study guided by the conceptual and theoretical frameworks. I created file folders for each labeled category. Each labeled category script included the respondent's pseudonym identification and the excerpt line number from the transcript. I analyzed the notes made from the district MTSS-RTI procedural documents, district training document, intervention program, teachers' math teaching guide, and assessment tools, along with the interviews to write the results of the study.

I secured the electronic copies, hard copies of transcripts and files in a locked filing cabinet in my home office that is not accessible to any other person. The copies will be kept securely for five years after the dissertation was defended and accepted by the university and then shredded.

I wrote the findings using verbatim quotes from interviewees and the district MTSS-RTI procedural documents, professional development handouts, and teachers' MTSS-RTI documentation. A record and description of topics and themes that were unique and interesting in the data formed part of the final product. During the data

collection and analysis, I used a daily journal to write down thoughts about coding, providing a rationale for merging codes and explaining the meaning of each theme (Merriam & Tisdell, 2014). Merriam and Tisdell (2014) suggested that the researcher also purposefully look for data that might challenge the researcher's expectations or emerging findings. I included in the final report all discrepancies that challenge my expectations or emerging findings.

Issues of Trustworthiness

I established the trustworthiness of the study through the techniques of credibility, dependability, transferability, and confirmability. Credibility is establishing that the findings of the study are realistic. Dependability confirms that the study findings are consistent and other researchers could repeat the study. Transferability is the degree to which the study is transferable to another setting. Confirmability questions how the data collected supports the findings. The participants reviewed the transcripts of their interviews, and the interpretation of the data to verify their statements and fill in the gaps from their interviews (Merriam & Tisdell, 2014).

Similarly, I provided a detailed description of the plan and execution of the study processes to establish dependability, to enable another researcher to repeat the work and develop a thorough understanding of the methods and their effectiveness. I included a detailed description of each step in conducting the study, data collection, and analysis – coding- to derive the findings. The dissertation committee may examine the research data collection process, data analysis and the result of the study to confirm the accuracy of the results and verify that the collected data support the findings (Merriam & Tisdell, 2014).

I included a detailed description of contextual information about the school and fourth-grade classroom environment in the study write up. I also added a detailed description of the fourth-grade population, teacher qualification, training and beliefs, and the data collected so that the readers can determine the extent to which the findings are transferable (Merriam & Tisdell, 2014). Establishing confirmability involves developing an audit trail. In establishing confirmability, detailed descriptions of the data collection process, analysis, and interpretation were included in the final product. The transcribed recordings from interviews, documents, and artifacts were managed, organized, and coded, using the NVivo computer software program.

The laptop, interview transcripts, research journal, and documents will be locked in a cabinet not accessible by any other person. I kept a diary of reflection, analysis, and self-critique of the progress of the research project.

Ethical Procedures

I obtained authorization from the Walden University Institutional Review Board (IRB) and approval from the school district's Office of Research and Accountability and the targeted school's principal. The school district has a specific form for requesting permission for research in the schools. Merriam and Tisdell (2014) explained that ethical issues could exist with procedures as described in the guidelines of institutional review boards (IRB) such as "do no harm" and ensure informed consent and protect participants' right to privacy. I made efforts to protect the participants from harm and ensure their right to confidentiality. Teachers had the opportunity to provide informed consent with the option to withdraw from the study anytime (Merriam & Tisdell, 2014).

I sent individual emails to the fourth-grade special and general education teachers inviting them to participate in the research. The email described the purpose and significance of the study and extended an invitation to participate in the study. I delivered the informed consent form to potential participants. The informed consent letter explained that to conceal their identity and retain their confidentiality each transcript has a pseudonym. Participants signed the letter of informed consent and given time to select a date and time for the interview. All participants had access to their interview transcripts to clarify or respond to additional questions and provide feedback. All these actions will protect the participants, and their rights will be safeguarded.

Also, the ethical protection of participants will be maintained by adhering to the National Institutes of Health (NIH) policies and procedures for protecting human participants. I assured participants that the research procedures, analysis, and write-up plans would not include participants' identities indirectly or directly. All the information they provide through the interviews will be confidential.

I assured participants rights to confidentiality by securing all transcripts, computer, and documents, that is available to me and the dissertation committee members if they requested them. During the meeting with the teachers, I asked for access to school MTSS-RTI materials, math intervention program, teachers' intervention lesson guides, plans, and assessments.

There is no relationship between the school, the teachers and me. I retired in 2012, and never worked in the state, district, or school; therefore there is no conflict of interest.

Summary

This chapter presented the research design and methodology. Included is a description of the district and elementary school population; the criterion used to select participants for the study, ethical concerns, and methods of collecting, analyzing data and addressing bias in the study. Of all the research methods explored, the qualitative case study was determined to be the most appropriate to answer the research questions.

The chapter covered the review of the research purpose, data collection procedures and method of analysis. Also included are the interview protocols developed from the research literature and the research questions. Additionally, the chapter included a description of the role of the researcher, research trustworthiness, and ethical procedures. There was also a review of school and district document and materials related to students' intervention, teacher training, mathematics curriculum, and intervention program and assessment tools, data, and teachers' plans.

Chapter 4 included the collected data, analysis, interpretation and findings. The chapter contained a description of the research procedures and the list of documents used to verify school practices and training. The chapter included a description of the coding of the interview transcripts, analysis of the data and a description of the research findings with direct quotes from each participant.

Chapter 4

Introduction

The purpose of the study was to discover how fourth-grade special and general education teachers, in MAC elementary school used MTSS-RTI evidence-based curriculum, instruction, intervention, assessment, and student data to teach math word problem-solving skills. The data gathered from the study provided information about the intervention program and teaching strategies fourth-grade teachers used to teach mathematics concepts, procedures, skills, and intervention.

The following are the research questions that guided the study:

- How do fourth-grade teachers use the MTSS-RTI for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties?
- What strategies do teachers adopt when teaching mathematics concepts, procedures, and skills instruction and intervention to fourth-graders?
- How do teachers help fourth-grade children solve real-world problems and to develop strategies based on different problem-solving approaches?
- What professional training, resources, support, and coaching has the district, and the school provided for teachers to implement the MTSS-RTI framework to address fourth-graders mathematics word problem-solving difficulties?

This chapter discusses the research setting and demographics of the school, students and teachers, data collection, data analysis, evidence of trustworthiness, the research results and is followed by a summary.

Setting

The five-year-old, MAC elementary school (pseudonym) is a large school with 824 students. Table 3 is a listing of the students' demographics.

Table 3

Demographic Details of the Selected Research Setting

Ethic Category	Hispanics	Black	White	Multi-Ethnic	Asian
Percentage	57%	20%	18%	3%	1%

In the 2018 Florida Standards Assessments, only 41% of the 143 fourth-grade students scored level three and above. The school received a D grade in the 2017-2018 school year. The school-based team made some changes to improve the performance of the struggling students. The school adopted the i-Read Florida Mathematics in September 2018. During the first two weeks of the research project in January 2019, there was universal screening (diagnostics testing), throughout the school, a computerized process which took three weeks.

The School-Based Leadership Team released to teachers the computer-generated progress monitoring results that showed each student progress from the first diagnostic test in September to January 2019. The coach reported that all students made gains, 52% of the students performed on the fourth-grade level. They have the prerequisite skills to continue in the fourth-grade curriculum. The coach made it clear that the students are a long way from meeting the goals of the 2019 Florida Standards Assessment.

In the school, there are five general education fourth-grade inclusive classes and one self-contained special education class, which altogether consist of 140 students. I invited all eight teachers to participate in the study; only five teachers taught math and accepted the invitation. Table 4 list the fourth-grade teachers and their subject assignment.

Table 4

Fourth-grade Teacher Subject Assignment

Teachers	Title	Subject Assignment
Mrs. Alexander	General Edu	Reading and English Language Arts
Mrs. Benson	General Edu.	Reading and English Language Arts
Mrs. Bobb	Special Edu.	Math, Reading and English Language Arts
Mr. Frank	General Edu.	Math, Reading and English Language Arts
Ms. Hayman	General Edu.	Reading and English Language Arts
Mrs. King	General Edu.	Reading and English Language Arts
Mrs. Lord	Math Coach	Mathematics
Mrs. Smith	Special Edu.	Math, Reading and English Language Arts

All fourth-grade special and general education classroom teachers are responsible for 90 minutes of Reading and Language Arts instruction because of very low performance in this area. Lack of reading comprehension skills affects students' performance in mathematics word problem-solving. Fourth-graders receive 60 minutes of

math instruction daily. The math coach also provided coaching and training for teachers and participates in the assessment of students, and collaborative planning with fourth-grade teachers. Table 5 lists the work demographics of the research participants.

Demographics

Table 5

The Work Demographics of Participants.

Teachers	Numbers of Years Teaching				
	Experience	at MAC	Fourth-Grade	Math	MTSS-RTI
Mrs. Alexander	3	3	3	3	0
Mrs. Bob	2	2	2	2	2
Mr. Frank	3	3	3	3	3
Mrs. Lord	8	5	5	8	5
Mrs. Smith	15	2	8	8	8

Even though all eight fourth-grade teachers were invited only five of them teach math and participated in the research project. Mrs. Smith is a special education teacher teaching for more than fifteen years. She taught fourth grade for eight years and moved to MAC Elementary from Washington DC over two years ago. Mr. Frank and Mrs. Alexander, general education teachers, have been teaching for three years at MAC Elementary School. Mrs. Bobb, a special education resource teacher, has been teaching for 2 years.

They came to MAC elementary from college and taught fourth-grade for three and two years. Mrs. Lord, math coach and general education teacher has been teaching for more than 8 years and has been teaching math in the lower performing fourth-grade classes for the past five years.

Data collection

The collection of data took six weeks. I conducted two face to face interviews with two fourth-grade special education teachers. Three fourth-grade general education teachers completed the interviews via emails. During the same period teacher training documents, math and intervention program, assessment tools and the observation of Tier 2 intervention lesson were analyzed in addition to obtaining information about the intervention program. I visited the school on two consecutive days during each of the first four weeks before the first interview because of universal testing in the school. Before this, I obtained consent from the participant teachers after discussing with them the consent form that is presented in Appendix B and a copy was given to them. The teachers were provided with four options about how to participate in the study: face to face interview, through email, Skype or a conference call.

Before the interviews were conducted I requested permission to record the interview. However, Mrs. Smith and Mrs. Bobb the special education teachers requested that their interviews should not be recorded but allowed time for me to type their responses on the computer during the interviews. Mrs. Smith stayed after school to participate in the interview. Mrs. Bobb's interview took place in her classroom during her planning period over two consecutive days. Each interview was recorded under a given

pseudonym and was provided with the opportunity to review their transcript of the interviews and to make any corrections to the same if required.

MAC Elementary School has five general education inclusive classes and one self-contained special education class. Three general education teachers explained that they were not teaching Math and could not participate in the study. The other two general education teachers and coach explained that they were testing and would answer the questions through email as soon as they can. I emailed the questions (Appendix A) to the teachers and sent follow-up emails and visited the school over the next two weeks. After weekly reminders, in the fifth and sixth weeks, I received the completed transcripts from the two general education teachers and the math coach. The math coach printed the question and wrote in the answers at her convenience. I typed her answers and uploaded the transcript into the computer program. The five interviews were uploaded into NVivo 12 and coded based on the themes derived from the central research questions and the sub-question of the study.

Table 6 gives details of the teachers and the numbers of students with disabilities, English language learners (ELL) and general education (ED) students for whom they are responsible.

Table 6

Demographics of the Fourth-grade Students

Teachers	Students with Disabilities	ELL	General Ed. Students	Total#
Mrs. Alexander	8	9	6	23
Mrs. Bobb (Special Ed.)	18	8	0	18
Mr. Frank	8	9	11	28
Mrs. Lord	8	12	40	40
Mrs. Smith (Special Ed.)	8	3	0	8

During the data analysis period, I went to the school to clarify certain issues which came up. To clarify these issues, I observed a teacher's small group tier two intervention. During the collaborative meeting, I raised the issues with the teachers as to why there is no math program in the school and why many students failed the Florida Standards Assessments. The response came from Mrs. Smith who invited me to observe her math class the following day.

Data Analysis

I entered the interview transcripts into NVivo 12. I read the transcripts and coded each broad category that related to the central research question which provided a structure to identify the subcategories on my subsequent readings. The main research question was: How do fourth-grade teachers use the Multi-Tiered Support System-

Response-to-Intervention support system for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties? The broad categories derived from the questions and sub-questions were MTSS-RTI, math and intervention programs, teaching strategies, planning and preparation, co-teaching, professional development, and challenges and barriers. The subcategories under MTSS-RTI were tiered one, tier two, characteristics of students with difficulties, and progress monitoring. The description of the i-Ready Florida Math came from the teacher training manuals.

Evidence of Trustworthiness

In a qualitative study, credibility is established when the researcher considers the complexities involved in a study and deal with the patterns involved which are sometimes difficult to explain (Guba, 1981). I conducted the study in an elementary school with five fourth-grade special and general education teachers. Additionally, I included a detailed description of contextual information about the school and fourth-grade classroom environment in the study write up. It consists of a detailed description of the fourth-grade population, teacher qualification, training and opinions, and the data collected so that the readers can determine the extent to which the findings are transferable.

In qualitative research, transferability could be achieved by providing detailed descriptions of the data gathered during the study period Guba, (1981). I have shown transferability by including context-rich information gathered during the study period.

In my attempt to establish dependability I described the plan and execution of the study processes to enable another researcher to repeat the work and develop a thorough

understanding of the methods and their effectiveness. Dependability was further strengthened by including a description of each step in conducting the study data collection, analysis, coding and to the point where findings were derived.

The aspect of conformability which is the qualitative equivalent of the concept of objectivity in qualitative studies (Guba, 1981) was achieved by reviewing the transcripts of the interviews conducted with the participants. Each participant reviewed the transcripts of their interviews, and the interpretation of the data to verify their statements and fill in the gaps from their interviews. Establishing confirmability involves developing an audit trail. In establishing confirmability, detailed descriptions of the data collection process, analysis, and interpretation are in the final product.

The interview transcripts and documents were managed, organized, and coded, using the NVivo 12 computer software program. I locked my computer with a personalized access code, all interview transcripts, research journal, and documents in a cabinet not accessible by any other person. Apart from all the activities described above I also kept a research journal which included my reflections analysis, and self-critique of the progress of the research project.

Results

The research results are organized by research question and subquestions from which came the main categories and subcategories. Five interviews, documents on the i-Ready Florida Math program, district training document, and teachers' guides and assessment tools provided the data of the study.

Research question: How do fourth-grade teachers use the MTSS-RTI for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties?

Response to Intervention Tier One

The five research participants used the MTSS-RTI components of the evidence-based curriculum, universal screening, instruction, tier two intervention, and assessment to teach math word problem-solving skills to students who were having difficulties. This study covered the use of universal screening, tier one instruction, and tier two intervention and progress monitoring for students with persistent and significant math word problem-solving difficulties. Tier one is the whole class instruction with the scientific-based curriculum, diagnostic testing, and progress monitoring. Universal screening (diagnostic testing) is used to determine the students at risk for academic failure proactively. The computerized diagnostic test identifies the prerequisite skills students lack, group students, according to their needs, and prescribes whole class instruction, and small group tier two intervention. The teachers used the computerized i-Ready Florida Math Adaptive Diagnostic Assessment for universal screening. They explained the reasons for diagnostic testing as follows.

As indicated by Mr. Frank the diagnostic testing enables teachers “to comprehensively identify the below level skills and sub-skills (prerequisite skills) not mastered by students and to allow for individualized direct instruction.” He further added that “the computer program *determines* tier two intervention.”

Mrs. Alexander stated that the diagnostic test is used:

> To identify students at risk of meeting grade level standards. Instant reporting help teacher monitor all students progress. The diagnostic test shows why students are struggling, and who need tier two small group intervention. The i-Ready computer program assigns lessons to the student to their specific needs whether they are below, on or above grade level.

According to Mrs. Bobb the diagnostic testing "identify the students' strength and weaknesses. It also identifies students who need intervention. After students are assessed to identify their skills and content deficits, they are grouped according to needs."

Mrs. Smith opinion was that it "determines their strength and weaknesses in prerequisite math concept and skills for grade four. Each student's results indicated the areas they need intervention."

Characteristics of Students with Difficulties

An analysis of students with difficulties in math word problem-solving, math scripts revealed that the students exhibited many characteristics. Teachers noted that children with difficulties in math word problem-solving lack comprehension skills that affect their ability to decode the language in the problem and determine the operation to use to solve the problem. Some students are not fluent in math computation and have difficulties with place value. The teachers' comments are as follows.

Mrs. Lord, the math coach, explained that "The students demonstrated issues of comprehension. They did not understand what the problem was asking them. Therefore, they could not determine which math operation to use."

According to Mrs. Smith:

Students have difficulties reading the math word problems, decoding the language, determine what kind of problem it is and which operation to use. Some English language learners have learning disabilities and lack reading comprehension skills. Students have difficulty decoding the vocabulary. Although students are taught math language and vocabulary, some are not able to apply them in the test.

Mr. Frank explained that:

Comprehension of basic facts found in the word problem plague ELL and some of the special education students. *Lack of comprehension skills* causes the student to miss-identify the required operation to be used to solve the equation. In word problems with two or more *math* operations, the hierarchical order of the *math* operations is reversed. Some students have not mastered place value in numbers with three or more numerals.

Mrs. Bobb stated that:

Students have difficulties with decoding vocabulary and lack comprehension skills. They have difficulties reading word problems. Students have difficulties differentiating between important and extra (*irrelevant)* information. They have difficulties with visual deficits and abstract thinking. They need repetition of instruction and practice to master the skills. They have difficulties selecting operation. The students are easily distracted.

Response to Intervention Tier Two Intervention

The five teachers used fourth-grade is -Ready Florida Mathematics Practice and Problem-Solving program for tier two intervention. For universal screening and monitoring students' progress, the computerized i-Ready Florida Math Adaptive Diagnostic Assessment was used. The computerized program grouped students according to their needs and provided the online interactive tier two intervention for each student. The program provides teachers with tools for reteaching the skills and content to the whole class and in small groups.

Mrs. Lord, the math coach, added more information further to the view of how teachers selected students for tier two intervention. She explained that:

> Students are selected based on the test results and their work in small groups. Data is analyzed based on student performance and observations conducted daily in small groups. When a student shows a consistent struggle and is well behind his or her peers, the multi-tiered support system is implemented. The teacher then implements the intervention. The duration can last 6-8 weeks for tier two intervention. The classroom teacher provides the face to face support.

Mrs. Smith added that:

> After the screening test, the teacher gets each student's results with an indication of the areas in which they need intervention. Students are group according to the skills and content deficits. All intervention take place along with the fourth-grade math curriculum. The 60 minutes math is

> divided into whole group instruction fourth-grade math, small group guided practice and independent practice, and 20 minutes of intervention on the skills students are having difficulties.
>
> Mrs. Bobb stated that:
>
> After students are assessed to identify their skills and content deficit, they are grouped according to need. Along with core instruction, students receive tier two small group instruction two to three times a week for 20 or 30 minutes during the mathematics period.

Mrs. Alexander added that:

> The online diagnostic test generated results showing students strength and weaknesses, *with* online tutorials. The i-Ready program assigned lessons to the students to address their specific needs whether they are below, on or above grade level.

However, Mr. Frank thought that from the diagnostic testing "the computer program determines tier two intervention. It is used with scaffolding from the teacher in the small group intervention."

Progress Monitoring

Teachers used different assessment tools to monitor students' progress. Teachers used the end of the unit test; teacher created worksheets, teacher-made test, Easy Curriculum-Based Measures assessment, and i-Ready formative and summative assessment. Teachers assessed students weekly, bi-weekly, monthly and at the end of math unit and intervention.

Mr. Frank uses teacher created worksheets, and some oral sharing during small group, and i-ready summative assessment.

Mrs. Alexander checks students understanding during daily small group intervention and weekly test to verify their understanding.

Mrs. Bobb uses Easy Curriculum Measures assessment for weekly and bi-weekly assessment, and i-Ready summative assessment.

Mrs. Lord uses Easy Curriculum-Based Measures assessment twice per month to monitor students' progress during small group intervention. Mrs. Lord stated that she also uses "The summative assessment is the unit test that incorporates word problems."

Mrs. Smith explained that she assessed students "weekly with teacher-made test and Easy Curriculum-Based Measures assessment to monitor their progress and after six weeks i-Ready summative assessment."

Intervention Program

Teachers used the i-Ready Florida Mathematics Practice and Problem-Solving program for tier two intervention. Aligned with the Florida Mathematics Standards, i-Ready Florida incorporates the state's MTSS-RTI tiered instruction and intervention model. The program includes student texts, teacher's guide, online teacher's toolbox, computer-generated diagnostic testing with automatic results, that group students for tier two intervention, teacher's lesson plans, differentiated small group instruction for reteaching and tier one, tier two and tier three interventions.

i-Ready Florida math is a blended mathematics program of research-based instruction and assessment designed to provide students with rigorous instruction in

Florida math standards in preparation for college and career readiness. The program incorporates differentiated instruction, guided and independent practice of critical mathematical concepts and skills, intervention and progress monitoring formative and summative assessment. The i-Ready Florida math program provides online prerequisite lesson plans from previous grades, practice center activities, and targeted best-practice teaching models and strategies for small group and tier two intervention.

The i-Ready Florida math program provides interactive online instruction designed to provide individualized instruction that addresses the unique needs of each student. Engaging characters read the problems, teach content and skills, provide practice exercises and immediate feedback, and increase problems difficult until the students mastered the skills.

The i-Ready Florida Math Practice and Problem-Solving automatically differentiate the instruction for every student. It creates and delivers an individualized instruction plan, using explicit instruction through an interactive format that is accessible anywhere. Teachers have access to differentiate lessons plans for reteaching skills and content to a small group of students from the online toolbox (Curriculum Associates, LLC, 2015).

Research Question: What strategies do teachers adopt when teaching mathematics concepts, procedures, and skills instruction and intervention to fourth-graders?

Teaching Strategies

During teachers, collaborative planning sessions; they utilized copies of different evidence-based math textbooks from which they developed worksheets, for guided

instruction, and independent practice. The coach emailed teachers copies of math worksheets, formative and summative test for the unit to each teacher. Teachers incorporate math word problems and directions to give practices in reading and comprehending math language. Teachers used checklists, rubrics, KWPL graphic organizers (Appendix D), models or pictures, questions, and manipulatives to teach math word problems-solving to fourth-grade students. Teachers used different strategies to teach how to solve real-world problems and to develop problem-solving strategies. Teachers utilized word problem analysis to discover students' possible errors or misconceptions; create word problems using students' names and differentiate instruction.

Mrs. Lord, the math coach, stated that "There currently is no math program. We teach the standards, with materials we find or create. The intervention program is i-Ready. We have supplementary with i-Ready, Eureka and Stepping Stones in Math and Go Math Florida."

Mrs. Lord teaches students "to complete a KWPL graphic organizer that helps them sort information and allows the student to create and apply strategies to solve the word problem." To help students retain and transfer the knowledge and skills to different problems, Mrs. Lord "taught KWPL and underline actions in the problem so they can identify which math operation to use."

According to Mrs. Alexander, "We use a computer program called i-Ready Florida math. This program assigns a lesson to the students to their specific needs whether they are below, on or, or above grade level."

Mrs. Alexander explaining further stated that:

> I use modeling as well as hands-on, and math application. I see the most growth from my student when they can relate to the problem or if they can use manipulatives to help them understand. I encourage students to underline important information and draw pictures or models to help them retain information.

Mrs. Bobb stated that she uses "i-Ready Florida Mathematics Practice and Problem-solving and Khan Academy for tier two intervention; manipulative where necessary, pictures to develop visualizing make it as concrete as possible and real word problems when possible." She also indicated that she "uses questions and checklists from the i-Ready Florida Mathematics Practice and Problem-solving program, student homework book and online practice."

Mr. Frank also uses "i-Ready Florida Mathematics Practice and Problem-solving for tier two intervention." To teach math word, problem-solving Mr. Frank uses a checklist that:

- Identify the facts stated in the problem (cross out non-relevant information)
- Create a graphic representation of the problem
- Identify the operation to be used
- Create an equation
- Solve the equation using manipulatives where necessary

About this issue, Mrs. Smith added that:

For students receiving math intervention, the skills and concepts are modified with additional practice time.

- Teach relevant math vocabulary,
- Revise prerequisite skills and concepts.
- Provide step by step instruction of the concept,
- Model the skill using examples,
- Practice *with* models and manipulatives.

After the analysis of the interviews, I came up with two follow-up questions which I posed to teachers during their bi-weekly collaborative planning session.

Observation of A Tier Two Intervention Lesson

According to the Council for Exceptional Children (2014), math tier two intervention should be a sequenced program that logically builds on students existing skills includes visual representations and opportunities for students to practice newly learned skills with and without direct support, and cumulative review of lessons.

Mrs. Smith, a special education teacher, taught fraction math word problem-solving to a group of four students. “Objective: Solve word problem involving addition with fractions of the like denominator.” She reviewed the vocabulary and terminology (e.g., nominator, denominator) used with fractions. The teacher and students read the word problem; the teacher asked the students to identify the verbs in the problem and review which math operation they represent.

"Shrina has a muffin tray that holds 12 muffins. She fills 3/12 of the tray with apple muffin batter. Then she fills 6/12 with pumpkin muffin batter. What fraction of the tray is filled?"

The teacher asked students to read the questions, "What do you Know? What do you want to find out? What information do you need to use? How will you use the information?" These questions are columns in the graphic organizer. The teacher fills in the answers as students provided them from the problem in the graphic organizer on the whiteboard next to her. The teacher created a model or pictorial representation on the whiteboard and added the equation as students provided the answers (3/12+6/12=9/12). The student copied and solved the equation on the paper in front of them. The teacher checked the children's work randomly. Then, the teacher asked a child to explain how he got the answer.

The teacher repeated the process with two other word problems. The students read the second problem together and work on creating a model, write an equation and find the solution. The teacher checks each student's work, asking question guiding them through the process. The teacher asked students to repeat the instruction, read the question they are going to use. Then, the teacher gave the students a worksheet with three practice items for independent practice to monitor students' mastery of the skills. Teachers' lesson plans included graphic organizer, questions, checklists, models, manipulatives and performance task tips to help students check the steps in solving math word problems and their calculations of the equations. Students are encouraged to use models and equation to help them solve math word problems.

According to Valenzuela et al. (2014), the multi-tiered response to intervention tier two intervention should address the task, with monitoring assessment, student practice items, and mastery benchmark. Teachers should model the new concepts and skills; provide guided and independent practice, and corrective feedback, with frequent review of the content during the period of instruction. Mrs. Smith lesson plan covered all the elements listed in Appendix C. She modeled solving the word problem; guided students through practice items and have the students completed items independently to monitor their progress and gave them immediate feedback.

Math Program

In response to my question, why is there no math program for fourth-grade?

> Mrs. Alexander responded saying:
>
> The state standards are very ambitious, and the standards pose many difficulties to teachers who work with students from *diverse cultural and linguistic* background living in poverty. Most of the students in this school are English language learners living in poverty. The children do not speak English at home. The published math textbooks based on the standards do not take into consideration the students' culture or experiences. The vocabulary is above the level of most of the students, and no program has enough independent practice problems for each unit of study or standard. Teachers must create word problems and use different textbooks to provide students with additional practice they need.

Florida Standards Assessments Failure

As to the question of why so many students failed the Florida Standards Assessments?

Mrs. Smith explained that:

> The test is biased because not all bilingual students were born in the United States. Some students recently arrived in the state, are immigrants and refugees. They were not exposed to the American culture as may live in poverty. The word problems used life circumstances that students do not understand because of lack of experience or exposure to the events. Most students lived in poverty before they moved here and continue to live in poverty in this country. Some students must adjust to the English language dialect, the length of the school day, the math standards and daylight-saving time.

Mr. Frank chimed in "Some of the students are behind by two grade levels. They do not have a disability; others are hindered because of behavior issues, absenteeism or are nomads moving around the district or state."

Mrs. Lord added that "We have to remember that most of the children do not get help at home and their only exposure to the math skills and content is the time spent in the classroom."

Research question: How do teachers help fourth-grade children solve real-world problems and to develop strategies based on different problem-solving approaches?

Planning and Preparation

To teach students how to solve real-world problems and to develop problem-solving strategies; teachers used different approaches. Teachers used word problem analysis to discover students' possible errors or misconceptions; create word problems using students' names and differentiate instruction.

As a remedy to this situation, Mrs. Lord recommended "looking at the problem to identify students' possible errors or misconceptions when solving the problem. Provide the student with a graphic organizer and help students identify which actions occur within a problem."

Mrs. Bobb stated that she used "the I-Ready Florida Mathematics Practice and Problem-Solving program teachers planning guide and Khan Academy videos, to differentiate instruction."

Mrs. Alexander explained, "creating word problems that use students' names and things they are interested in saving time and catches the students attention right away."

Mr. Frank stated that he used problems that involve situations that are real to students.

Mrs. Smith advised that "all students to receive the same instruction at the same grade level, teachers meet and collaborate to make lesson plans."

Co-Teaching

Teachers described co-teaching but relate it to teachers and coach collaboration on grade level. The coach modeled new material or strategies and listened to teachers teach a lesson and then debrief them.

Mrs. Lord (math coach) described co-teaching as, “two teachers teach a lesson together. One teacher can add in where necessary; both teachers pull groups to support students’ instruction.”

Mrs. Bobb stated, “Teachers collaborate on grade level with the math resource teacher (*coach*). The math resource teacher provides workshops, lesson demonstration, and coaching.”

Mrs. Alexander responded, “We have a math coach; she models any new material or strategy if we need assistance.

Research question: What professional training, resources, support, coaching, and practices has the district and school provided for teachers to implement the response to intervention framework to address fourth-graders mathematics word problem-solving difficulties?

Professional Development Activities

The district and school personnel provide training in the implementation of MTSS-RTI. Teachers received training in the implementation of I-Ready Florida Mathematics, in administering the diagnostic test, using the online teacher's tool kit, monitoring students’ tier two interactive intervention, and administering the formative and summative assessments. Two participants explained that the district has regular training workshops after school and Saturdays.

Mrs. Smith responded, “The district provides professional development in both MTSS-RTI implementation and mathematics after school and on Saturday throughout the school year. The math resource teacher provides some training.”

Mrs. Lord explained, “Districts provides training focused on planning that assists with problem-solving. Our school math coach helps with strategies and solutions.”

According to Mr. Frank professional development activities include, “in school workshops and peer coaching.”

Mrs. Bobb responded:

> Professional development is available at staff meetings, set up by the math resource teacher. The district has teacher training throughout the year, and teachers can register and attend at their convenient after school or on Saturdays. The i-Ready Florida mathematics also has online resources.

Mrs. Alexander reported, “I have not taken any response to intervention math training with the district.”

Support System and Coaching

The math coach and resource teachers provide support and coaching to teachers. The coach demonstrates new strategies to teach math content and skills, collaborate with teachers, observe teachers teaching and offer advice. One teacher explained that the ELL resource teacher works with a small group of struggling students. During collaborative planning, the coach introduces the new unit to the teachers and provide teaching strategies, resources materials, independent practice materials for students, as well as the progress monitoring assessments.

According to Mrs. Smith -

> The math resource teacher uses the class to demonstrate how to teach the student's mathematics skills and concept. The math resource teacher

> attends teacher collaboration sessions and answers questions, offer advice on teaching strategies. The math resource teacher observes your teaching and debriefs afterward with corrective advice.

Mrs. Frank reported that "The math specialist teacher, upon request of the classroom teacher, assists with the planning of the MTSS-RTI lesson planning and even observe its implementation."

Mrs. Lord stated that "Our school math coach helps with strategies and solutions. Math coach supports with possible interventions strategies etc."

Mrs. Bobb explained that:

> The math I-Ready Mathematics Practice and Problem-Solving program also have online resources. There is a math resource teacher in the school who observe your teaching and debrief after the lesson. The resource teacher also does demonstration lessons and answer teachers questions.

Mrs. Alexander indicated that "The ELL resource teacher assists ELL students as well as reteaches any previous material to a small group of students who were not able to master the material."

Resources

Although the school does not have one specific math program, the school has an intervention program. The school has the materials teachers need to achieve the goal of improving students' math word problem-solving skills. One teacher believed that they need additional training.

Commenting on the availability of resources Mrs. Bobb stated that “Teacher resource room has resources available; Math coach provides resources. Workshops, plan with teachers. State and district personnel provide training.”

Mrs. Smith stated that “Books, computer programs, online access for both teachers and students on the school and district website.”

Mrs. Lord explained that the “Resources are strategically used to meet needs or reteach core curriculum and enrichment.”

Response to Intervention Improvement

Teachers believe that to improve the use of MTSS-RTI to teach word problem-solving they need time to reinforce math skills and concepts. Teachers believed that to improve the use of MTSS-RTI to teach math word problem-solving they need additional training to support response to intervention tier two math intervention.

According to Mrs. Smith, “more time is needed for both teachers and students for teaching and practice and to reinforce skills and concepts.”

Mr. Frank indicated that “Extra planning time and professional videos” are required.

Mrs. Lord thought that they should “Have additional training for teachers. More resources that support the math MTSS-RTI process.

Challenges and Barriers

Teachers listed some challenges and barriers that affect the effective use of the MTSS-RTI tier two intervention to improve students’ math word problem-solving difficulties. The special education teachers listed the removal of students for therapy,

speech, and language and behavior modification intervention during instruction time. Other barriers to student progress are poor attendance and a lack of comprehension skills that affect students' ability to identify the correct operation to solve the word problem.

Mr. Frank stated that "not allowing the students to master the skills before moving on to the next topic." As students who lack critical prerequisite skills experienced challenges in interpreting and solving math word problems.

Mrs. Smith explained that:

> The students with difficulties have other issues (*speech and language deficits and behavior problems)* that remove them from the classroom for speech and language therapy, and behavior modification intervention. Students with disabilities have poor attendance because of medical issues.

Mrs. Lord wrote that "When students cannot read the problem and cannot identify the action to solve the problem."

Mrs. Alexander indicated that:

> The English language learners and students with disabilities have difficulties with the textbooks which require reading comprehension skills. In the interactive online program, a character reads the direction and word problems to the students, but only a few students have the state test read to them.

Mrs. Smith explained that:

> Some students are at a disadvantage because they are behind because of migration from state to state or within the state or from other countries.

> Some children have a challenging home life. Some have learning disabilities. Some were diagnosed with learning difficulties but did not receive the intervention. Some are willing but do not have the ability. Students have poor attendance leaving gaps in their learning. They lack confidence in themselves. Helpless. Parents are unable to help students. Students should be tested at their performance grade level and not based on their age or grade level. *(Fourth-grade students are performing at grades one, two, and grade three levels).*

Summary

The five teachers used the multi-tiered support system-response to intervention evidence-based curriculum, universal screening, instruction, intervention, and assessment to teach students who are having difficulties in math word problem-solving skills. This study covered the use of universal screening, tier one instruction, and tier two intervention and process monitoring assessment for students with persistent and significant math word problem-solving difficulties. Tier one is the whole class instruction with the scientific-based curriculum, diagnostic testing, and progress monitoring. The teachers used the computerized i-Ready Florida Math Adaptive Diagnostic Assessment for universal screening to determine the students at risk for academic failure proactively. The computerized diagnostic test identifies the prerequisite skills students lack, group students, according to their needs, and prescribes whole class, and small group instruction, and tier two intervention. The 60 minutes math is divided into whole group

instruction fourth-grade math, small group guided and independent practice and 20-30 minutes of tier two intervention on the skills students are having difficulties.

An analysis of students with difficulties in math word problem-solving, scripts revealed that they exhibit many characteristics. Teachers noted that children with difficulties in math word problem-solving lack comprehension skills that affect their ability to decode the language in the problem and determine the operation to use to solve the problem. Students also have difficulties transferring what they learned to other problems or applying them in the assessments. Students also exhibit difficulties with visual deficits and abstract thinking.

The i-Ready Florida Mathematics Practice and Problem-Solving program is the tier two intervention program. The computerized program grouped students according to their needs and provided the online interactive tier two intervention for each student. The program provides teachers with tools for reteaching the skills and content to the whole class and in small groups. Teachers used different assessment tools to monitor students' progress. Teachers used the end of the unit test; teacher created worksheets, teacher-made test, Easy Curriculum-Based Measures assessment, and i-Ready formative and summative assessment. Teachers assessed students weekly, bi-weekly, monthly and at the end of math unit and intervention.

During teachers collaborative planning sessions; they utilized copies of different math textbooks from which they developed worksheets, for guided instruction, and independent practice. The coach emailed teachers copies of worksheets, formative and summative test for the unit to each teacher. Teachers incorporate math word problems

and directions to give students practice in reading and comprehending math language. Teachers used checklists, rubrics, KWPL graphic organizers (Appendix D), models or pictures, and manipulatives to teach math word problems-solving to fourth-grade students. Teachers utilized word problem analysis to discover students' possible errors or misconceptions; create word problems using students' names and differentiate instruction.

Teachers described co-teaching but relate it to teachers and coach collaboration on grade level. The coach modeled new material or strategies and listened to teachers teach a lesson and then debrief them. The district and school personnel provide training in the implementation of MTSS-RTI. Teachers received training in the implementation of i-Ready Florida Math, in administering the diagnostic test, using the online teacher's tool kit, monitoring students' tier two interactive intervention, and administering the formative and summative assessments. Two teachers explained that the district has regular training workshops after school and Saturdays. The math coach and resource teachers provided support and coaching to teachers; demonstrated new strategies to teach math content and skills; collaborate with teachers, observe teachers teaching and offer advice. One teacher explained that the English language learners resource teacher works with a small group of struggling students. During collaborative planning, the coach introduces the new unit to the teachers and provide teaching strategies, resources materials, independent practice materials for students, as well as the progress monitoring assessments.

Although the school does not have one specific math program, the school has an intervention program. The school has the materials teachers needed to achieve the goal of improving students' math word problem-solving skills. One teacher believed that teachers need additional training to be able to use MTSS-RTI more effectively. Teachers believed that to improve the use of MTSS-RTI to teach word problem-solving they need time to reinforce math skills and concepts; as well as additional training to support response to intervention tier two math intervention.

Teachers listed many challenges and barriers that affect the effective use of the MTSS-RTI for tier two intervention to improve students' math word problem-solving difficulties. The special education teachers listed the removal of students for speech and language therapy, and behavior modification intervention during instruction time. Another challenge is students' lack of comprehension skills that affect their ability to identify the correct operation to solve the word problem. Because of migration, many students are further behind their peers. Many have very difficult homelife; poor attendance that leaves gaps in their learning. Some students lack confidence in themselves and most do not have parental support.

The next chapter will consist of an introduction, the interpretation of the findings, limitation of the study, recommendation, implications, and conclusion of the study.

Chapter 5

Introduction

The purpose of this qualitative single-case study was to discover how fourth-grade special and general education teachers utilized the MTSS-RTI evidence-based curriculum, instruction, intervention, assessment, and student data to teach math word problem-solving skills. The participants were five fourth-grade general and special education teachers charged with instructing children from diverse cultural and linguistic backgrounds, with different abilities and disabilities. The study identified and described the strategies teachers employed in teaching mathematics concepts, procedures, skills instruction and intervention, and how teachers helped children develop strategies to solve real-world problems. The study findings revealed the resources, socio-cultural, and pedagogical practices, teacher training, and support system in place for fourth-grade teachers to implement the multi-tiered response to intervention system. The study findings indicated the barriers, challenges, and the successes the teachers experienced using the MTSS-RTI. The goal of the study was to discover how the teachers utilized the MTSS-RTI components of evidence-based curriculum and intervention programs, differentiated instruction, and a comprehensive assessment system data to make instructional decisions.

The qualitative study approach provided an in-depth analysis of how fourth-grade special and general education teachers used the MTSS-RTI universal screening, intervention, and progress monitoring system to remediate students' mathematics word problem-solving difficulties. Additionally, the study provided an understanding of the use

of the MTSS-RTI model within the complex social setting of the general education classrooms with students from diverse background and with different abilities or disabilities. It also described the school's socio-cultural environment, teacher training, student assessment, data collection, analysis, interpretation, and decision-making system in place for fourth-grade teachers to implement the MTSS-RTI.

Interviews, the teachers' unit, and lesson plans, intervention program, district training document, teachers' guides, tier two intervention observation, and assessment tools were the sources of data for this study. In-depth, open-ended interviews with five general and special education teachers provided the evidence in answer to the research questions.

Teachers used the MTSS-RTI evidence-based curriculum, universal screening, instruction, intervention, and assessment to teach math word problem-solving skills to students who are having difficulties. The teachers proactively utilized the computerized i-Ready Florida Math Adaptive Diagnostic Assessment for universal screening to determine the students at risk for academic failure. The computerized diagnostic test identifies the prerequisite skills students lack, group students according to need, and prescribes whole class, and small group instruction and tier two intervention. The teachers used the end of the unit test; teacher created worksheets, teacher-made test, Easy Curriculum-Based Measures assessment, and i-Ready formative and summative assessment to monitor student progress. They assessed students weekly, bi-weekly, monthly and at the end of math unit and intervention. The 60 minutes math is divided into whole group instruction fourth-grade math, small group guided and independent

practice and 20-30 minutes of tier two intervention on the skills students are having difficulties.

An analysis of students with difficulties in math word problem-solving, scripts revealed that they exhibit many characteristics. They lacked comprehension skills that affect their ability to decode the language in the problem and determine the operation to use to solve the problem. Students also have difficulties transferring what they learned to other problems or applying them in the assessments. Students also exhibit difficulties in visual and abstract thinking.

During teachers collaborative planning sessions; they utilized copies of different math textbooks from which they developed worksheets, for guided instruction, and independent practice. Teachers incorporate math word problems and directions to give practices in reading and comprehending math language. Teachers used checklists, rubrics, KWPL graphic organizers (Appendix), models or pictures, and manipulatives to teach math word problems-solving to fourth-grade students. Teachers utilized word problem analysis to discover students' possible errors or misconceptions; create word problems using students' names and differentiate instruction.

The district and school personnel provide training in the implementation of MTSS-RTI. Teachers received training in the implementation of i-Ready, in administering the diagnostic test, using the online teacher's tool kit, monitoring students' tier two interactive intervention, and administering the formative and summative assessments.

Many challenges and barriers affect the teachers' use of the MTSS-RTI for tier two intervention to improve students' math word problem-solving skills. During instruction time service providers remove students for therapy, speech and language therapy, and behavior modification intervention. Another challenge is students' lack of comprehension skills that affect their ability to identify the correct operation to solve the word problem. Many students are further behind their peers, because of migration from other states, countries, and districts. Many have a very difficult home life; poor attendance that leaves gaps in their learning. Some students lack confidence in themselves and most do not have parental support.

Interpretation of the Findings

The fourth-grade students of MAC Elementary School, like some fourth-grade students in the United States, come from diverse linguistic and cultural backgrounds, have difficulties solving math word problems. The students' performance on the Florida Standards Assessment reflected their difficulties with developing math word problem-solving skills. In the 2018 Florida Standards Assessments, only 41% of the 143 students achieved proficiency. According to Gonzales and Krawec (2014), there are significantly more word problem-solving items in the Florida Standards Assessments, than in previous state assessments. Through math word problem-solving, learners applied fundamental knowledge, concepts, and skills to real-world situations and achieved proficiency in math. The goal of the case study was to discover how fourth-grade teachers utilized MTSS-RTI to teach math word problem-solving skills to students who have persistent and significant difficulties.

The MTSS-RTI components are whole-class tier one research-based curriculum, instruction, universal screening, and diagnostic assessment, small group tier two and individual tier three intervention, and progress monitoring assessment (Griffin et al., 2013; Hunt & Little, 2014; Powell et al., 2015). Fourth-grade teachers of MAC Elementary School used the MTSS-RTI evidence-based curriculum, universal screening, instruction, intervention, and assessment to teach math word problem-solving skills to students who are having difficulties.

In Regan et al. (2015) research teachers reported being overwhelmed by the amount of information; inadequate training, insufficient time for effective intervention, the inability to collect and analyze data and coping with the new additional responsibilities. In the regular classroom, teachers administered paper and pencil tests, examined the scripts, analyzed students' errors, determined who needed tier two intervention, planned whole group, and small group intervention, and monitor students' progress. MAC Elementary School fourth-grade teachers cut down on time and the difficulties teachers experienced by using a computerized program. MAC Elementary School teachers used a computerized program that analyzes students' diagnostic assessments, identifies students' deficits, created tier two intervention for individual students is an interactive program and differentiate and modify instruction for the teacher-led whole class and small group instruction.

The teachers used the computerized i-Ready Florida Math Adaptive Diagnostic Assessment for universal screening to determine the students at risk for academic failure proactively. Students completed the test on the computer. The computerized diagnostic

test program examined the scripts, analyzed students' errors, identified the prerequisite skills students lack, group students according to their needs, and prescribed whole class, and small group instruction, and tier two intervention. The 60 minutes math period is divided into whole-group instruction in fourth-grade math, small group guided and independent practice and 20-30 minutes of tier two intervention on the skills students are having difficulties.

Researchers (Orosco et al., 2013; Orosco, 2014) suggested that the teacher modify and differentiate the instruction for small group intervention. They indicated that during math intervention teachers pre-teach concepts, vocabulary, terminology, and comprehension strategies that integrate concepts and procedures, and scaffold learning through modeling, guided and independent practice. During Mrs. Smith small group tier two intervention, she followed some of these strategies. She reviewed the vocabulary and terminology used in fractions. Mrs. Smith and students read the word problem aloud; the teacher asked the students to identify the verbs in the problem and review which math operation they represent. The teacher asked, "What do you Know? What do you want to find out? What information do you need to use? How will you use the information?" These questions are columns in the graphic organizer (Appendix). The teacher fills in the answers from the problem on the graphic organizer on the whiteboard next to her. The teacher created a model or pictorial representation on the whiteboard and added the equation. When she handed the independent practice items to the students, she asked the students to read the directions and each problem.

The Florida Department of Education (2015) required that educators use reliable, valid and instructional relevant assessment tools for screening, diagnostic, progress monitoring, formative and summative measures. MAC Elementary School's teachers monitored students' progress with the end of the unit test; teacher created worksheets, teacher-made test, Easy Curriculum-Based Measures, and i-Ready formative and summative assessment to monitor student progress. The teachers used the results of Easy Curriculum-Based Measures to evaluate students' development, growth, or proficiency in math word problem-solving, computation and procedural skills. Teachers integrated assessment results to plan, revise, and evaluate instruction, and teaching strategies in their daily practice. They assessed students weekly, bi-weekly, monthly and at the end of math unit and intervention. The aim is to ensure that every child had access to evidence-based curriculum based on the Florida math standards and instruction regardless of their cultural and linguistic background, abilities and disabilities.

The fourth-graders of MAC Elementary School come from different linguistic and cultural backgrounds, with and without disabilities, like the other children in the United States, struggle with math word problem-solving (Bjorn et al., 2016). The racial and ethnic minority (African American, Hispanic, and English language learners) are at risk for math difficulties and face challenges with the multi-step nature of word problem-solving development. Additionally, they have difficulties learning the language of mathematics, practical strategies for understanding and solving word problems, because of inadequate background knowledge, limited vocabulary, and language development (Kong & Orosco, 2015). The students of MAC Elementary School exhibited many of the

characteristics revealed in the research literature. The students struggle with lack of comprehension skill; problems with decoding and understanding the vocabulary, recognizing the problem structure; extracting the relevant information, selecting the appropriate math operation and attention issues. Additionally, MAC Elementary fourth-graders have difficulties transferring what they learned to other problems or applying them in the assessments.

According to Walkington, Clinton and Shivraj (2018), English Language learners and African Americans who speak vernacular English at home have difficulties with reading and understanding American Standard English, the language of the standardized math test. They wrote that the fourth-grade students have difficulties with math word problem-solving because of the language and vocabulary specific to mathematics (technical vocabulary), words with multiple meanings, complex verbs, prepositions, abstract words, pronouns, comparative words, symbolic language, and complex visual displays. Driver and Powell (2016) indicated that English language learners have difficulties with the semantic and syntactic features of mathematical discourse for example, “take away,” “the same as,” and “how many go into.” Walkington et al. (2018) stated that the analysis of six mathematics word problems items on a fourth-grade standardized test revealed that the problems “included complex, multiple clauses as well as long noun phrases” that can lead to comprehension challenges for English language learners (p.369). The researchers call for the modifying of math items in the standardized test to be less linguistically complex to “reduce the achievement gap between English language learners and English speakers” (p. 369).

Doabler et al. (2015) explained that a well-designed mathematics curriculum provides appropriate pacing, incorporates teaching models of new content, guided instruction, and independent student practice. The teachers of MAC Elementary School did not have a specific math program but used evidence-based math curriculum to create their own. The teachers developed worksheets, for guided instruction, and independent practice; incorporating math word problems and directions to give students practice in reading and comprehending math language. Teachers taught students how to transfer math skills to novel problem types using manipulatives, models or pictures, checklists, rubrics, and KWPL graphic organizers (Appendix D). They used technology, posing challenging questions and making math relevant to students. Teachers utilized word problem analysis to discover students' possible errors or misconceptions; create word problems using students' names and differentiate instruction.

According to Meyer & Behar-Horenstein (2015), general and special education teachers with different types of knowledge, skills, and expertise work collaboratively to design instruction, co-teach and evaluate students' outcomes. The general and special education teachers of MAC Elementary School relate co-teaching to collaborative planning on grade level. The coach modeling new material or strategies, listening to teachers teach a lesson and debriefing after the lesson.

Castillo et al. (2013) recommended that educators acquire or improve their attitudes, beliefs, knowledge, and skills essential to implementing the multi-tiered response to intervention model of service delivery through professional development. Therefore, the ongoing professional development should be intensive, sustainable,

cooperative, backed by coaches modeling knowledge and skills, and collective problem-solving. At MAC Elementary School, district and school personnel provide training in the implementation of MTSS-RTI. Teachers received training in implementing i-Ready Florida math, in administering the diagnostic test, using the online teacher's toolbox, monitoring online student tier two interactive intervention, and administering the formative and summative assessments. The district has regular professional development for teachers after school and Saturdays. The math coach provides support and coaching to teachers.

MAC Elementary School fourth-grade teachers listed insufficient time for effective intervention especially in reading comprehension skills that affect students' abilities to identify the correct operation to solve the work problem. Another challenge being students' family migration, leaving them further behind their peers and with gaps in their learning. Some students have a difficult home life; poor attendance, lack self-confidence and most do not have parental support.

The researcher used Welner's (2001) zone of mediation framework to analyze the MTSS-RTI policy special and general education teachers used to develop students' math word problem-solving skills. MAC Elementary School is five years old; the administrators, teachers, and staff are building structures to support the use of MTSS-RTI. Teachers collaborate on grade level; participate in training together and are influential in the selection of materials, grouping students based on age and ability, special education practices, and instructional services to learners with and without learning difficulties. The math coach and general education teachers stated the school

used its resources strategically to meet the needs of reteaching, the core curriculum and enrichment activities. The school provides teachers with the resources for diagnostic testing, reteaching content, and skills, and teaching the core curriculum and providing enrichment exercises for students who are on grade level. The administrator assigned reading specialists, the math coach, and special education resource teachers to address the needs of low-performing students.

Vygotsky's zone of proximal development described the ways participatory and social learning takes place. Teachers and peers that are more knowledgeable scaffold individuals learning concepts and skills until the student can work independently. The MTSS-RTI system follows the same process as used in Vygotsky's zone of proximal development in theory and practice. Instructions and intervention begin with the assessment of the student's skill level, followed by core instruction and intervention, progress monitoring, and further instructional support (Re et al., 2014). At MAC Elementary School teachers used the computerized i-Ready Florida Math Adaptive Diagnostic Assessment for universal screening to determine the students at risk for academic failure proactively. The computerized diagnostic test identifies the prerequisite skills students lack, group students according to need, and prescribes whole class, and small group instruction, and tier two intervention. Students received 60 minutes of instruction daily, teacher-led instruction, small group guided and independent practice, and 20-30 minutes small group tier two intervention or enrichment. Teachers scaffold students' learning during small group guided instruction and intervention.

Kong and Orosco (2015) suggested that teachers differentiate and modify instruction to match students' academic language capabilities and use instructional scaffolding to reduce the cognitive demands of multiple step word problems. Teachers must differentiate and change their teaching because students have different learning styles, abilities and disabilities and they learn at different paces. MAC Elementary School fourth-grade teachers used i-Ready Florida Math Practice and Problem-Solving that automatically differentiate the instruction for every student. The program created and delivered an individualized instruction plan, using explicit instruction through an interactive format that is accessible anywhere. Teachers have access through the online toolbox of differentiated lessons plans for reteaching skills and content to a small group of students.

Limitations of the Study

There are a few limitations to this study. The study focused on how five MAC Elementary School fourth-grade special and general education teachers used MTSS-RTI to teach math word problem-solving to students from diverse linguistic and cultural backgrounds with and without disabilities. The school established five years ago, received a D grade in the 2017-2018 school year. The research findings may not be generalized, in states, districts, and schools that do not have similar populations. To address this issue a detailed description of contextual information about the school; a detailed description of the fourth-grade population, teacher qualification, training, and beliefs, how the student data is collected, analyzed and interpreted was included so readers can determine the extent to which the findings are transferable (Merriam &

Tisdell, 2014). This research took six weeks during and after the second diagnostic testing that evaluated student progress as well as recommended their needs for tier two intervention in the second term. All efforts were made to research how the teachers used the MTSS-RTI to teach math word problem-solving with fidelity and without bias because of a genuine interest in discovering how teachers achieve their goals.

Recommendations

I recommend that future research span the entire school year; beginning with the first diagnostic test and following up with the second and third diagnostic/progress monitoring test culminating in the Florida Standard Assessment. Research covering the year will illustrate the consistency and effectiveness of the teachers use of the Multi-RTI with i-Ready Florida Mathematics to provide students with math word problem-solving difficulties tier two intervention. I used interviews and documents and one observation one teacher collaborative planning meeting to gather information and found them very informative. I recommend that the reading teachers and math teachers work collaboratively to reinforce math vocabulary, terminology and reading comprehension skills during guided reading period. Teachers should ensure that tier two intervention focused on comprehension fluency and basic math concepts before moving on to more complex word problems.

Implications

The teachers of MAC Elementary School used the MTSS-RTI components of whole-class tier one research-based curriculum, instruction, universal screening and diagnostic assessment, small group tier two intervention and individual tier three

intervention, and progress monitoring assessment to teach math word problem-solving. Teachers meet the challenges of universal screening, correcting scripts, analyzing, interpreting the data and plan instruction in response to students' deficits in math word problem-solving with the use of the computerized program. The computerized program i-Ready Florida Math based on Florida's MTSS-RTI incorporates differentiated instruction, guided and independent practice of critical mathematical concepts and skills, intervention and progress monitoring formative and summative assessment.

Teachers may save time with the i-Ready Florida math program provides online prerequisite lesson plans from previous grades, practice center activities, and targeted best-practice teaching models and strategies for small group and tier two intervention. While the teacher teaches one group of students, the other students can individually participate in the online interactive tier two intervention, where the character read the problem, teach the skill, provide practice exercises and immediate feedback to students. The interactive program can help English language learners acquire math word problem-solving skills with scaffolding support in the development of vocabulary and reading comprehension.

Conclusion

Schools serve minorities, English learners, students with disabilities, and children from the low socioeconomic background, who are experiencing math word problem-solving difficulties. The MTSS-RTI model ensures that teachers provide equal and first-class education opportunities to all students, using appropriate research-based instruction, intervention, and progress monitoring assessment (King Thorius et al., 2014). The case

study was significant in discovering how fourth-grade general and special education teachers utilized MTSS-RTI evidence-based universal screening, tier one and tier two intervention, assessment, and student data to make an instructional decision for struggling students. The fourth-grade special and general education teachers in the study used a computerized program to implement MTSS-RTI processes to remediate students' math word problem-solving difficulties. This study added to the literature showing the implementation of MTSS-RTI processes by general and special education teachers in the authentic classroom environment to teach math word problem-solving to students with learning difficulties.

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Appendix A: Teacher Interview Protocol

To differentiate answers to the questions, underline the answers.

Teachers' Information:

1. How long have you taught at this school _____and at the fourth-grade level? _____
2. How many years have you been teaching fourth-grade mathematics? _____
3. How long have you been using the MTSS-RTI in this school? _____
4. What is the demographic of your class (number of students)?
    a) Students with disabilities _____
    b) English as a Second Language students _____
    c) General Education students _____

Research question: How do fourth-grade teachers use the MTSS-RTI for developing the mathematics word problem-solving skills of children who have persistent and significant difficulties?

5. Please describe the universal screening (testing) system, data collection (students' prerequisite skill and math concepts), analysis and interpretation feature in the MTSS-RTI instructional decision-making process.
6. When analyzing the screening and assessment data what problems do the students who are having mathematics word problem-solving difficulties demonstrate?
7. Explain how students are selected and grouped for math word problem-solving intervention.

8. What is the duration of the MTSS-RTI tier two intervention? Who provides the intervention?
9. What are the formative assessment tools used to evaluate students' progress during the intervention? How often are they assessed?
10. What are the summative assessment tools used to evaluate students' progress after intervention?

Research question: What strategies do teachers adopt when teaching mathematics concepts, procedures, and skills instruction and intervention to fourth-graders?

11. What are the math program and intervention programs used in fourth-grade?
12. What are the teaching strategies teachers use to teach mathematics word problem-solving skills to fourth-graders?
13. What is the word problem-solving strategies provided to students with difficulties to help them retain, and transfer the knowledge and skills to different problems?

Research question: How do teachers help fourth-grader children solve real-world problems and to develop strategies based on different problem-solving approaches?

14. What kind of proactive planning and preparation goes into teaching all students mathematical word problem-solving skills and strategies?
15. How does co-teaching operate at the fourth-grade level?

Research question: What professional training, resources, support, coaching, and practices has the district and school provided for teachers to implement the MTSS-

RTI framework to address fourth-graders mathematics word problem-solving difficulties?

16. Please give details of the training the district provided to teachers for implementing MTSS-RTI practices for teaching students with mathematics word problem-solving difficulties.
17. What kind of support system or coaching is available to teachers who are using the MTSS-RTI method to teach math?
18. What are the math resources available to teachers who are using MTSS- RTI Tiers in math classes?
19. What improvement can be made to make MTSS-RTI practices and math classes more successful for students with word problem-solving difficulties?
20. What are the challenges and barriers you experienced in teaching math word problem-solving skills using the MTSS-RTI methods?

Appendix B: Checklist to Evaluate Teachers' Lesson Plans

Coponent	0 = Absent 1 = Partially Present 2 = Presemt	Evidence/ Comments
Problem Identification		
Identified target skill	0 1 2	
Data were collected to determine the target	0 1 2	
student's current level of performance,	0 1 2	
The expected level of performance	0 1 2	
A gap analysis between the student's current level of performance and the benchmark	0 1 2	
Clear goals and objectives		
Intervention Development and Implementation	0 1 2	
A complete intervention plan		
An intervention support plan was developed	0 1 2	
A plan for assessing intervention: frequency, focus, dates of progress monitoring,	0 1 2	
Criteria for a positive response to intervention	0 1 2	

Additional Comments:

_____

_____

Appendix C

Blank Tiers I & II Critical Components Checklist

Tiers I and II Critical Components Checklist

School: _____ **Target Area:** ☐ Reading ☐ Math ☐ Behavior

Window: ☐ 1 ☐ 2 ☐ 3 **Grade Level (if applicable):** _____

Directions: For each selected target area and grade-level, please use the scale provided to indicate the degree to which each critical component of a Problem-Solving/Response to Intervention (PS/RtI) model is present in paperwork (i.e., permanent products) derived from data meetings (i.e., meetings in which the PS/RtI model is used to examine Tier I and/or II instruction). See the attached rubric for the criteria for determining the degree to which each critical component is present in the paperwork.

Component	0 = Absent 1 = Partially Present 2 = Present N/A = Not Applicable	Evidence/Comments
Problem Identification		
1. Data were used to determine the effectiveness of core instruction	0 1 2	
2. Decisions were made to modify core instruction or to develop supplemental (Tier II) interventions	0 1 2	
3. Universal screening (e.g., DIBELS, ODRs) or other data sources (e.g., district-wide assessments) were used to identify groups of students in need of supplemental intervention	0 1 2	
Problem Analysis		
4. The school-based team generated hypotheses to identify potential reasons for students not meeting benchmarks	0 1 2	
5. Data were used to determine viable or active hypotheses for why students were not attaining benchmarks	0 1 2	
Intervention Development and Implementation		
6. Modifications were made to core instruction		
a. A plan for implementation of modifications to core instruction was documented	0 1 2 N/A	
b. Support for implementation of modifications to core instruction was documented	0 1 2 N/A	
c. Documentation of implementation of modifications to core instruction was provided	0 1 2 N/A	

Problem Solving/Response to Intervention
Developed by the Florida PS/RtI Statewide Project — http://floridarti.usf.edu

Critical Components Checklist

Component	0 = Absent 1 = Partially Present 2 = Present N/A = Not Applicable	Evidence/Comments
7. Supplemental (Tier II) instruction was developed or modified		
a. A plan for implementation of supplemental instruction was documented	0 1 2 N/A	
b. Support for implementation of supplemental instruction was documented	0 1 2 N/A	
c. Documentation of implementation of supplemental instruction was provided	0 1 2 N/A	
Program Evaluation/RtI		
8. Criteria for positive response to intervention were defined	0 1 2	
9. Progress monitoring and/or universal screening data were collected/scheduled	0 1 2	
10. A decision regarding student RtI was documented	0 1 2	
11. A plan for continuing, modifying, or terminating the intervention plan was provided	0 1 2	

Additional Comments:

2

Appendix D: Math word Problem-solving Graphic Organizers

What do you Know?	What do you want to find out?	What information do you need to use?	How will I use the information?