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IMPACT OF RESPONSE TO INTERVENTION ON ACHIEVEMENT

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IMPACT OF RESPONSE TO INTERVENTION ON ACHIEVEMENT

by

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Abstract

IMPACT OF RESPONSE TO INTERVENTION ON ACHIEVEMENT

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The Improvement Science Dissertation in Practice focused on an initial comprehensive assessment of the Response to Intervention (RtI) framework, implemented in a district in East Texas, and its impact of student achievement. Following the evaluation, a subsequent improvement iteration concentrated on the impact of RtI, with the use of job-embedded professional learning, on student achievement. Both iterations utilized a mixed-methods case study using an embedded experimental model with a one-phase approach. The findings highlighted that student achievement did improve with statistically significant results except for in the second iteration where there was not statistically significant results in fifth and sixth grade reading from winter to spring and eighth grade reading overall. Additionally, the data showcased the need for targeted professional development on Tier Two and Tier Three instructional strategies as well as a documented RtI framework guide.

Keywords: accelerate, at-risk, multi-tier, instruction, interventions, learning, students

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Chapter 1

The Problem of Practice

There have been persistent educational gaps with American students meeting grade level expectations. Some of the factors that may have contributed to the decline in grade level performance include standardized testing (Noggle, 2014), socioeconomic status (Li et al., 2019), and months of missed instruction due to the 2020 Coronavirus pandemic (Lewis & Kuhfeld, 2021). Effective, differentiated instruction is essential to providing an avenue for students to reach mastery in content areas. When students experience difficulty learning a concept, it is necessary to provide targeted interventions early to reduce the possibility of expanding achievement deficits.

Response to Intervention (RtI) is "a prevention model of multi-tiered instruction with a minimum of three tiers" and is a systematic way to identify students early who are experiencing difficulty (Preston et al., 2016, p. 176). According to the Texas Education Agency (2022), "RtI uses targeted, research-based interventions to meet students' needs, to monitor student progress, and to ensure effective instruction in the general education setting" (p.3). Additionally, the RtI model allows instructors to collaboratively determine interventions for implementation, create goals, and routinely meet to review progress through data-based discussions. In the multi-tiered model, the intensity and time of targeted intervention provided to the student increases as they move to higher tiers. Mellard et al. (2010) described three options when altering the intervention dosage as students move into different tiers: minutes, frequency, and duration. As students increase in tier level, they may also have their intervention minutes increased, the frequency of their intervention amplified, or the intervention timeline extended.

Problem of Practice

Over a calendar year, the goal for students is to master a set of defined academic standards,

narrow any educational gaps in knowledge, and be successfully promoted to the next school year. However, while collaboratively reviewing Campus A's data with the district leadership team, composed of district and campus administrators and teachers, a problem was identified: Seventy-four percent of students did not meet progress measured on the 2019 State of Texas Assessment of Academic Readiness (STAAR) test in 4th-grade mathematics. The leadership team completed a causal system analysis, including a fishbone diagram, a system improvement map, and a driver diagram to better understand the problem.

The fishbone diagram (Figure 1.1) supported navigating the problem analysis and created a visual representation of outcomes derived from discussions to identify potential factors contributing to the low student proficiency rates (Bryk et al., 2015). The assessment revealed four major categories of causes: assessments, teacher challenges, instructional models, and alignment.

In the first category of assessments, the team discovered a lack of consistent assessment platforms being used from year to year. The inconsistency of assessment platforms poses multiple challenges as it constantly requires teachers to adapt to new assessment programs and track student progress across different platforms. Furthermore, the assessment data is not closely aligned with the Texas Essential Knowledge and Skills (TEKS) standards, making it challenging to inform instructional decisions in the classroom.

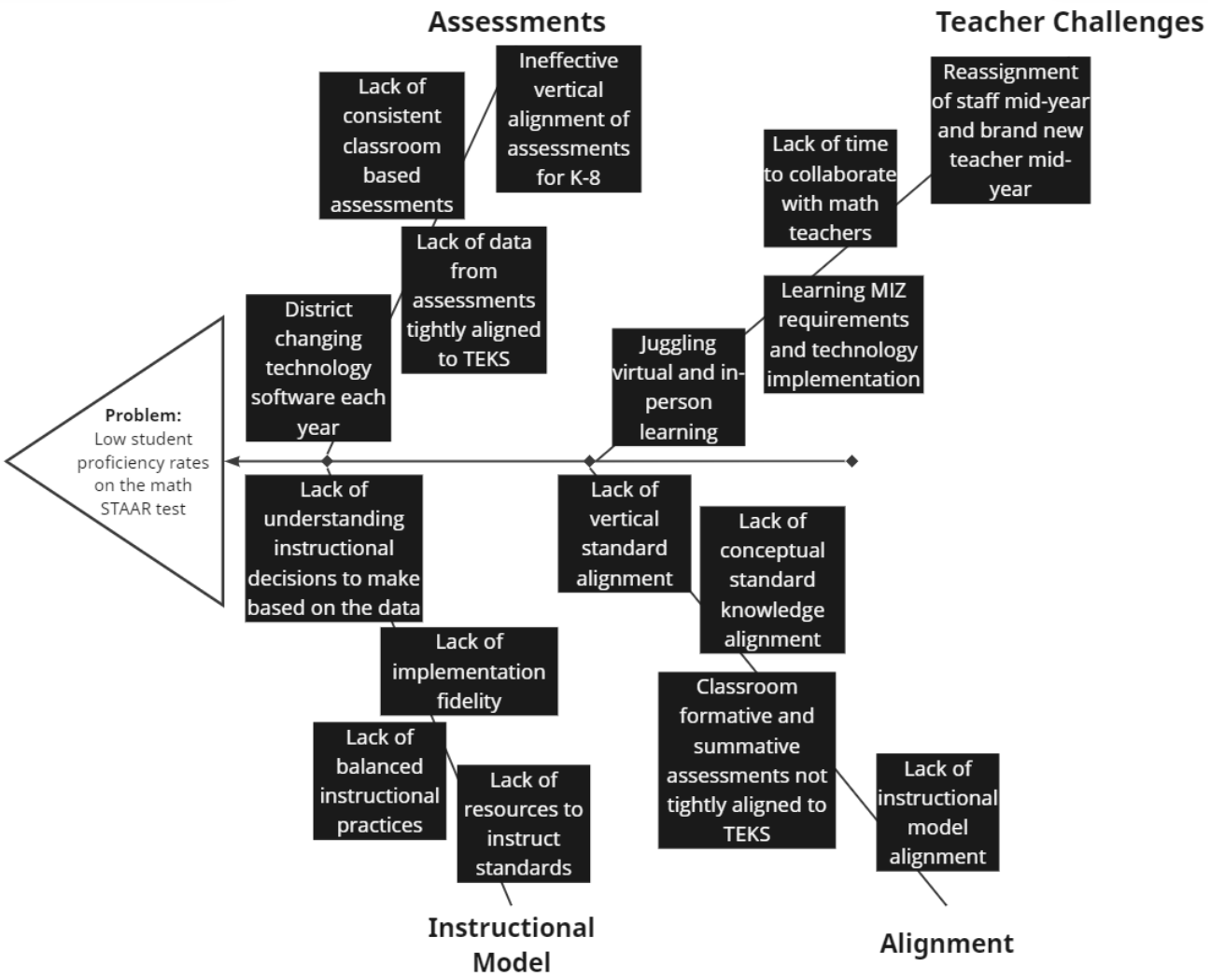
Within the teacher challenges category, a significant factor arising from the pandemic was the intricate nature of instructing in-person and virtual learners. Teachers also had to adapt to a new instructional blended learning model, comply with the Math Innovation Zones (MIZ) grant requirements, and become proficient in the technology platforms associated with blended learning. Additionally, a mid-year realignment of classes and teachers resulted in third-grade students being assigned new teachers during the school year. Moreover, due to the small size of the campus and

district, there were limited opportunities for math teachers to collaborate on instructional practices and data.

The instructional model category included four factors contributing to low student proficiency rates. The first factor acknowledged that the staff did not fully comprehend and faithfully implement balanced instructional practices which include effective classroom management, instruction of meaningful content that is differentiated based on students' needs, and strong motivation (Nevins Stanulis & Floden, 2009). Furthermore, when data was gathered, there needed to be a clearer understanding of how to utilize the data to guide instructional decisions. It was also noted that more consistent resources are needed to support instruction of the standards. Lastly, in the alignment category, deficiencies were found in vertical standard alignment, alignment of the instructional model, alignment of conceptual standard knowledge, and the need for classroom assessments to align with the TEKS standards.

Figure 1.1

Fishbone Diagram for Low Proficiency Rates on the Math STAAR Test

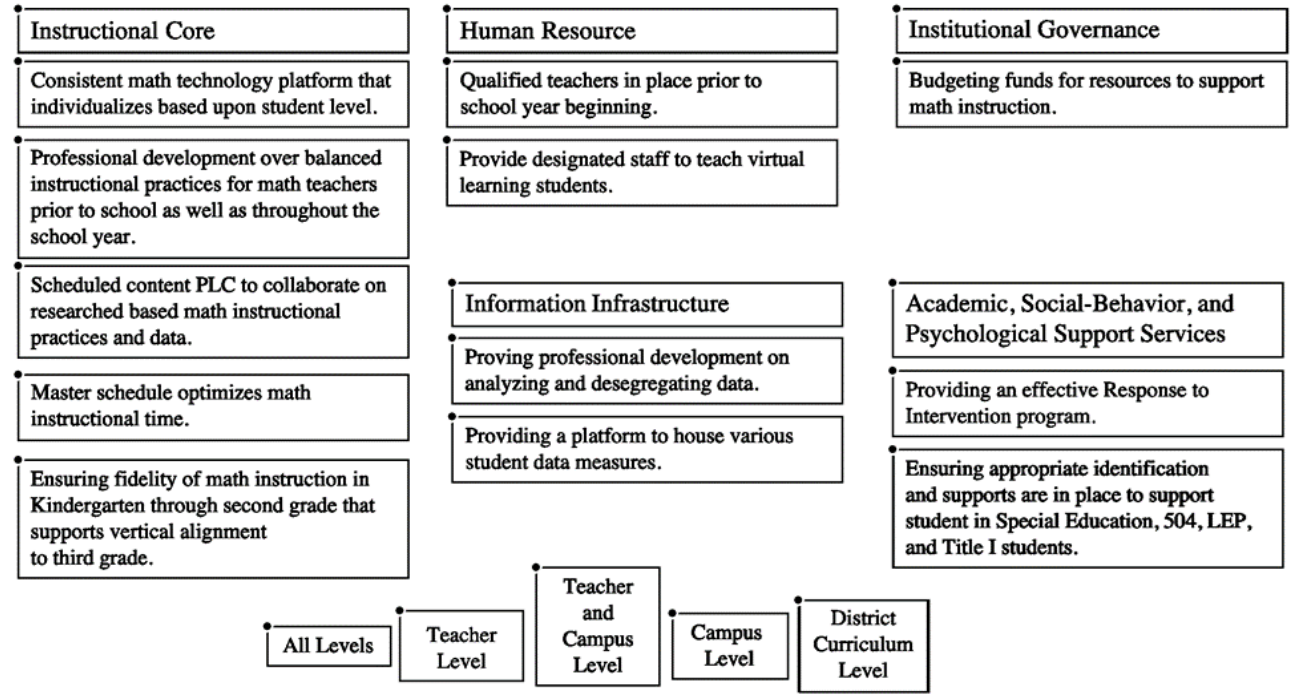


The system improvement map (Figure 1.2) illustrates the fundamental organizational elements expected to materialize as improvement efforts advance (Bryk et al., 2015). The identified subsystems encompass the instructional core, human resources, information infrastructure, institutional governance, and academic, social-behavioral, and psychological support services. Within the instructional core, one key issue is the need for a consistent math technology platform at the district level that caters to individual student needs. At the campus level, insufficient professional

learning on balanced instructional practices, infrequent scheduled content professional learning communities (PLC) throughout the school year, and a master schedule that fails to optimize math instructional time have been observed. Additionally, there needed to be more consistent and aligned math instruction from kindergarten through second grade to support a seamless transition to third grade. Regarding human resources, the campus ensured the presence of qualified math teachers at the beginning of the school year. However, there was a lack of designated staff assigned to teach virtual learning students at the district level. In terms of information infrastructure, the campus needed to provide adequate professional learning on data analysis and disaggregation. Moreover, the district needed an adequate platform to centralize various student data measures. Under institutional governance, insufficient funds were allocated by the district to procure resources that support math instruction. Within the academic, social-behavioral, and psychological support services, there were concerns about the effectiveness of the current RtI program implemented in classrooms. Additionally, inadequate identification and support from the campus and teachers were noted for students in Special Education, 504, Limited English Proficient (LEP), and Title 1 categories.

Figure 1.2

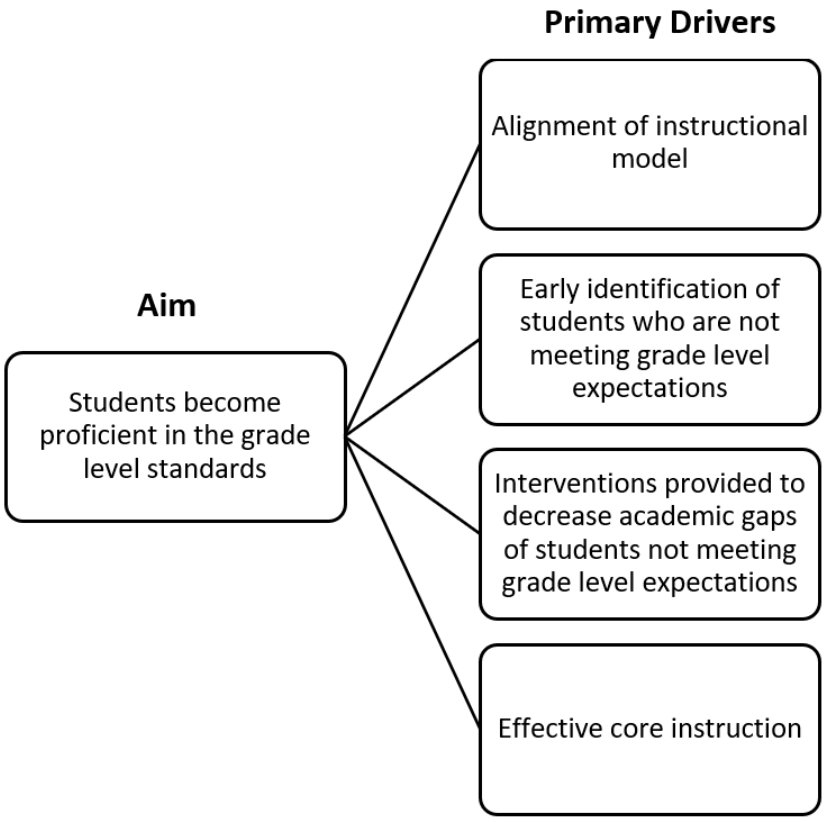
System Improvement Map



Finally, the district leadership team members completed a driver diagram (Figure 1.3) as a planning tool to identify the aim of the improvement project and the areas that need to be measured to see if the improvement initiative is effective (Fathima, 2016). The primary drivers identified were the alignment of the instructional model, early identification of students not meeting grade-level standards, implementation of effective interventions to decrease academic gaps, and providing effective core instruction. The leadership team believed that improving these drivers would lead to students becoming proficient in the grade level standards.

Figure 1.3

Driver Diagram



As a result of these stakeholder discussions, the leadership team identified the RtI model as a vehicle that could propel the campus towards the long-term goal of students becoming proficient in grade level content and increasing the percentage of students meeting the progress measure on the STAAR test. The RtI model provided a framework for the early identification of struggling students, targeted instruction and interventions based on data, and frequent monitoring of student progress. The leadership team decided to focus improvement efforts on math for the first iteration.

Purpose of the Present Study

The mixed-methods study aimed to examine the students who did not meet the progress measure on the 2019 STAAR test at a K-12 charter school in east Texas. Using the mixed-method approach allowed the researcher to use quantitative and qualitative data sets to better understand the

extent to which an RtI model was effective in helping struggling students meet grade-level expectations (Creswell & Plano Clark, 2006). Specifically, the research questions asked were: 1) to what extent did the RtI model affect the students' proficiency, and 2) to what extent were the students' needs being met at their functional level?

Theory of Change

The RtI model focuses on a multi-tiered approach to identifying students and providing targeted interventions at varying intensity levels based on the student's needs identified in progress monitoring. This approach allows struggling students to be identified early and promptly provided differentiated intervention to decrease the opportunity of a growing academic gap and accelerate learning. As an academic gap decreases, the likelihood of a student experiencing success on a grade-appropriate standard increases, which positively affects their progress. To increase student performance, the stakeholders decided to utilize IXL as the educational technology platform designed to supplement a conventional standards-aligned curriculum with real-time diagnostics, personalized guidance, and actionable analytics (IXL Learning, 2023a). To increase student performance in reading for the second iteration, the stakeholders decided to use Lexia online curriculum, which included Lexia Core 5 Reading and Lexia PowerUp Literacy programs (Lexia, 2023).

For the RtI model to be effectively implemented, teachers entered required data collected throughout the year to monitor student performance and determine tier assignments on the student progress monitoring spreadsheet. The elementary student progress monitoring spreadsheet included student data from the Texas Early Mathematics Inventories (TEMI), Texas Primary Reading Inventory (TPRI), Rapid Task Assessment, and students' reading levels. The upper elementary through high school student progress monitoring spreadsheet included individual student data from

the STAAR assessment, post-assessments, IXL diagnostic scores, common district assessments (CDA), and benchmarks.

Professional learning was provided to all staff members engaged in the RtI process at the beginning of the school year in district professional learning sessions and campus PLCs. Specifically, training was provided on data collection, data evaluation, tier instruction, and progress monitoring. RtI committees, composed of teachers, administrators, special education staff, and instructional coaches, met every nine weeks to determine progress monitoring goals based on the students' present performance levels with the expectation that they would have four months of growth in nine weeks. Once goals were established, the committee identified the research-based instructional strategies to be utilized in the classroom when providing Tier Two and Tier Three interventions to support students towards their progress monitoring goals. The teacher provided small group instruction in Tier Two and Tier Three that targeted foundational concepts and skills needed to be mastered at the student's instructional level. Additionally, the students were provided a Chromebook with the required infrastructure to support internet access to work within the math IXL Diagnostic Arena, a specific component of the online program that evaluated student performance levels, and the Lexia online curriculum.

The RtI implementation steps noted above identified short-term, medium, and long-term outcomes. For the short-term outcomes, staff and the RtI committee would be knowledgeable of the RtI process and be able to implement the framework with fidelity. By meeting the short-term outcomes, students would experience success on concepts at their functional level, increasing their engagement with the content.

For medium outcomes, students would meet progress monitoring goals each nine-week cycle and show a decreased academic achievement gap by progressing their knowledge toward grade level

expectations. For students who did not meet the goal, the committee would increase the time and frequency of interventions or change interventions based on the student's needs. Also, students who were not progressing in Tier Three could be evaluated for special education services at each RtI committee meeting. Through these medium outcomes, student proficiency on grade-level standards would increase. Students who demonstrate mastery of standards can build new knowledge connected to prior concepts learned. Meaningful learning allows students to successfully apply math concepts throughout their educational career, progress to the next grade level, and reach the long-term outcome of eventually graduating from high school.

Methodology

Research Design

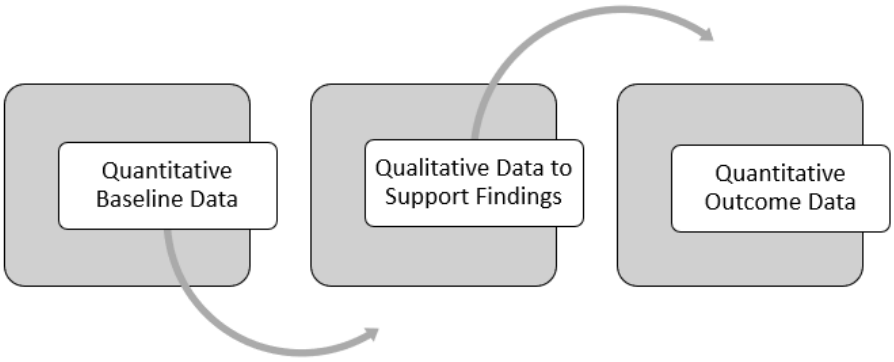
The study was an Improvement Science Dissertation in Practice, which allowed the researcher to focus on a relevant problem of practice, apply it in the field of study, and refine it through the dissertation process (Perry et al., 2020). The initial iteration of the study is a comprehensive assessment of an existing intervention within the practice, followed by a subsequent iteration focused on implementing an improvement to the intervention and collecting data on the outcome (Pape et al., 2022). The initial iteration focused on the RtI implementation in math, since this was the area with the highest need based on the 2019 STAAR data. The second iteration expanded to include the impact of RtI implementation, with the use of job-embedded professional learning, on students' reading and math proficiencies. The Plan-Do-Study-Act (PDSA) methodology was utilized in the study to plan the tasks that needed to be completed to reach the expected outcomes, execute and record data associated with the plan, assess the plan's effectiveness, and decide whether to adapt, adopt, or abandon the intervention tested (Christoff, 2018).

Design-based research (DBR) methodology was utilized to increase the implementation of educational research in schools in order to improve instructional practices (Anderson & Shattuck, 2012). By applying the DBR methodology, used as the basis of the RtI intervention study, educators take a practical approach to employ and refine interventions through multiple iterations to continuously improve teaching and learning (Campanella & Penuel, 2021). The researcher and educators examined the existing RtI practice within the study's district, identified areas that required attention, proposed research-based solutions for implementation, evaluated the effectiveness of iterations, and derived design principles applicable to other researchers and practitioners (Fahd et al., 2021).

The evaluation study of the RtI model at a charter school utilized a mixed-method design to "validate findings through triangulation, but also to give a deeper, broader and more illustrative description of the phenomenon" (Hurmerinta-Peltomäki & Nummela, 2006, p. 452). Specifically, the mixed-methods study employed was an embedded experimental model with a one-phase approach, shown in Figure 1.4. The approach allowed the researcher to address relevant research questions using quantitative data as the primary source and qualitative data as a secondary reference to support the study (Creswell & Plano Clark, 2006).

Figure 1.4

Embedded Experimental Model with a One-Phase Approach



Quantitative data were obtained from the student progress monitoring spreadsheets and Likert scale questions from a survey administered to teachers. The data was used to evaluate shifts in academic outcomes to determine if the RtI model impacted student's proficiencies in math (Strunk, 2020), assessed the teachers' perception of students' ability to navigate and utilize the IXL program, and the teachers perceived understanding of the RtI process. The qualitative data were obtained from teacher surveys to seek meaning and interpretation of the teachers' perspective if the students' needs were being met at their functional level (Merriam & Tisdell, 2015).

The Institutional Review Board (IRB) approved all evaluation study materials and processes, and all participants gave signed, informed consent before the data collection. Additionally, in order to maintain anonymity, the campus principal removed student names from the quantitative data before it was given to the researcher, and the researcher replaced student names with pseudonyms. Furthermore, the participants of the survey completed questionnaires anonymously.

Context

Phase One

The mixed-methods study included a K-12 laboratory charter school in East Texas. Through project-based learning (PBL), problem-based learning (PrBL), and blended learning (BL) instruction, the school focuses on science, technology, engineering, and math (STEM) education. The district is a technology-rich school with one-to-one devices for third through 12th-grade students, while students in kindergarten through second grade utilize class sets of technology within stations in the classrooms. Students are given a choice in STEM education at the high school level and choose to pursue either a biomedical or engineering track. The students' demographics were 65% White, 20% Hispanic, 6% Black, 6% Asian, and 3% multiracial. Fifty-nine percent of students were male, and 41% percent of the students were female. Thirty percent of the students were

economically disadvantaged, 10% were dyslexic, 4% were English learners, 9% were gifted and talented, and 7% received special education services. Additionally, the campus had 24 teachers, three paraprofessionals, and three administrators. As a part of employment, each teacher must complete their master's degree within seven years of being employed by the district.

Phase Two

The research occurred in a district with three charter schools in East Texas with a total enrollment of 853 students. The educational mission revolved around STEM pathways and employing instructional methods such as PBL, PrBL, and BL. Demographically, the student body comprised approximately 64% White, 20% Hispanic, 7% Black, 6% multiracial, and 3% Asian students. The gender distribution was evenly split, with 50% male and 50% female students. Among the students, 33% faced economic disadvantages, 7% had dyslexia, 2% were English learners, 7% were identified as gifted and talented, and 9% received special education services. The district had 57 teachers, seven paraprofessionals, three administrators, 10 professional support staff, and nine auxiliary staff members. As a condition of employment, each teacher was required to obtain a master's degree within seven years of being hired by the district.

Participants

Phase One

For the evaluation of the RtI model, teachers were selected using purposeful sampling from one of three K-12 campuses in the district. Teacher participants were only considered from the pool of STAAR-tested grade levels in mathematics. The researcher conferenced with those who met the qualifications to review the study and answer questions. The researcher also sent follow-up emails to review the purpose of the research and how they would engage in the study if they were interested.

Each participant received a recruitment script and signed informed consent to participate in the survey.

All eligible teachers elected to participate in the study. The experience level of the four participating teachers ranged from one to 15 years, with three participants having less than two years of experience. Three of the teachers were female, and one was male, with all teachers being White. All participants graduated from a teaching preparation program at a university and were highly qualified in their subject areas through state certification credentials.

Phase Two

To ensure a focused selection of participants well-versed in RtI implementation based on their firsthand knowledge, purposeful sampling was employed to choose teachers from the district for study inclusion (Palinkas et al., 2015). The teachers taught English language arts or mathematics within the grade range from third to 12th grade. Seven of the 17 teachers meeting the criteria participated in the study. Among the seven participants, their teaching experience ranged from one to 20 years, with all but one having less than five years of experience. All participants were White, and all but one were female. Furthermore, all the participants possessed the necessary qualifications in their respective subject areas, as evidenced by state certification credentials.

Instrumentation and Data Collection

Phase One

As part of the mixed-method model evaluation, quantitative data was collected from the teacher's student progress monitoring spreadsheets, which the principal provided to the researcher at the close of the school year with student-identifiable information removed. The spreadsheets included beginning and end-of-year IXL diagnostic data for third through 12th grade. The IXL diagnostic score indicates students' current academic level (IXL Learning, 2023b). The data

collected from spreadsheets were utilized to answer research question one: To what extent does the RtI model affect the student's proficiency in math?

Additionally, quantitative and qualitative data were collected from a survey administered in the spring to the teachers that participated in the study. The survey consisted of one Likert scale question and four open-ended questions. The Likert scale is a measurement tool to analyze perceptions and attitudes. The Likert question specifically asked the teachers their perception of how well the students could navigate and utilize the IXL program using a 5-point scale, with zero representing extremely inadequate, one representing somewhat inadequate, two representing neither adequate nor inadequate, three representing somewhat adequate, and four representing extremely adequate. The open-ended questions addressed research question two: To what extent were students' needs being met at their functional level? The survey concentrated on instructional strategies that were being utilized during the intervention period, identified to what extent they felt students were successful on concepts at the student's functional level in Tier Two and Tier Three, and determined if engagement increased or decreased based on student success (see Appendix B).

Phase Two

The mixed-method study encompassed quantitative and qualitative data sources. The quantitative data consisted of fall, winter, and spring Measure of Academic Progress (MAP) assessment scores for 726 students in grades three through eight. These scores were utilized to evaluate whether the implementation of RtI reduced the academic achievement gap. The MAP data provided a Rasch UnIT (RIT) score for each student, reflecting their level of content knowledge (NWEA, 2022). Specifically, the MAP data addressed the first research question, which explored how the RtI model impacted students' math proficiency. To ensure data privacy, the principal provided the researcher with de-identified reports at the end of the school year, and the researcher

assigned numerical pseudonyms to each student's dataset. Additionally, quantitative data was collected from a Likert scale question in a survey to collect participants' perceptions of their understanding of the RtI process. The Likert scale ranged from zero, representing not knowledgeable, to five, representing extremely knowledgeable.

In addition, an anonymous survey was administered to collect qualitative and quantitative data, and participants provided informed consent (see Appendix C). The survey was distributed via Qualtrics survey software, with each teacher receiving an email link to access it. The survey included three multiple-choice and six open-ended questions. The multiple-choice questions sought information about respondents' preparedness to deliver Tier Two and Tier Three interventions and their perception of the reduction in the academic achievement gap. The open-ended questions allowed participants to express perspectives of their strengths and areas requiring further professional learning during the implementation of the RtI framework, make suggestions for enhancing the effectiveness of the RtI model, descriptions of Tier Two and Tier Three interventions utilized in their classroom, and factors contributing to changes in the student’s academic gap.

Data Analysis

Phase One

The data analysis for the evaluation study was derived from examining IXL beginning and end-of-the-year student diagnostic scores and one survey administered in the spring to teachers. Teachers reviewed and verified that the data was accurate before the spreadsheets with the IXL scores were submitted to the researcher by the principal. The quantitative IXL diagnostic scores were first analyzed using descriptive statistics to evaluate the normality of the data before conducting a series of paired samples t-tests, and it was found that each level of data was not normally distributed. Given the violation of assumptions, the Wilcoxon Signed Rank non-parametric

test was used to determine the impact of the RtI model on math proficiency. The Likert scale data were analyzed using descriptive statistics by identifying the mode of the responses to determine the collective sentiment expressed by the participants.

The qualitative analysis included the review of four open-ended responses from the survey using thematic analysis, which enables the researcher to derive themes from data obtained through lived experiences inductively (Sundler et al., 2019). Once the survey closed, the researcher compiled all answers from each respondent by the question, reviewed the answers to each question, and wrote the main themes from each response. Based on these central themes, categories were created for each question. The researcher then compared the categories between questions to identify relationships that may exist.

Phase Two

A one-way repeated measures ANOVA was conducted using MAP data to determine whether a statistically significant difference existed in reading and math achievement throughout the academic year. Prior to data analysis, the assumptions of the analytical procedure were assessed. It was found that the levels of the data were not normally distributed. Given the violation of assumptions, the Friedman nonparametric test was utilized to assess the impact of RtI on students' reading and math proficiency. Furthermore, the quantifiable elements derived from the survey were subjected to descriptive statistical analysis to measure central tendency.

Further, an inductive thematic analysis method was employed for the open-ended qualitative questions to better understand the participants' perceptions (Hewitt-Taylor, 2001). The researcher downloaded all survey responses from the Qualtrics survey software and carefully reviewed each respondent's answer to every question. After an initial reading, each response was coded by summarizing each sentence with a relevant word or phrase (Linneberg & Korsgaard, 2019).

Subsequently, the codes were organized into categories that shared key elements (Saldaña, 2015). Finally, themes were identified across respondents for each question.

Limitations of the Research

Phase One

There were multiple limitations to the research conducted. The data collected was derived from a small sample size of teachers that participated in the RtI process, and this limited data may not be generalizable to other subjects or teachers. Additionally, the IXL diagnostic scores from the teacher's student progress monitoring spreadsheet may not have been a score that was genuinely representative of the student's current level, as students spent differing amounts of time utilizing the software. Due to this fluctuation, it is recommended that future studies use a tool that will consistently provide accurate data on student achievement to evaluate growth. Lastly, the study did not disaggregate the data by subpopulations, which could have shown emerging themes based on subsets of groups. Therefore, it is recommended that in proceeding studies that data is evaluated based on the subset groups to gain a more extensive portrayal of student progress (Bernhardt & Geise, 2009).

Phase Two

In the subsequent study, there were additional limitations. For example, a benchmark survey was not administered before job-embedded professional learning was provided, making it challenging to compare teachers' perceptions before and after training. Additionally, the teachers' perceptions may be biased in the survey due to teachers wanting to be socially desirable to the researcher, who was a district administrator (Qualtrics, 2023). Another limitation was the small sample size of participating teachers, which may have limited the generalizability of the findings. Finally, the participants' demographics may not fully represent the entire faculty.

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Chapter 2

Abstract

Academic achievement plays an integral part in the success of a society and is a focus at the international, national, and state level. Multiple assessments are utilized to gauge academic deficits that occur in kindergarten through 12th grade so that interventions can be implemented to mitigate these deficiencies. The literature details the Response to Intervention (RtI) models used to decrease academic gaps through a problem-solving approach or standard treatment protocol. The tools utilized within the model are explained, such as universal screeners and progress monitoring. Furthermore, information on the implementation fidelity is presented, concentrating on training needed for staff and families, barriers to implementation, and components of a successful RTI program.

Keywords: at-risk, multi-tiered system of supports, universal screeners, progress monitoring, rti tiers, fidelity of implementation

Increasing Academic Achievement through Response to Intervention

A person's cognitive ability significantly impacts academic achievement and is often evaluated through grades, assessments, and certificates or degrees earned (Steinmayr, 2014). Kindergarten through twelfth-grade schools focuses on adequately preparing students for post-secondary endeavors that require adequate mastery of foundational skills. However, students graduating high school and pursuing a college degree are not fully prepared, as seen through American College Testing (ACT) data, where 42% of the students did not meet at least on ACT College Readiness Benchmark in science, math, English, and reading (ACT, 2023). High academic achievement in school generates an increase in a skilled labor workforce with 21st-century skills (Hanushek, 2015), which may have a positive economic effect on society (Mitra & Zheng, 2011). Educational outcomes, outside of academics, also focus on building the skills of cultural literacy needed to function within society and the political literacy skills needed to be a functioning citizen (Biesta, 2009). Due to the influence of academic achievement on society, it is an area monitored by countries, states, districts, campuses, and classrooms. Each level employs specific assessments to evaluate how well-prepared individuals are in that context.

Academic Achievement Assessments

International

One assessment utilized at the international level to compare the academics of each country is the Program for International Student Assessment (PISA). "PISA measures 15-year-olds' ability to use their reading, mathematics, and science knowledge and skills to meet real-life challenges" (OECD, 2018b, para. 1). Additionally, each assessment also focuses on a non-core component such as learning in the digital world and creative thinking (OECD, 2018a, para. 3). When the PISA assessment was given in 2018, the students in the United States scored above the International

Organisation for Economic Co-operation and Development (OECD) average of the other countries that participated in the assessment in reading and science (Bouchrika, 2022). However, Bouchrika detailed how the United States scored below the international OECD average in math. Even though the United States has made minor improvements since the 2015 test administration, it is still lagging in academic performance compared to other countries by placing "24th in reading, 38th in mathematics, and 25th in science" (Bouchrika, 2022, para. 10). Even though this assessment was given in 79 countries, there has been some upheaval to the utilization of this test as it relied solely on using a standardized test to determine rank (Strauss, 2019). While the data provides information on the United States compared to other countries, the United States utilizes additional assessments to understand academic achievement within its borders better.

National

The National Assessment of Educational Progress (NAEP) is utilized to gauge the educational landscape of the United States, which is an assessment mandated by Congress with multiple subjects assessed but a heavier focus on reading, science, and math (USDE, 2022a). The subjects covered on the assessment are arts, civics, reading, math, geography, economics, science, technology and engineering, United States history, and writing (USDE, 2022c). The individual assessments are scored using an average scale score showing a student's proficiency in each subject area, but the student's individual data is not accessible (USDE, 2022d). Data is reported on the Nation's Report Card, which disaggregates the information based on grade, type of school, gender, and teacher experience (USDE, 2022a). NAEP also provides data on students' performance based on the NAEP achievement levels of NAEP Basic, NAEP Proficient, and NAEP Advanced, which do not correlate to subject competence needed at a grade level assessed by state and district standards (USDE, 2022d).

Based on the long-term trend reports of nine-year-old students, the average scores were stagnant from 2012 to the 2020 administration in reading and math (USDE, 2022b). However, the long-term trend report showed that the 13-year-old average reading and math scores slightly declined from the 2012 administration to the 2020 administration, with the reading score decreasing by three points and the math score depreciating by five points (USDE, 2022b). Sawchuck (2014) described how the results provided meaningful data for the nation; however, there are still concerns that the data can be misinterpreted to meet the data needs of organizations or governmental agencies.

Furthermore, the 2022 national results showed that the average math and reading scores declined for fourth- and eighth-grade students from the previous assessment administration in 2019 (Mollenkamp, 2022). Jimenez (2022) also reported that this decline has been the most extensive in math scores since 1990. The data indicated an increase in students who were not meeting NAEP's basic level, which means that the students did not show mastery of the foundational skills needed to be proficient (Mollenkamp, 2022). To understand the academic proficiency of specific grade levels and content areas, states also administer their assessments to provide data to guide educational reform, such as the Texas State Assessment of Academic Readiness (STAAR) and State of Texas Assessments of Academic Readiness Alternate 2 (STAAR Alt 2).

State Assessments

In Texas, the STAAR and STAAR Alternate 2 assessments measure the academic achievement of students (Texas Education Agency [TEA], 2022b). The STAAR assessments, including the STAAR end-of-course (EOC) assessments, are given in the spring each year to assess a student's mastery of grade-level standards, also known as the Texas Essential Knowledge and Skills (TEKS). The STAAR assessments assess reading and math subjects in grades three through eight, science in fifth and eighth grade, and social studies in eighth grade. The STAAR EOC is a STAAR

assessment given at the completion of high school level courses and measures students' proficiency of the TEKS in algebra, biology, United States history, English I, and English II (Texas Education Agency [TEA], 2022a). Students who do not pass the high school STAAR EOC assessment with a score of approaches or higher have additional opportunities to take the assessment in June and December (TEA, 2022a).

The percentage of students that met grade-level standards on the 2022 reading STAAR assessment has improved since the inception of STAAR in 2012 (Lopez, 2022). However, the math scores, which were on an upward trajectory before the Coronavirus (COVID-19), with 50% of students meeting grade-level standards at its peak in 2019, have drastically declined to 40% meeting grade-level standards in 2022, with only a 5% increase between the 2021 and 2022 assessments (Lopez, 2022).

Additionally, the state of Texas utilizes the standardized assessments of the Texas English Language Proficiency Assessment System (TELPAS) and Texas English Language Proficiency Assessment System Alternate (TELPAS Alternate) to measure the English proficiency of students (TEA, 2022b). The assessment measures the student's English language acquisition in the domains of listening, speaking, reading, and writing. The assessment is given in the Spring of each year to students through either a paper or online assessment (TEA, 2022c).

While these measures are designed to evaluate student learning, they are not exempt from criticism. For example, Madrigal and Epstein (2021) described some of the criticism of the state assessment as placing emphasis on measuring student achievement from only one standardized test, the harmful side effects when students fail the examination, and inequities that the test could perpetuate. Furthermore, a study was conducted on the readability of the STAAR assessment, and

the results found that reading passages were not in alignment with the grade level being assessed (Szabo & Sinclair, 2019).

Based on declining results from the international, national, and state assessment, math and reading are areas identified where improvement is needed to ensure students are prepared for post-secondary education. One method implemented to decrease these deficiencies is Response to Intervention (RtI), which falls under a Multi-Tiered System of Support (MTSS) umbrella.

Multi-Tiered System of Support and Response to Intervention

An MTSS focuses on supporting the whole child through academics, social-emotional learning, and behavior (Sailor et al., 2020). Utley and Obiakor (2015) described how the "MTTS framework consists of principles of response to intervention (RtI), positive behavioral interventions and supports (PBIS), and integrates a continuum of system-wide resources, strategies, structures, and evidence-based practices for addressing barriers to student learning and discipline" (p. 1). August et al. (2018) highlighted that an increased number of evidence-based programs for social-emotional support are focusing on broader aspects such as "emotion regulation, trauma, depression, and anxiety" (p. 3). While MTSS supports the whole child, RtI is one component that focuses on supporting students' academic achievement.

Initially, RtI was initiated in response to an unbalanced number of referrals submitted for minority subgroups to special education (Grigorenko, 2009). After the Individuals with Disabilities Education Act (IDEA) reauthorization in 2004, states could utilize RtI to provide early intervention before referring a student for testing for a specific learning disability (Al Otaiba et al., 2014a). However, the Office of Special Education and Rehabilitative Services (2011) has emphasized that the RTI process cannot delay the appraisal of a student suspected of having a disability.

The National Center on Response to Intervention (2010) defined RtI as a framework that identifies students at risk for not mastering grade-appropriate content and provides research-based support at varying intensities based on students' academic needs. RtI derives from applied behavioral analysis (Ardoin et al., 2016), specifically focusing on the behavior modification model through the process of identifying the problem, determining the root cause of the problem, implementing strategies to address deficits, and monitoring the outcomes of those interventions on the student's progress (Sabnis et al., 2019). Many factors contribute to students becoming at risk for inadequate academic achievement. Larose and Tarabulsy (2005) reported that students might become at risk based on internal and external forces. Internal factors impacting a student's intellectual attainment are disabilities, language, developmental differences, and physical and mental health (Hanover Research & ULEAD Education, 2019). External factors influencing a student's risk include the academic setting, teacher quality, and socioeconomic status (Hanover Research & ULEAD Education, 2019). Once the students are identified as being at risk academically, schools may choose to utilize a model of RtI to mitigate the educational gap. Utilizing the proactive approach of RTI allows teams to identify students at risk for poor learning outcomes based on data from the universal screener before academic gaps are observed through classroom assessment data (Lawrence, 2007).

Tools of RtI

Universal Screeners

Universal screeners are assessments given to all students to identify strengths and predict areas where intervention support would benefit student achievement (Searle, 2010). Universal screeners are an essential aspect of academic RtI (Dougherty Stahl, 2016), as they allow all students to be assessed uniformly to identify students who may experience learning difficulties early (Gersten et al., 2012). Gersten et al. (2009) highlighted that there is limited research on universal math

screeners that should be implemented in later elementary grades and higher. Still, they recommended utilizing a screener that focuses on the student's current grade priority objectives (Gersten et al., 2009). The screeners should be timely, feasible, cost-effective, of high sensitivity and specificity, and unbiased (Zugarramurdi et al., 2022). He and Meyer (2021) described that it is not only necessary that the universal screener be reliable and accurate, but it must also have "benchmarks through a scientifically designed and evidenced-based process" (p. 24). The benchmarks are short assessments that can predict learning problems (National Center on Response to Intervention, 2010). They are usually given at the school year's beginning, middle, and end (Hughes & Dexter, 2011).

When universal screeners are administered throughout the year, the students shown to be at risk are monitored through other data points to determine if additional interventions are needed to support the student (Fuchs et al., 2008). After identification, the process aims for students to meet grade-appropriate standards with qualified practitioners providing interventions through a structured framework (Grigorenko, 2009). For example, the Vail School District, located in Arizona, implemented the RtI model with System to Enhance Educational Performance (STEEP) assessments as part of their universal screeners, which are assessments given to all students to identify those who may be at-risk and need additional support (VanDerHeyden et al., 2007). During the first year of the study, fewer students were referred for special education services, and a high percentage of those who were referred qualified due to the implementation of the RtI model. Furthermore, the study found that the district incurred reduced costs for conventional assessments and could allocate those funds for interventions, consultation services, and individual evaluations (VanDerHeyden et al., 2007). After the universal screener is used for academics, students who need additional support are identified, goals are created, and data must be collected to monitor the student's progress toward those goals.

Progress Monitoring

Progress monitoring is vital for academic RtI to ensure that data points are collected and reviewed to determine the need for increased or decreased support. They should not be confused with screening or diagnostic assessments, which have their own purpose in the RtI process. Diagnostic assessments are given to individual students each year to identify specific weaknesses for that student for the content they have learned and used to drive instructional decisions for intervening (Mellard & Johnson, 2008). Whereas progress monitoring is conducted daily, a few times throughout the week, or weekly to monitor student progress toward student-specific goals created by the RtI Committee and to assess if the implemented intervention is working (Mellard & Johnson, 2008). Bouck and Cosby (2017) also noted that progress monitoring is conducted when students move into Tier Two and Three.

Progress monitoring utilizes short assessments that can reliably tell if a student is making progress toward their identified intervention goals, assess whether the instruction has been effective, and guide decisions made by the committee (Lembke et al., 2012). To progress monitor, the measure of assessment must be determined, baseline data identified, short-term goals identified, long-term goals identified, timelines for evaluation of data identified, scores graphed, and meetings held to review progress and next steps (Luckner & Bowen, 2010). Gillam and Justice (2010) described that progress monitoring tools must be tools that can be given frequently with ease and psychometrically sound. Burton and Kappenberg (2011) provided examples of progress monitoring for academics, such as students being able to correctly read designated words in a specified period or correctly spelling a set number of words from a spelling list. Mellard and Johnson (2008) identified possible challenges with using progress monitoring, such as selecting the appropriate tools, ensuring an adequate amount of progress monitoring tools, implementing them within the general education

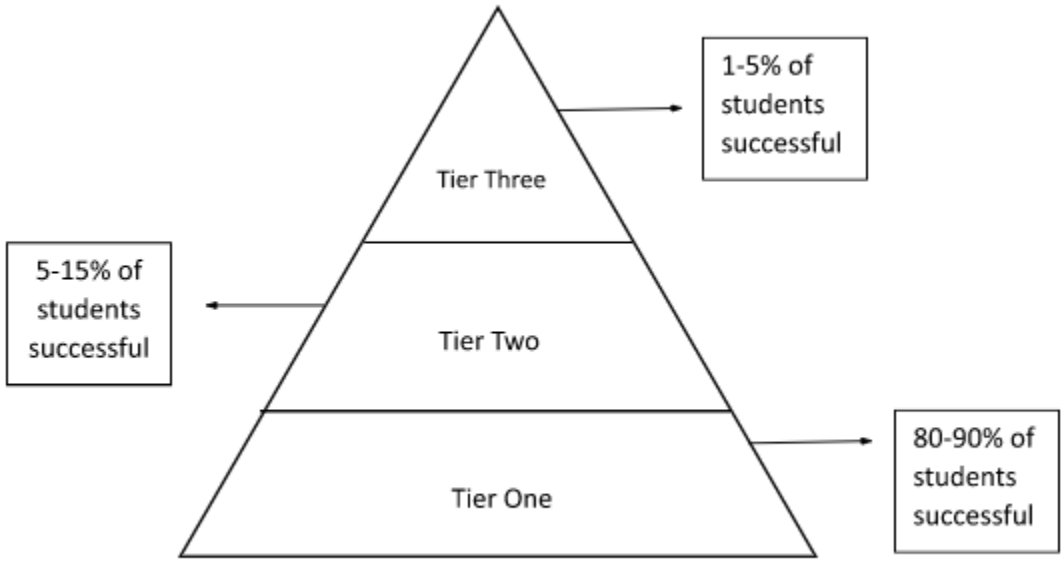
setting, using inconsistent data to guide intervention decisions, and determining the rules that will guide the decisions based on the data. Although there are challenges, these tools are essential components utilized in the RtI Tiers.

RtI Tiers

Most RtI models consist of Tier One, Tier Two, and Tier Three, as shown in Figure 1, and can be implemented in elementary through secondary schools (Canter et al., 2008). Tier One includes all students, and as students need increased intervention and support, they move into Tier Two and Tier Three (Riccomini & Witzel, 2009). As movement occurs into higher tiers, the intervention frequency and time increase to meet the identified short-term goals that are being progress monitored (Regan, 2015). The number of students should decrease drastically as the tier number increases if the RtI model works effectively, as shown in Figure 1.

Figure 2.1

RtI Tiers



Note: The percentage of students successful in each tier is obtained from McREL International (2015).

Tier One

The cornerstone of RtI is effective core instruction in Tier One utilizing research-based instructional strategies for academics, although there are few criteria for what high-quality instruction entails (Gersten et al., 2009; Hughes & Dexter, 2011). Research-based instructional strategies should include specific instructional interventions and a comprehensive curriculum (Hoover & Love, 2011). Bjorn et al. (2018) also highlighted that Tier One instruction should consist of explicit, differentiated instruction and focus on fundamental skills that can be covered with all students in the general education classroom (Berkeley et al., 2009). Lembke et al. (2012) reviewed the importance of conducting fidelity checks of core instruction. If most students are not successfully mastering the concepts, the curriculum or instruction will need to be evaluated for changes. According to McREL International (2015), 80-90% of students should be successful with the instruction and interventions provided to all students in Tier One. When students are not successful in Tier One by meeting grade-level standards, they are moved into Tier Two.

Tier Two

Johnson and Smith (2008) stated that academic Tier Two should focus on students who are not meeting grade-level standards even after effective, high-quality instruction in Tier One. Tier Two interventions should supplement the core instruction, not supplant the instruction (Dougherty Stahl, 2016). According to McREL International (2015), 5-15% percent of students in Tier Two should succeed with moderate, targeted interventions. For example, Bouck and Cosby (2017) identified interventions for Tier Two services within a secondary school, such as additional mathematics courses, small group pullouts for math support, an alternative math class, or utilizing

technology. Additionally, the interventions of explicit instruction strategies, concrete-representational-abstract (CRA) instruction sequence, schema-based instruction, and number talks are recommended for Tier Two and Tier Three students (Bouck & Cosby, 2017). Gersten et al. (2009) provided examples of explicit instructional strategies, including solving problems with explicit models, extensive practice, think-alouds, and extensive feedback. Furthermore, there is strong evidence of the significant positive impact of teaching students "the structure of problem types- and how to discriminate superficial from substantive information to know when to apply the solution methods they have learned" and how it affects their ability to solve word problems (Gersten et al., 2009, p. 26). In Tier Two instruction, students at risk for learning difficulties in any subject area should receive targeted support for "20 to 40 minutes, four to five times each week" (Gersten et al., 2009, p. 5). If a student is not successful in Tier Two, they will move to Tier Three, but according to Al Otaiba et al. (2014b), there is still limited guidance on when to move students between Tier Two and Tier Three.

Tier Three

Gersten et al. (2009) claimed that Tier Three is for students who are not making adequate progress in Tier Two, and it often entails one-on-one support along with multiple intervention strategies. Furthermore, students may also receive special education services in Tier Three or, in some cases, Tier Four. According to McREL International (2015), in Tier Three, approximately 1-5% percent of students should receive intensive, significant interventions. Fletcher and Vaughn (2009) discussed how Tier Three should have more extended intervention periods with smaller groups of students than Tier Two intervention periods. A teacher specializing in the content could be the teacher of record for this intervention period. Turse and Albrecht (2015) stated that in Tier Three,

the individual providing the intervention might alter or use an additional curriculum to meet the student's needs.

Throughout the tiers, students receive varying levels of support to assist them in meeting identified goals. Furthermore, there are varying models of how students are identified and the types of support provided.

Models of Response to Intervention

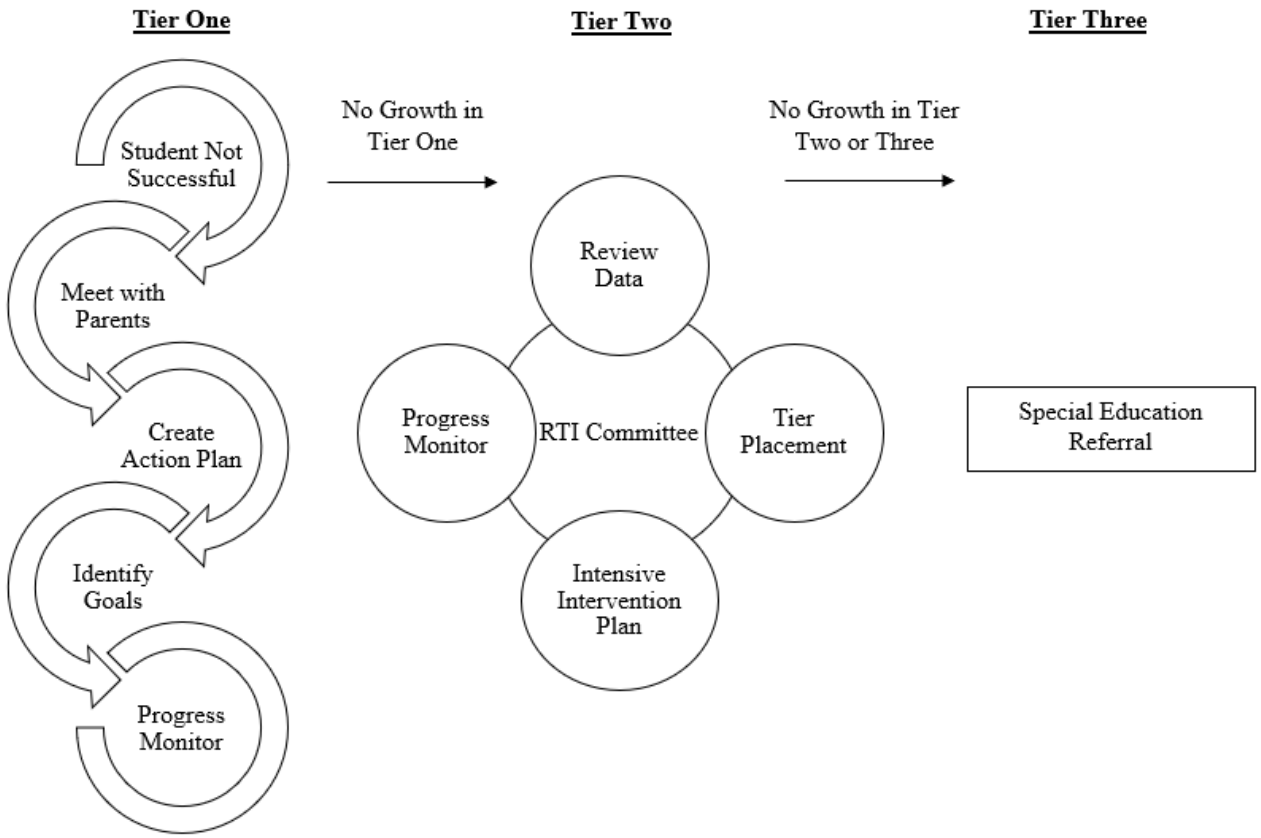
RtI is a "proactive and preventative approach, in contrast to an educational approach, where students fail before measures and support are put in place: the 'wait-to-fail' model" (Nilvius, 2020, p. 279). Preston et al. (2016) identified two types of RtI models, the problem-solving approach and the standard treatment protocol for all students. Fletcher and Vaughn (2011) highlighted that both models include training for staff, a component focused on identifying students needing additional support, and routine measurement of student progress toward identified goals.

Problem-Solving Approach

Preston et al. (2016) described the problem-solving approach (PSA) as a model where the teacher changes the instruction to meet the student's needs in Tier One based on a universal screener and progress monitoring, as shown in Figure 2. This model emphasizes the collaboration between the general education teacher and a content specialist to identify interventions targeting each student's deficient skills instead of the groups (King & Coughlin, 2016).

Figure 2.2

Problem-Solving Approach



If a student is unsuccessful in Tier One, the teacher initiates a cyclical process of meeting with the parents, creating a plan of action unique to that student's needs, identifying goals, and identifying times to monitor progress. If the student is not showing growth in Tier One, the teacher reaches out for the support of the RtI committee, which is created at the building level and comprised of specialists, the principal or campus administrator, and classroom teachers (Callender, 2014). The RtI committee then develops a more intensive intervention plan for the student in Tier Two. If the student is still not progressing in Tier Two, they move to Tier Three with more intensive intervention. If the student is still non-responsive, they move into Tier Four and are evaluated for a special education referral. According to King and Coughlin (2016), this method benefits school

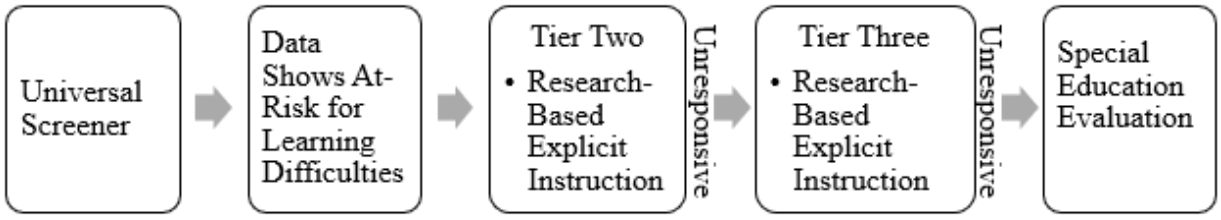
districts because it allows students' skills to be targeted by specifically designed intervention strategies. However, utilizing a PSA requires teachers to understand broad skills deeper. Additionally, the district will need to provide expansive professional learning, which may be at an increased cost to the district. A conventional alternative for this method is the standard treatment protocol.

Standard Treatment Protocol

Standard treatment protocol (STP) focuses on remediating deficits through prescribed interventions that are not varied to the unique needs of each student, as shown in Figure 3 (King & Coughlin, 2016). Instead, the interventions address specific skills that are shown as a weakness for identified groups of students (King & Coughlin, 2016).

Figure 2.3

Standard Treatment Protocol



Preston et al. (2016) described the STP model as beginning with all students being administered a universal screener, and those at-risk for learning difficulties are moved to Tier Two. While in Tier Two, there are researched-based explicit instruction lessons followed for intervention. When the student is not responsive in Tier Two, they are moved to Tier Three, and if they do not progress in this tier, they are referred for a special education evaluation. According to King and Coughlin (2016), this method benefits a school district due to the limited costs for one intervention

method and focused professional learning. However, STP does not allow for targeted, varied intervention based on individual students' needs.

In both models, students move through tiers based on their response to instruction provided at each level. As students progress to higher levels, the frequency of intervention time increases, and the instructional approaches are varied. Additionally, both models focus on general instruction in Tier One and supplemental instruction in Tier Two and Tier Three. Whether the model of the Problem-Solving Approach or the Standard Treatment Protocol is used, accountability must be established to ensure the fidelity of the model implementation.

Fidelity of Implementation

Goodman (2017) described how MTSS uses research-based interventions to meet the student's needs, utilizes data for intervention design and evaluation of effectiveness, and requires processes to be enacted to ensure that the MTSS framework is implemented with fidelity. Merriam-Webster (2022) defines fidelity as the accuracy to which one duplicates the details to replicate the outcomes. Therefore, once RtI is implemented, systems should be designed to measure the fidelity of the RtI implementation and use that data to make informed decisions about changes that need to occur within the components of the RtI model (Keller-Margulis, 2012). If staff does not consistently execute the framework with fidelity, there will be broad inconsistencies in the implementation of the RtI models (Savits et al., 2018), and the effectiveness of the intervention may be skewed (Sanetti & Collier-Meek, 2015). Sanetti and Collier-Meek (2015) described supports that can be implemented to support fidelity, such as an intervention manual, test-driving interventions, direct training, treatment planning protocol, implementation planning, instructional coaching, intervention scripts, role play, participant modeling, motivational interviewing, self-monitoring, prompts video support, and performance feedback. One critical component of ensuring fidelity is professional learning.

Professional Learning

When implementing any program or process, all stakeholders need to understand why it is being used, how it will be utilized, and the impact it can or has had. By including those that will implement the program, such as the administrators and teachers, the organization increases the potential for buy-in from staff and understanding of how to implement it with fidelity.

To ensure that RtI can be implemented with fidelity, teachers and administrators will need to engage in professional learning to deepen their understanding of the process, make informed decisions on strategies to implement within different components of RtI, understand and be able to implement assessment instruments, and collect data to inform the collaborative review of student achievement. Lamb (2014) emphasized the need to have time for staff to collaborate throughout the process from data collection, intervention implementation, and evaluation and refinement of interventions. Also, Castillo et al. (2018) highlighted that one of the most effective methods for professional learning is for teachers to engage in relevant, real-world scenarios to problem-solve as a collaborative group. This training will set the stage for launching the RtI process through a presentation of the components, coaching by knowledgeable staff, and follow-up mini-lessons tailored to the needs of groups or individuals.

Sanetti and Collier-Meek (2015) described in their study that they provided explicit training as Tier One support, which included didactic training, modeling, role-play, feedback, and discussions. For Tier Two, there was targeted professional learning for staff members identified as needing additional support by providing sessions focused on planning how to implement, including action planning and coping planning (Sanetti & Collier-Meek, 2015). Lastly, the study provided Tier Three support for staff members whose data indicated additional needs through participant modeling, which included discussions outside of class with the teacher, modeling in class, teacher

implementing intervention, and specific feedback from teacher implementation (Sanetti & Collier-Meek, 2015). The study found that when teachers were provided differentiated support based on their needs, implementation integrity increased, and the instances where the intended outcomes of the intervention also occurred rose. Not only do staff need professional learning, but parents and families also need training on how they engage within the RTI process.

Parent and Family Engagement

Martinez and Young (2011) described from their research that engaging parents and families would make the RtI process more productive, but it is often absent. Most meetings occur with school personnel, and a letter is sent home to parents with the committee's findings if the student moved to Tier Two or higher. A study by Burns and Harris (2014) found that most states communicated the value of parental engagement for student success. However, very few states have specific processes to engage families within the RtI process. Wingate et al. (2018) highlighted how families did not have this process when they were in school; therefore, many families will not understand the RtI process or the information that may have been communicated in the letters sent home after an RTI meeting. The training should be provided to staff implementing the RtI process at the school and the parents and families who impact the student's progress at home. By proactively educating parents and family members, it may help lessen misconceptions or negative feelings that can center around "gaps in services, not the most effective approach, waste of time, little/no information, too much testing, not relevant due to IEP/special education (SPED) services, and effective enrichment and support" (Wingate, 2018, p. 166). While optimizing the partnership with families is essential to the successful implementation, there are still challenges in executing an effective RtI program.

Barriers to RtI

Leaver (2012) identified five perceived barriers by teachers with the enactment of RtI, beginning with the lack of job-embedded professional learning that provided the tools to understand the system, how to be accountable for implementation, and how to implement the system effectively. Another obstacle is a lack of consistent accountability in the fidelity of implementation (Leaver, 2012). Lamb (2014) stressed that one of the most important factors to monitor regarding adherence is quality instruction in Tier One because if this is not occurring, it impedes the success of the RtI process. Additionally, the staff viewed the process as additional work, which stifled the buy-in from staff to embrace the process (Leaver, 2012). Furthermore, the time barrier in completing required forms, providing the interventions in each tier, collecting and documenting the data, and the time it took to refer students for additional testing (Leaver, 2012). Lastly, the barrier of support was noted through needed financial support for implementation, validating the professional perspective of teachers when needing to expedite referrals for additional testing, and consistent process from one campus to another (Leaver, 2012). For example, many barriers were observed in the La Esperanza School District (LESD), an urban district located in the mountains of the Midwest (Orosco & Klingner, 2010). Orosco and Klinger's (2010) study found that staff perceived that the RtI implementation was unsuccessful due to limited resources, misalignment in assessment and instruction, inadequate teacher preparation, and negative school culture.

Through the research, there is no straightforward RtI approach with well-defined steps within each tier that is practiced consistently from district to district or state to state. Iannuzzi (2015) described the need for more research that provides strategies on how to implement RtI in all subjects and all grades, including behavior management and social-emotional growth. According to Gersten et al. (2009), there is limited research on RtI in secondary schools and especially in the content area

of math. Lembke et al. (2012) noted that most of the research that has been conducted about RtI had been focused on reading, but it is essential for this research to be conducted because most students that struggle with reading also struggle with math. Even though barriers exist, key factors are needed to implement the model successfully.

Success of the RtI Model

For RtI to positively impact student success, Hughes and Dexter (2011) noted the importance of professional learning in RtI processes, administrative support, teacher buy-in, and adequate meeting time for coordination. Iannuzzi (2015) stressed the importance of ensuring that teachers are equipped with the knowledge, resources, and support to provide high-quality Tier One instruction so that the needs of most students are met in the general education classroom, which also decreases the number of students who are needing Tier Two or Tier Three instruction. Nellis (2012) also recommended creating transparent processes and procedures for the RtI committee and creating and communicating the team's purpose and role before the RtI committee meeting to ensure successful implementation. Hoover (2011) also emphasized the need to ensure that enacted interventions are research-based practices. RtI can have the potential to considerably accelerate student achievement with a Cohen's *d* effect size of 1.09, which is considered a large effect size and has shown to have a positive year's growth in student learning (Corwin, 2019). Grapin et al. (2019) noted that implementing RtI in the lower elementary grades may have a more significant long-term impact on students' comprehension. By focusing on these critical factors, RtI has the potential to decrease the academic gap and increase student achievement.

In summary, academic achievement is a priority of K-12 schools within the United States due to the impact that it can have on a student being prepared for post-secondary education and, ultimately, the impact that the individual can have in society. Students identified as at risk for not

meeting academic standards are supported through RtI, a component of MTSS. RTI provides a foundation to target student improvement and decrease the academic gap through a multi-tiered approach with increased intensity of support provided at each tier. Each RtI model reviewed emphasized a collaborative data evaluation process and creating a plan that included goal setting, progress monitoring, and determination of interventions. Fidelity of implementation needs to be a key element when creating and monitoring the RTI process and should include professional learning for staff and families that are differentiated based on needs, accountability for the enactment of the process, time for the completion of items within the process, and financial support to run the model effectively.

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Chapter Three

Abstract

This evaluation research sought to provide school professionals with quantitative and qualitative data on the progress and effects of the multi-tiered Response to Intervention (RtI) implementation on a K-12 campus and its effectiveness in decreasing student academic gaps in math as evidenced by data collected from the State of Texas Assessment of Academic Readiness (STAAR) assessment. RtI is a multi-tiered system of support that focuses on providing targeted intervention to improve student achievement. Diagnostic scores from the personalized learning program IXL (IXL Learning, 2023b) revealed that students had progressed overall in their math proficiency throughout the school year despite an unprecedented instructional year during a pandemic. Responses from the survey indicated that teachers perceived that students who were taught at their functional level had an increase in academic engagement and a boost in their self-confidence when completing math work.

Keywords: at-risk, education, instructional framework, math, multi-tiered, student progress

Evaluation of the Impact of Response to Intervention on Achievement

Effective, differentiated instruction is vital to provide the avenue for students to master and excel in content areas (Lawrence, 2007). When students experience difficulty with learning a concept, it is essential to provide targeted interventions early to reduce the possibility of expanding the academic deficits. Response to Intervention (RtI) is "a prevention model of multitiered instruction with a minimum of three tiers" and is a systematic way to identify students early who are encountering adversity in academics or behavior, collaboratively identify interventions to implement, create goals, and for instructors to meet to review progress through data-based discussions (Preston et al., 2016, p. 176). The RtI framework allows for students at-risk of poor learning outcomes to be identified early using an academic screening tool, often called a universal screener. The screener provides information about students who may be showing academic levels inconsistent with their grade level, allowing for interventions to be provided before academic gaps grow (Zugarramurdi et al., 2022). In the multi-tiered model, the intensity and time of the targeted interventions provided to the students increased as they moved to higher tiers.

The long-term goal of each teacher is for their students to be proficient in the skills needed to advance successfully to the next grade level so they can have the foundation to master the following year's standards successfully. The RtI framework is a model that assists in narrowing academic gaps and increasing student achievement.

Literature Review

The RtI framework provides research-based interventions at varying intensities to students at risk for not meeting grade-appropriate standards to decrease academic gaps and increase student achievement (The National Center on Response to Intervention, 2010). RtI is a "proactive and preventative approach, in contrast to an educational approach, where students fail before measures

and support are put in place: the ‘wait-to-fail’ model” (Nilvius, 2020, p. 279). In order to identify and monitor students who are not meeting grade-level expectations, specific tools are utilized in the RtI framework, such as universal screeners and progress monitoring.

Tools of RtI

Universal Screeners

Universal screeners are a critical aspect of RtI (Dougherty Stahl, 2016), as they allow students to be assessed uniformly to identify those that may experience learning difficulties early (Gersten et al., 2012). Academic universal screeners are short assessments that can predict learning deficits (National Center on Response to Intervention, 2010) and are usually given at the beginning, middle, and end of the school year (Hughes & Dexter, 2011). When universal screeners are administered throughout the year, the students shown to be at risk are monitored through other data points to distinguish if additional intervention is needed to support the student (Fuchs et al., 2008). For example, Gersten et al. (2009) highlighted that there is limited research on math universal screeners implemented in later elementary grades and higher and also recommended utilizing a screener focused on the student’s current grade priority objectives.

Progress Monitoring

Progress monitoring is a short assessment that can reliably evaluate a student’s learning progression and serves as a data point to guide instructional decisions to support the student toward mastery of academic standards (Shapiro et al., 2011; Lembke et al., 2012). Progress monitoring differs from universal screeners due to universal screeners assessing multiple skills, while progress monitoring only assesses a few specific skills. “Progress monitoring measures are considered dynamic indices because they measure change in response to systematic instruction” (Gillam & Justice, 2010. p. 14). Progress monitoring includes three steps: 1) the teacher identifies academic

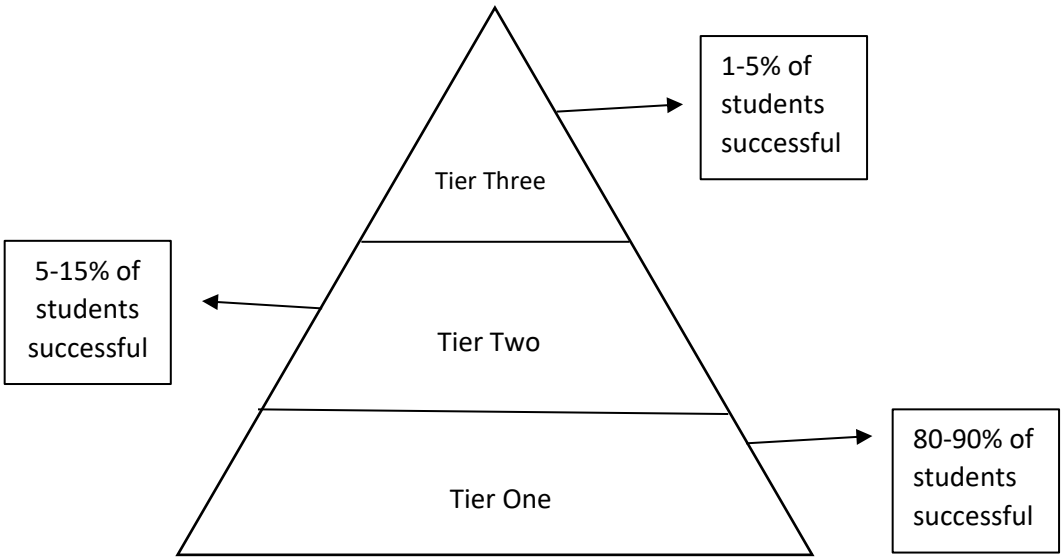
gaps; 2) consistently implements progress monitoring assessments based on the RtI framework; and 3) adjusts the intervention to meet the student's needs (Burton & Kappenberg, 2011). Gilliam and Justice (2010) highlighted that valid and reliable progress monitoring tools should be easy to conduct and evaluate since these will be given often to guide instructional decisions. These tools are a critical component of the RtI framework and are utilized in specific tiers.

RtI Tiers

Most RtI models consist of Tier One, Tier Two, and Tier Three, as shown in Figure 3.1, which can be utilized from elementary through secondary grades (Canter et al., 2008). All students are included in Tier One, and as students need increased support and intervention, they move into Tier Two and Tier Three (Riccomini & Witzel, 2009). The number of students should decrease drastically as the tier number increases if the RtI model works effectively.

Figure 3.1

RtI Tiers



Note: The percentage of students successful in each tier is obtained from McREL International (2015).

Tier One

The cornerstone of RtI is effective core instruction in Tier One utilizing research-based instructional strategies, although there are no defined criteria for what high-quality instruction entails (Gersten et al., 2009; Hughes & Dexter, 2011). Research-based instructional strategies should include an all-inclusive curriculum with identified instructional interventions (Hoover & Love, 2011). Bjorn et al. (2018) also highlighted that Tier One instruction should include explicit, differentiated instruction and focus on weaknesses in basic skills that can be addressed in the general education classroom (Berkeley et al., 2009). Lembke et al. (2012) reviewed the importance of conducting fidelity checks of core instruction. If most students are not successfully mastering the concepts, then the curriculum or instruction must be evaluated for changes. According to McREL International (2015), if Tier One is implemented correctly, 80-90% of students should be successful with the general instruction. Students not progressing in the general education classrooms may move into Tier Two (see Figure 3.1).

Tier Two

Johnson and Smith (2008) stated that Tier Two should focus on students demonstrating below grade-level standards even after effective, high-quality instruction in Tier One. Tier Two intervention should supplement the core instruction, not supplant the instruction (Dougherty Stahl, 2016). According to McREL International (2015), 5-15% percent of students should be successful with moderate, targeted interventions provided in Tier Two. In Tier Two instruction, students at risk for learning difficulties in a subject area should receive targeted support for “20 to 40 minutes, four to five times each week” (Gersten et al., 2009, p. 5).

Bouck and Cosby (2017) identified options for Tier Two services within a secondary school, such as additional content courses, small group pullouts, an alternative content class, or utilizing

technology. Additionally, Bouck and Cosby (2017) identified the beneficial impact of utilizing the intervention strategies of explicit instruction, concrete-representational-abstract (CRA) instruction sequence, schema-based instruction, and number talks with Tier Two and Tier Three students. Gersten et al. (2009) also showed strong evidence of explicit instruction's positive effects when including many examples when solving problems with explicit models, extensive practice, think-alouds, and extensive feedback. Furthermore, there is also strong evidence of the positive impact of teaching students about the types of problems they will encounter, how to discern the meaningful information being presented, and how to determine the correct method to apply based on that information (Gersten et al., 2009).

Bouck and Cosby (2017) also noted that progress monitoring is conducted when students move into Tier Two and Tier Three. If students are not progressing in Tier Two, the RtI committee evaluates if they should move into Tier Three. However, there is still insufficient information on when to transition students from Tier Two to Tier Three (Al Otaiba et al., 2014).

Tier Three

Gersten et al. (2009) claimed that Tier Three is for students who are not progressing in Tier Two, and it often entails multiple intervention strategies utilized in a one-on-one setting. Furthermore, special education services may be available for Tier Three or Tier Four students. McREL International (2015) stated that approximately 1-5% of students progress to Tier Three and receive intensive, significant interventions. Tier Three should have extended intervention periods with smaller groups of students than Tier Two (Fletcher & Vaughn, 2009). The Iris Center (2023) recommended providing Tier Three intervention four to five times a week, with each session ranging from 40-60 minutes. Additionally, interventions should focus on explicitly teaching skills, with progress monitoring occurring at least once per week (Iris Center, 2023). Turse and Albrecht (2015)

stated that the educator could use modified or special curriculum-based programming to meet the student's needs in Tier Three.

The tiers provide a model to scaffold support for students to receive personalized intervention at varying levels to close academic gaps. Different models influence the steps that are followed within the tiers. Although a basic outline of the tier progression is utilized in RtI, each district determines its specific processes.

Models of Response to Intervention

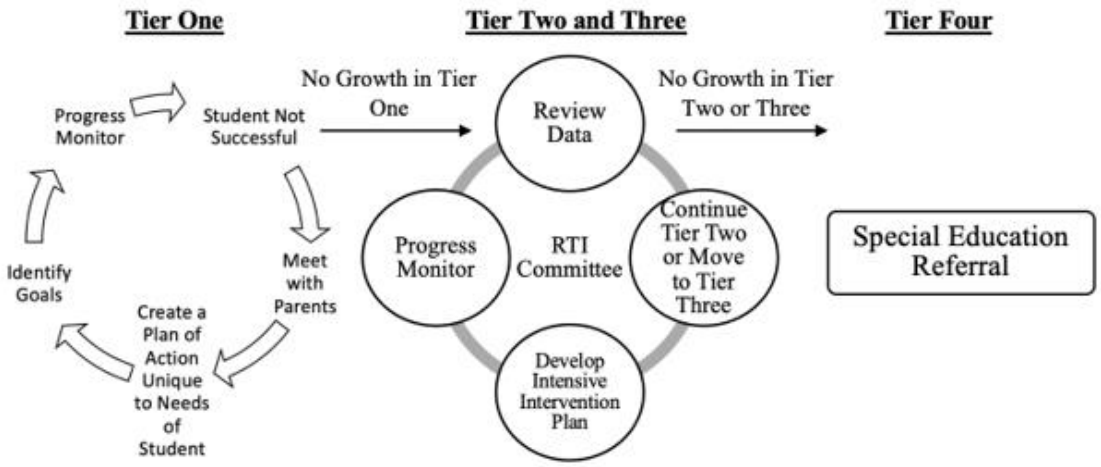
RtI allows teams of knowledgeable stakeholders to identify students at risk for poor learning outcomes through the universal screener before academic gaps are observed through classroom assessment data. Research conducted by Savits et al. (2018) found that broad inconsistencies in RtI models were observed from data collected through phone conferences, email, or websites. Preston et al. (2016) identified two RtI models, the problem-solving approach (PSA) and the standard treatment protocol (STP). Fletcher and Vaughn (2011) highlighted that both models require sustained professional learning, ongoing progress monitoring, and screening of students.

Problem-Solving Approach

Preston et al. (2016) described the PSA as a model where the teacher changes the instruction to meet the student's needs in Tier One based on the universal screener and progress monitoring, as shown in Figure 3.2. If a student is unsuccessful, the teacher initiates a cyclical process of meeting with the parents, creating a plan of action unique to that student's needs, identifying goals, and identifying times to monitor progress.

Figure 3.2

Problem-Solving Approach

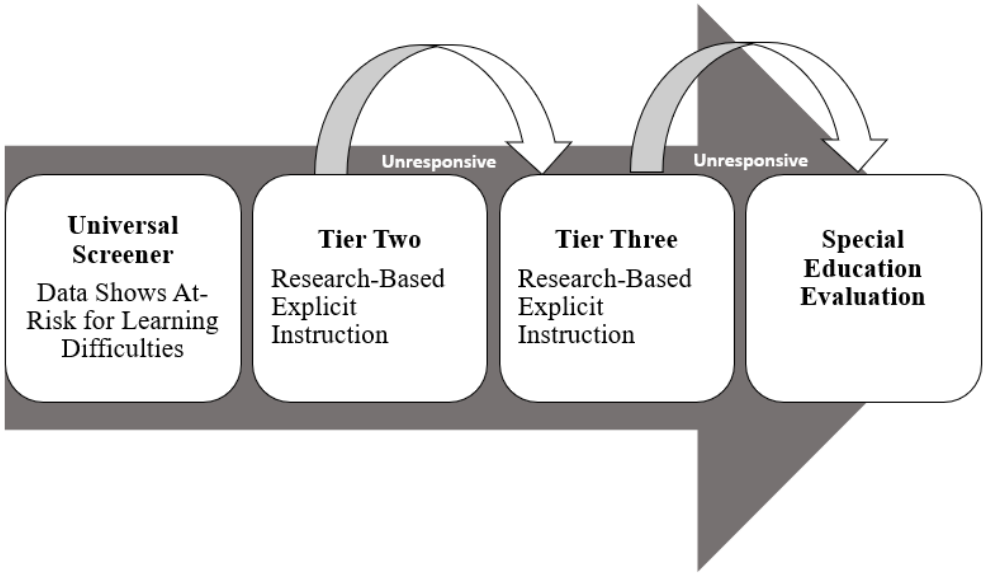


If the student is not showing growth in Tier One, the teacher reaches out for the support of the RtI committee. The RtI committee then moves the student to Tier Two and develops a more concentrated intervention plan based on the student's needs. If the student is still not progressing in Tier Two, the committee may move the student to Tier Three with more intensive intervention. If the student is still not responsive, the committee moves them into Tier Four, where they may be referred for special education services. According to King and Coughlin (2016), this method benefits districts because it allows students' skills to be targeted by specifically designed intervention strategies. However, utilizing the PSA model requires teachers to understand broad skills, requires extensive professional learning, and can be at an increased cost to the district (King & Coughlin, 2016). Therefore, some districts choose to utilize the STP model, as shown in Figure 3.3.

Standard Treatment Protocol

Figure 3.3

Standard Treatment Protocol



The STP model begins with all students being administered a universal screener, and those at risk for learning difficulties are moved to Tier Two (Preston et al., 2016). While in Tier Two, researched-based explicit instruction lessons are followed for intervention. When the student is not responsive in Tier Two, they are referred to Tier Three, and if they do not progress in this tier, they are referred for a special education evaluation. According to King and Coughlin (2016), this method benefits a district due to the limited costs for one intervention method and focused professional learning. However, utilizing STP does not allow targeted, varied intervention based on individual needs. Districts must evaluate their own needs to determine the best model for their schools.

In summary, RtI provides a process to decrease the academic gap through a multi-tiered approach with increased intensity of support provided at each tier. Each RtI process emphasized a collaborative approach to data evaluation and creation of a plan that includes goal setting, progress

monitoring, and determination of interventions. The literature has no clear RtI approach with well-defined steps within each tier practiced consistently from district to district or state to state. According to Gersten et al. (2009), there is limited research on RtI implementation at the secondary level, especially in math. Lembke et al. (2012) noted that most research on RtI has focused on reading, but it is vital for research to be conducted because most that struggle with reading also struggle with math.

Problem of Practice

While collaboratively reviewing campus data with stakeholders, a problem was identified: seventy-four percent of students did not meet progress measures on the 2019 fourth-grade Math STAAR, resulting in an increased academic gap, as shown in Appendix A. Once this area was identified, stakeholders began discussing the root cause for the lack of progress and ways to address and decrease the academic gap. Through this discussion, the RtI model was identified as a vehicle to propel the campus towards a long-term goal of students becoming proficient in math and increasing the percentage of students meeting the STAAR progress measure.

This study evaluated how effectively the RtI model mitigated academic gaps and supported students in meeting grade-level expectations in math. Specifically, the research questions asked were: 1) to what extent does the RtI model affect the students' proficiency in math, and 2) to what extent were the students' needs being met at their functional level?

Methodology

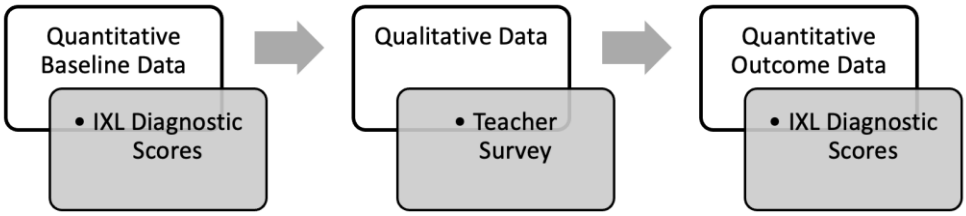
Research Design

The mixed-methods case study included quantitative and qualitative data sources to develop knowledge about the effectiveness of the RtI program implemented in the school of study using the embedded experimental model with a one-phase approach (Tran, 2016). The embedded experimental

model with a one-phase approach allowed the researcher to address the research questions using IXL data as the principal source supported by the survey's subsidiary data (Creswell & Plano Clark, 2006).

Figure 3.4

Embedded Experimental Model with a One-Phase Approach



Quantitative data were collected from student progress monitoring spreadsheets and a Likert scale question to determine changes in students' math proficiencies and teachers' perceptions of students' ability to use the IXL program. Qualitative data collected from surveys utilized rich descriptions of the natural environment to determine teachers' perceptions regarding if students' needs were being met at their functional level (Speklé & Widener, 2020). All data sources were approved by the Institutional Review Board (IRB), and each participant provided informed consent prior to data collection.

Context of the Study

The study was conducted at a K-12 charter school located in East Texas. The school's educational mission focused on STEM pathways through project-based learning (PBL), problem-based learning (PrBL), and blended learning (BL) instruction. There were 333 students enrolled on the campus of study. The demographics of the students were predominantly White, with approximately 20% Hispanic and 10% Black. Fifty-nine percent of the students were male, and 41% percent of the students were female. Thirty percent of the students were economically

disadvantaged, 10% were dyslexic, 4% were English learners, 9% were gifted and talented, and 7% received special education services. The campus had 24 teachers, three paraprofessionals, and three administrators.

The RtI Process at the School of Study

For this study, the RtI framework utilized the PSA model to ensure timely interventions were implemented before tier reassignment and common data points were collected for all students throughout the year. All students were administered the IXL diagnostic test as a universal screener, which has been validated through multiple studies, at the beginning of the year to obtain baseline data points that teachers utilized to guide instructional decisions to support the student (An, 2022). Also, teachers engaged in a cyclical process of the PSA by meeting with parents of students experiencing difficulty in Tier One instruction, collaboratively creating a plan of action, and monitoring progress to evaluate students' progression toward identified goals. If the student was not progressing towards identified goals, the teacher elicited the help of the RtI committee, who collaboratively reviewed the data to determine placement in Tier Two with more intensive intervention support. The general education teacher provided small group intervention in the general education classroom or after school to target foundational concepts and skills for Tier Two and Tier Three students. In addition to targeted classroom interventions, students used the personalized learning platform IXL to supplement their math instruction for 20 minutes daily. If the student did not respond to Tier Two interventions, the RtI committee would move the student into Tier Three. If the student did not respond to Tier Three interventions, the committee could recommend a referral for special education evaluation.

The school of study defined Tier One as quality classroom instruction through the PBL, PrBL, and BL model, which engages students in collaborative, authentic learning experiences

focused on relevant, real-world problems or projects. The school of study defined Tier Two intervention as targeted services provided in a small group setting to support student academic achievement in conjunction with general support offered to all students in Tier One. Teachers completed progress monitoring for Tier Two students every two weeks to determine the need for adjustments in the student's intervention plan. At the school of study, Tier Three interventions focused on specific skills with increased frequency and duration from those provided in Tier Two. Teachers completed progress monitoring for Tier Three students every one to two weeks to determine the need for adjustments to the intervention plan.

RtI meetings were scheduled at least once every nine weeks, where the RtI committee reviewed data collected by the general education teacher on individual students. During the RtI meetings, the committee determined goals for each Tier Two and Tier Three student based on their performance levels. The goal for each student in Tier Two and Tier Three was to have four months of growth in nine weeks. The RtI committee also determined which students needed to decrease or increase their tier assignments based on the data collected and recorded on the student progress monitoring spreadsheet. For students assigned to Tier Two and Tier Three, the committee discussed and determined interventions to be implemented to support the student toward their progress monitoring goals.

Recruitment and Participants

The teachers who participated in this study were selected using purposeful sampling. All math teachers from the campus who taught third through 12th grade were invited to participate in the study. The researcher consulted with qualified teachers to provide an overview of the study and clarify any questions. Additionally, in order to limit social desirability bias in the responses of the teachers to the survey questions, the researcher reviewed that their responses would be anonymous.

All four teachers agreed to participate in the study. The teachers had between one and 15 years of experience, with three having less than two years of experience. All teachers were White, and all but one teacher was female. All teachers were graduates of a university-based teacher education program and highly qualified in their areas of study through state certificates.

Instrumentation and Data Collection

Quantitative data was collected from the student progress monitoring spreadsheet to answer research question one: To what extent does the RtI model affect the student's proficiency in math? Specifically, the data collected from the student progress monitoring spreadsheet was the beginning and end of the year IXL diagnostic score to determine each student's academic progress in math. The student's diagnostic score "represents their working grade level" (IXL Learning, 2023a, para. 1). For students to be on grade level, their IXL diagnostic score should represent their grade level in the hundreds. For example, third-grade students should have an IXL diagnostic score of 300-399 to work on grade-appropriate content. If their diagnostic score is below this number, they are behind grade level in this content area, and if their diagnostic score is above this number, they are above grade level in that content area. The principal provided the researcher with the teacher's student progress monitoring spreadsheet at the close of the school year, with the student's identifiable information removed. The researcher assigned a pseudonym for each data set provided.

Qualitative data included a survey to address research question two: To what extent were students' needs being met at their functional level (see Appendix B)? The survey was sent through the Qualtrics survey software, and the questions focused on instructional strategies utilized in Tier Two and Tier Three, the teacher's perception of students' success at their functional level, and the teacher's perception of students' engagement at their functional level. Prior to the distribution of the survey questions, the researcher used peer scrutiny of the study to obtain feedback from professors

and fellow colleagues to enhance the trustworthiness of the survey questions and methods employed (Shenton, 2004). Additionally, the researcher refined the codes and themes through extensive iterations and directly quoted participants in the discussion of the results in order to increase credibility (Thomas & Magilvy, 2011). A quantitative data point was also collected from a teacher survey to identify the teacher's perception of the student's ability to navigate and utilize the IXL program using a five-point scale with zero representing extremely inadequate, one representing somewhat inadequate, two representing neither adequate nor inadequate, three representing somewhat adequate, and four representing extremely adequate. A limitation of the Likert scale question is the absence of a pilot test to increase validity. However, the scale had five points, which expanded the variance in responses which can increase the reliability.

Data Analysis

A series of paired samples t-test were conducted to determine the impact of the RtI model on the students' s math proficiency based on their IXL data. Prior to data analysis, the assumptions of the analytic procedure were assessed. Each level of the data was not normally distributed. Due to the assumptions being violated, the Wilcoxon Signed Rank nonparametric test was used to determine the impact of RtI on students' math proficiency.

Inductive thematic analysis was used to analyze the open-ended qualitative questions. The thematic analysis included five phases: familiarization, coding, constructing themes, reviewing potential themes, and defining the themes (Terry et al., 2017). The researcher downloaded all survey responses from the Qualtrics survey software and read through each response, making observations, and recording notes. After the initial reading, descriptive codes were assigned to segments of responses that captured the researcher's summary of the phrases. This process was completed through multiple iterations to perfect the codes to a condensed list (Terry et al., 2017). The

researcher then evaluated the codes to find patterns or categories that emerged, creating the themes. Lastly, the themes were reviewed to determine if they represented the data and evaluated for alignment with the research question. Quantifiable survey elements were analyzed using descriptive statistics to measure central tendency.

Results

RQ1. RtI and Student Math Proficiency

To address research question one, to what extent does the RtI model affect the student's proficiency in math, beginning and end of the year IXL diagnostic data were collected from 123 students from Campus A that were in grades three through eight. A series of Wilcoxon Signed Rank nonparametric tests were utilized to determine the impact of the RtI model on students' math proficiency based on their IXL data.

A Wilcoxon Signed Rank test was used to determine the impact of the RtI model on the students' third-grade math proficiency based on their IXL data. The results indicated that third-grade students had a higher math proficiency at the end of the school year (*Mdn* = 360.00, *SD* = 84.21) than at the beginning of the school year (*Mdn* = 240.00, *SD* = 82.83) based on their IXL diagnostic scores. The difference between conditions was statistically significant with $W = 0.00$, $p < 0.001$. The effect size for this analysis ($r_{rb} = 1.00$) fell above Cohen's (1992) convention for a large effect.

A Wilcoxon Signed Rank test was used to determine the impact of the RtI model on the students' fourth-grade math proficiency based on their IXL data. The results indicated that fourth-grade students had a higher math proficiency at the end of the school year (*Mdn* = 430.00, *SD* = 64.24) than at the beginning of the school year (*Mdn* = 370.00, *SD* = 43.70) based on their IXL diagnostic scores. The difference between conditions was statistically significant with $W = 8.50$, $p <$

0.001. The effect size for this analysis (r_{rb} = 0.91) fell above Cohen's (1992) convention for a large effect.

A Wilcoxon Signed Rank test was used to determine the impact of the RtI model on the students' fifth-grade math proficiency based on their IXL data. The results indicated that fifth-grade students had a higher math proficiency at the end of the school year (*M*dn = 522.00, *SD* = 91.68) than at the beginning of the school year (*Mdn* = 415.00, *SD* = 73.36) based on their IXL diagnostic scores. The difference between conditions was statistically significant with *W* = 1.00, *p* < 0.001. The effect size for this analysis (r_{rb} = 0.98) fell above Cohen's (1992) convention for a large effect.

A Wilcoxon Signed Rank test was used to determine the impact of the RtI model on the students' sixth-grade math proficiency based on their IXL data. The results indicated that sixth-grade students had a higher math proficiency at the end of the school year (*Mdn* = 550.00, *SD* = 118.27) than at the beginning of the school year (*Mdn* = 450.00, *SD* = 113.84) based on their IXL diagnostic scores. The difference between conditions was statistically significant with *W* = 9.00, *p* < 0.001. The effect size for this analysis (r_{rb} = 0.95) fell above Cohen's (1992) convention for a large effect.

A Wilcoxon Signed Rank test was used to determine the impact of the RtI model on the students' seventh-grade math proficiency based on their IXL data. The results indicated that seventh-grade students had a higher math proficiency at the end of the school year (*Mdn* = 650.00, *SD* = 150.59) than at the beginning of the school year (*Mdn* = 530.00, *SD* = 113.58) based on their IXL diagnostic scores. The difference between conditions was statistically significant with *W* = 2.00, *p* < 0.001. The effect size for this analysis (r_{rb} = 0.97) fell above Cohen's (1992) convention for a large effect.

A Wilcoxon Signed Rank test was used to determine the impact of the RtI model on the students' eighth-grade math proficiency based on their IXL data. The results indicated that eighth-

grade students had a higher math proficiency at the end of the school year (*Mdn* = 830.00, *SD* = 123.23) than at the beginning of the school year (*Mdn* = 670.00, *SD* = 118.47) based on their IXL diagnostic scores. The difference between conditions was statistically significant with $W = 6.00$, $p < 0.001$. The effect size for this analysis ($r_{rb} = 0.96$) fell above Cohen's (1992) convention for a large effect.

RQ2. Students' Needs at Their Functional Level

To address research question two, to what extent were the students' needs being met at their functional level, data was collected from a survey administered to the four math teachers who elected to participate in the study. The questions centered on the instructional strategies utilized with Tier Two and Three students and whether the teachers perceived that students were successful and more engaged when taught at their functional level.

The first open-ended question in the survey elicited the instructional strategies teachers utilized in Tier Two. From this data, two themes emerged: *size* and *instructional strategies*.

For the theme of *size*, three of the four teachers decreased the student-to-teacher ratio from whole-group to small-group instruction. For example, Teacher A stated they use "small groups for targeted instruction," and Teacher D stated they use small group instruction to "focus on a certain skill."

For the theme of *instructional strategies*, half of the teachers noted utilizing a specific instructional strategy to support students in Tier Two, such as "hands-on opportunities with different manipulatives and different materials where the students explain their thought process during the instruction" (Teacher B). Additionally, Teacher C stated that they use "concrete-based activities that allow students to use manipulatives and hands-on activities to explore difficult concepts such as fractions."

The second open-ended question on the survey asked teachers to describe the instructional strategies they utilized in Tier Three. From the data, similar responses to those from question one emerged—specifically, the themes of *size* and *instructional strategies*.

For the theme of *size*, half of the teachers varied the size of the student-to-teacher ratio through one-on-one instruction. Teacher C stated they use "one-on-one reteach time on abstract concepts." Furthermore, Teacher B meets individually with the Tier Three students to "have them explain their work and how they got their answers, " allowing the teacher to see where errors may have occurred.

For the theme of *instructional strategies*, half of the teachers utilized technology platforms, while only one teacher noted using hands-on activities. Teacher D stated they use "IXL," while Teacher C stated they use "Moby Max" as the technological platform to support students at their functional level. At the same time, only one respondent mentioned using hands-on activities focused on manipulatives such as "unifix cubes to construct shapes to determine the overall area of the certain shape" (Teacher B).

The third question on the survey was a five-point Likert scale that asked the teacher to identify how well they felt students could navigate and utilize the IXL program, with zero representing extremely inadequate, one representing somewhat inadequate, two representing neither adequate nor inadequate, three representing somewhat adequate, and four representing extremely adequate. Since this platform was used to identify the student's proficiency in math, it was important to understand if students were experiencing difficulties with the program that could impact the outcome of their IXL diagnostic score. Half of the teachers felt that students were somewhat adequate in navigating and utilizing the IXL program, while the other half believed that the students were extremely adequate.

The fourth open-ended question asked the teachers their perception of whether students who were taught concepts at their functional level were more successful, and all responses indicated that the teachers perceived they were. Teacher A stated, “Teaching a concept at their functional level ensures the scholar will be able to understand the concept.” Furthermore, Teacher B stated, “When looking at my Tier Two and Tier Three students for math, I have seen growth from the unit pre-assessment to our post-assessment.” In contrast, Teacher D noted that students are successful when they first learn the skill but forget how to do it if it is not spiraled back on the technology platform. One theme of *differentiation* emerged from three of the teacher’s responses.

For the theme of differentiation, Teacher C stated that “students are successful at their functional level when they are using manipulatives to practice the skill prior to attempting the skill on a more abstract level.” Teacher B stated, “The different instructional strategies that I’m implementing not only in my regular class time but as well as my intervention time is allowing my students to grow.” Additionally, one teacher mentioned that they utilize the technology platforms of IXL and Get More Math to differentiate the instruction for their students (Teacher D).

The fifth open-ended question asked the teachers whether they believed the students' engagement increased or decreased when taught at their functional level. All the teachers felt that students' engagement increased, and a theme of self-confidence emerged from the responses. The teachers stated that students were more comfortable with the content (Teacher B), had a “boost in self-esteem” (Teacher A), and became more confident with the concepts (Teacher D). Teacher C also described how students that are given the time to learn at their functional level become more confident in their skills.

Discussion

The results from this study indicated that students' math proficiency did progress through the school year, as seen through the data collected from the IXL diagnostic scores. These findings contradicted the study conducted by Hollands and Pan (2018), where they found that the average IXL growth of a student was 63 points, which was not statistically significant, when the target is for students to grow at least 100 points within a school year.

The data indicated that teachers were implementing strategies aligned with research-based practices in Tier Two, such as a change in the student-to-teacher ratio, think-alouds, and hands-on instruction (Bouck & Cosby, 2017). However, teachers did not describe using the Tier Two strategies of explicit instruction techniques or reviewing the structure of problems, which have been shown to impact the student's ability to solve word problems (Gersten et al., 2009). The teachers reported in Tier Three that the instructional size is often decreased to one-on-one, which meets the recommendation by Fletcher and Vaughn (2009) of a smaller group setting than in Tier Two. Furthermore, the teachers provided examples of instructional strategies utilized in Tier Three that mirrored those provided in Tier Two. Nevertheless, Turse and Albrecht (2015) recommended that districts create a modified curriculum to meet the needs of students in Tier Three.

Teacher observations supported higher student engagement, increased student self-confidence, and higher student achievement when instructing on the student's functional level. Within the RtI model, the teachers were able to work with Tier Two and Tier Three students in a small group setting at a more frequent interval than Tier One students. These interactions provided an opportunity to develop the teacher-student relationships which positively impacts student engagement. This is comparable to the findings from the study completed by Xerri et al. (2017) where they found that stronger teacher-student relationships correlated to higher student engagement

possibly due to the investment that teachers have in helping students succeed academically. Lastly, teachers felt students could successfully navigate and utilize the IXL platform. This finding suggested that the data obtained from the IXL diagnostic scores reflected the students' knowledge rather than being influenced by their inability to utilize the program effectively.

Although teachers' feedback in the survey favored the RtI model, their input shed light on the professional learning support teachers needed in order to implement appropriate instructional strategies in Tier Two and Tier Three to decrease variance in implementation. Similarly, Fuchs and Fuchs's (2017) research found that students identified as needing more support in Tier Two and Tier Three showed fewer performance gains than students not designated to receive additional support due to inconsistency in the implementation of the RtI framework.

The study had limitations that may have impacted the study's findings (Ross & Bibler Zaidi, 2019). For example, a control group was not utilized in the study to compare the results from the students receiving RtI to those not receiving the intervention. Therefore, it is difficult to determine if the findings were the result of the RtI implementation or other factors. Additionally, the study did not include a pilot test of the survey to increase validity. Furthermore, during the 2020-2021 school year, approximately 25% of the students were served through remote instruction due to the pandemic, which could have impacted students' academic progress. Lastly, questions that obtained the teacher's perceptions could be unreliable as they could include social desirability bias. The participants may not have been entirely transparent with their opinions in the survey in order to be regarded positively by the researcher, who the teachers knew was an administrator in the district.

Conclusion

Within any research, there will be some outcomes that were not expected. For example, the responses from the survey highlighted a need for teachers to gain a solid knowledge base of what

Tier Two and Tier Three instruction should look like and how to implement them effectively. At the beginning of the year, it is recommended that teachers receive professional learning focused on the RtI process, instruction in Tier Two, and instruction in Tier Three. Additionally, for future iterations, it is recommended that the survey include questions that garner teacher feedback about their perceptions of why students improved academically. The results from this survey will provide valuable information on future RtI implementation decisions and professional learning needs. Lastly, it would be beneficial to expand this research to include additional teachers from other campuses within the district to evaluate if the results varied based on location. This information could also assist with gathering data on possible variances in processes between campuses that need to be streamlined at the district level to improve the outcomes of the RtI model.

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Chapter Four

Abstract

The mixed-methods study examined the impact of Response to Intervention (RtI) on student academic achievement using job-embedded professional learning to increase teacher efficacy in implementation. Student achievement was measured using data from 726 students' beginning, middle, and end-of-the-year Measure of Academic Progress (MAP) assessments. The data were analyzed using a one-way repeated measures ANOVA, which showed a statistically significant increase in math and English language arts student proficiency. Additionally, qualitative and quantitative data were obtained from a survey administered to seven teachers. The results of the survey indicated moderate knowledge of the RtI process. Teachers felt they knew how to identify struggling students and interventions to implement. However, they needed more professional learning on documenting and enacting available intervention resources, especially in Tier Three.

Keywords: academic achievement, intervention, job-embedded professional learning, education, students

Response to Intervention, Professional Learning, and Student Achievement

Response to Intervention (RtI) is implemented across the United States; however, there are no consistent protocols followed from state to state or district to district, so the success of RtI can hinge on the teacher's knowledge of the process and fidelity of implementation (Al Otaiba et al., 2019). In a study conducted by Spear-Swerling and Cheesman (2012), most of the teachers surveyed had a basic understanding of the RtI model but did not understand the interventions that should be implemented in each tier. For RtI to successfully impact student achievement, teachers must understand how to gather data to identify student strengths and weaknesses and, based on this information, determine the instructional strategies to utilize in an intervention (Al Otaiba et al., 2019). Therefore, professional learning is crucial for increasing teachers' knowledge of implementing the RtI process and the interventions based on the data.

The Cambridge Dictionary defined professional learning as "training that is given to managers and people working in professions to increase their knowledge and skills" (Cambridge English Dictionary, 2023, para. 1). Zepeda (2019) identified processes and models that support job-embedded professional learning such as learning communities, coaching, study groups, critical friends, lesson study, action research, and portfolios. Professional learning in education aims to increase the performance accuracy of the staff member and students' achievement (Guskey, 2002). For professional learning to meet the intended outcomes, professional learning components should be implemented.

Literature Review

Districts must determine the type of training that will be provided, such as coaching, team-level training, or regional support, and work to standardize the training across the campuses to reduce process variability (Castro-Villarreal et al., 2016). In a study conducted by Dunst and Raab

(2010), participants completed self-evaluations of the training effectiveness they had participated in six months earlier. The results identified that the training conducted on-site for an extended period was more valuable than training completed off-campus or that only lasted two to three days. For practices to be maintained and replicated, professional learning must allow the teacher to implement and observe the success of those practices with ongoing follow-up and support provided through targeted professional learning (Guskey, 2002; McMaster et al., 2021). Furthermore, when providing professional learning, it is essential to remember that change can be challenging for teachers, it is an incremental process, timely and consistent feedback is needed, and support needs to be provided through the change cycle (McMaster et al., 2021).

Job-embedded Professional Learning

Job-embedded professional learning is conducted during the workday, concentrates on genuine problems of practice, and is focused on improving instructional practices that will impact student success (Croft et al., 2010). Learning Forward (2023) identified three categories within the professional learning framework: rigorous content for each learner, transformational processes, and conditions for success. Rigorous content for each learner outlined the core content of adult learning that improves student achievement (Learning Forward, 2023). Transformational processes focus on how teachers learn through implementation, learning designs, evidence, and equity drivers (Learning Forward, 2023). Conditions for success highlighted the need for educators to have an equity foundation, collaborate for continued improvement with all having a shared responsibility, ensure professional learning is systematic and a valued resource for continued growth, and ensure resources are available for successful implementation (Learning Forward, 2023). Within the three categories of the professional learning framework, professional learning can occur in different contexts.

Professional learning can occur in various formats, such as individually, in pairs, or a group setting. For example, professional learning could occur individually, with a teacher implementing a strategy learned within the classroom and reflecting on the success (Croft et al., 2010). The learning can also be completed one-on-one with a mentor or instructional coach who would provide real-time feedback on a lesson, observation, or strategies the teacher implements the next day (Croft et al., 2010). Professional learning can also be conducted in a team setting by group members discussing techniques observed in a lesson and how they can be incorporated into their practice, analyzing data and connecting it to instructional changes to improve student learning, or by teachers probing questions to members of the group for feedback and implementing suggestions learned in the classroom (Croft et al., 2010).

When professional learning programs are designed, stakeholders from all levels need to coordinate efforts to maximize the positive effects that the professional learning program may have (Nawab & Sharar, 2022). The collaborative team must decide the type of professional learning needed, such as transmission, transition, or transformative (Karsenty, 2021). The transmission category includes training by others who identify the outcomes of the training, learning for certification, and cascading, where the teachers learn and present to colleagues (Karsenty, 2021). In the transitional category, teachers learn by standards disseminated through policymakers, coaching or mentoring, and collaborative learning with teams (Karsenty, 2021). In the transformative category, educators engage in action research and an integrative prototype that includes various models focusing on teachers being change agents (Karsenty, 2021). To grow the identified needs of staff members, supervisors must differentiate the approach to the unique needs of the individual (Pajak & Arrington, 2004). Differentiated professional learning can be through action research,

coaching, mentoring, professional learning communities (PLCs), data teams, and examining student work.

Action Research

Action research allows participants to focus on an authentic problem in their current practice, formulate a plan for the study, analyze the data gathered, and determine the intervention to implement based on data (Zepeda, 2019). When staff members implement action research focused on improvement within the school, connected to the vision of the campus, backed by the administration, and have resources allocated to the implementation, they can have positive implications for success (Kitchen & Stevens, 2008). Action research allows for the production of new knowledge, enhancement of practices, and emphasizes the gravity of teachers' actions and responsibilities as a researcher (Capobianco & Feldman, 2006). Action research can also utilize the expertise of a coach to help guide the participant through their investigation.

Coaching

Instructional coaching is another job-embedded professional learning strategy to provide focused support to bolster teacher effectiveness (Shoukry & Cox, 2018). The coach can transition between light and heavy coaching within the coaching model. Killion (2008) defined light and heavy coaching in relation to the outcome of the coaching. Light coaching "results in coaches being accepted, appreciated, and even liked by their peers," while heavy coaching "includes curriculum analysis, data analysis, instructional changes, and conversations about beliefs and how they influence practice" (Killion, 2008, pp. 1-2). Jim Knight (2015) correlated light coaching to surface-level coaching, while heavy coaching is aligned with deep coaching that can substantially enhance teaching practices. In light coaching, the coach is focused on developing relationships with staff members, which is needed for staff members to be vulnerable with the coach on their needs (Killion,

2008). However, to have the most significant impact, the coach must move into heavy coaching, where the coach builds the teacher's competency through straightforward conversations evaluating data, curriculum, beliefs, and how each relates to student success (Killion, 2008). Furthermore, the staff member can create an individual growth plan that identifies goals, strategies to reach those goals, and the timeline for attaining the desired outcome (Sugarman, 2011). The coach is essential in this process to provide accountability and support for the teacher in meeting their professional goals. Another support often offered to staff members is that of a mentor.

Mentoring

Mentoring allows staff members with specific expertise to support the instructional effectiveness of mentees through a formal role or informal role, such as peer coaching (Glanz & Zepeda, 2016). Mentoring incorporates social cognitive principles by allowing mentees to learn competencies from mentors who explain, model, and demonstrate the skills needed for the mentee to function effectively in their professional career (Schunk, 2019). Prior to mentors supporting mentees, they should be provided training on the responsibilities that this role entails through shadowing, leadership coursework, workshops, discussion groups, and meetings (Zepeda, 2019). Although mentors can provide targeted support to an assigned individual, PLCs offer an opportunity to develop teachers' professional expertise through a group setting.

Professional Learning Communities

PLCs provide a time for teachers to learn from one another and work to solve problems they are currently facing by discussing instructional strategies, sharing resources, and creating lessons and assessments tightly aligned to the standards (Dever & Lash, 2013). The key characteristics of a successful PLC are a common objective with a concentration on a tangible result, collective emphasis on student learning, reflective dialogue, active involvement through collaboration,

distributed leadership, trust between members, prior knowledge and motivation, and activities aligned to the goal (Prenger et al., 2017). For PLCs to be effective, teachers must be allocated time to collaborate, often completed through common planning time (Dever & Lash, 2013). Dever and Lash (2013) described the importance of training staff on the PLC expectations and process to increase the understanding and motivation of team members to engage in the PLC approach. Within the PLC model, teachers will often utilize the data teams' protocol to improve student achievement.

Data Teams

Data drives professional learning and includes formative and summative assessments, classroom observations, student work samples, or results from action research (Zepeda, 2019). Data teams solve specific school problems using a structured protocol focused on data (Bolhuis et al., 2016). The protocol includes defining the problem, developing a theory, collecting data, checking data quality, analyzing data, drawing conclusions based on data, executing improvement processes, and evaluating effectiveness (Schildkamp et al., 2016). The group may examine student work within the data teams' protocol to find correlations between the evaluated data.

Examining Student Work

Examining student work allows teachers to evaluate student learning and improve instructional practices (Thompson et al., 2009). Zydney and Holovach (2004) defined three roles in this process: the presenter, the active participant, and the group facilitator, while WestEd (2017) identified additional roles, such as timekeeper and note-taker if there are enough members to fulfill the roles. The presenter provides an overview of the lesson, the active participants identify and describe the samples that surpassed expectations, met expectations, or did not meet expectations of the lesson, and the facilitator guides the group through the protocol (Zydney & Holovach, 2004). The protocol has one teacher bring a lesson plan, assignments completed by students, and the rubric

used to evaluate student learning (Zydney & Holovach, 2004). Thompson et al. (2009) encouraged teams to evaluate the work of three above-average, three average, and three below-average students. When evaluating student work, the team will identify why students did or did not learn, unexpected trends, and the learning relationship between different groups of students (Thompson et al., 2009). WestEd (2017) also suggested including a time for the active participants to share praise about the reviewed lesson.

Problem of Practice

To decrease the academic deficits of students and increase academic performance, RtI was enacted to decrease students' academic deficits and increase academic performance. In the evaluation study of the RtI implementation, professional learning was identified as an area for improvement to increase the fidelity and success of the RtI process.

This study evaluated how effectively the RtI model mitigated academic gaps and supported students in meeting grade-level expectations using job-embedded professional learning. Specifically, the research questions asked were: 1) to what extent does the RtI model affect the students' proficiency in reading and math, and 2) to what extent were the students' needs being met at their functional level?

Methodology

Research Design

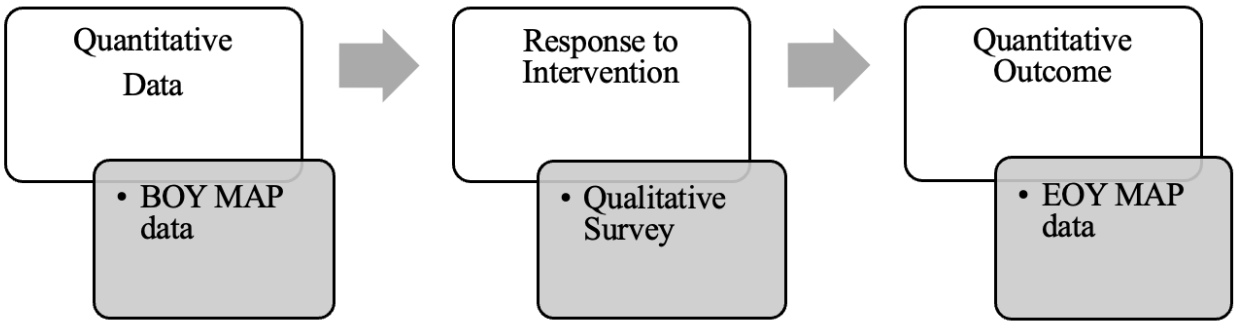
The design-based research (DBR) methodology is a collective endeavor between the practitioner and researcher to improve an internal procedure (Anderson & Shattuck, 2012). Through the utilization of DBR, a team of educators analyzed the RtI practice in the district of study, identified needs to be addressed, identified research-based solutions for implementation, evaluated

the effectiveness of iterations, and identified the design principles to be shared with other researchers and practitioners (Fahd et al., 2021).

The study utilized a mixed-method design to provide quantitative and qualitative data to determine if the job-embedded professional learning impacted the success of the RtI model. Specifically, the mixed method employed was the embedded experimental model with a one-phase approach, as shown in Figure 4.1. This model allowed the investigator to use quantitative data as a baseline and outcome measurement for the intervention and qualitative data to corroborate further the intervention results (Creswell & Plano Clark, 2006).

Figure 4.1

Embedded Experimental Model with a One-Phase Approach



Context of the Study

The study occurred in a district with three charter schools in East Texas with an enrollment of 853 students. The school's educational mission focused on STEM pathways through project-based learning (PBL), problem-based learning (PrBL), and blended learning (BL) instruction. The demographics of the students were approximately 64% White, 20% Hispanic, 7% Black, 6% multiracial, and 3% Asian. Fifty percent of the student population was male, and 50% were female. Thirty-three percent of the students were economically disadvantaged, 7% were dyslexic, 2% were English Learners, 7% were gifted and talented, and 9% received special education services. The

district had 57 teachers, seven paraprofessionals, three administrators, 10 professional support staff, and nine auxiliary staff members. As a part of employment, each teacher had to earn their master's degree within seven years of being employed by the district.

At the school of study, job-embedded professional learning was implemented to improve teachers' ability to instruct students at their functional level. At the beginning of the school year, instructional coaches provided standardized RtI training explicitly focused on Tier Two and Tier Three instruction. Additionally, instructional coaching was utilized throughout the school year to target individual teacher needs regarding instruction and the RtI process. Instructional coaches also attended each RtI meeting to provide guidance on strategies that could be implemented based on the specific student's weaknesses. Furthermore, PLCs were utilized to evaluate data, student work, and instructional methodologies implemented for Tier One, Tier Two, and Tier Three students.

Participants

Purposeful sampling was utilized to select teachers from the district to participate in the study who were knowledgeable about RtI implementation from personal experience (Palinkas et al., 2015). The teachers taught English language arts or mathematics in the district of study within the grade range of third through 12th grade. Of the 17 teachers that met the inclusion criteria, seven elected to participate in the study. The experience level of the seven participants ranged from one to 20 years, with six of the seven having less than five years of experience. All but one of the teachers were female, and all the teachers were White. All participants were highly qualified in their subject areas through state certification credentials.

Instrumentation and Data Collection

The mixed-method study included quantitative and qualitative data sources approved by the Institutional Review Board (IRB). The quantitative data included the fall, winter, and spring

Measure of Academic Progress (MAP) assessment scores for third through eighth-grade students to evaluate if there was a decrease in academic achievement gaps due to RtI implementation. The MAP data provided each student with a Rasch UnIT (RIT) score, representing the student's knowledge of that content (NWEA, 2022). The MAP data was also used to address the first research question: To what extent does the RtI model affect the student's proficiency in math? The principal provided reports to the researcher with student-identifiable information removed at the close of the school year, and the researcher assigned a numerical pseudonym to each student's data set.

An anonymous survey was utilized to collect qualitative and quantitative data (see Appendix C). Participants who elected to engage in the study provided informed consent before the data collection occurred. The survey was distributed through the Qualtrics survey software by sending an email link to each teacher. The qualitative data collected from the survey included three multiple-choice and six open-ended questions. The multiple-choice questions elicited the respondents' perception of whether they were prepared to provide intervention services in Tier Two and Tier Three and if they felt that the academic gap had decreased. The open-ended questions gathered respondents' perceptions of their strengths, areas where they needed additional professional learning in order to implement the RtI model, and feedback on ways to improve the RtI model's effectiveness. Furthermore, the survey also collected the teachers' descriptions of RtI interventions provided in Tier Two and Three, the support they needed to implement each tier effectively, and what the teacher believed contributed to the increase or decrease of the academic gap. Lastly, quantitative data was collected from one Likert scale survey question to determine participants' perception of their knowledge about the RtI process using a 5-point scale, with one being extremely knowledgeable, two being very knowledgeable, three being moderately knowledgeable, four being slightly knowledgeable, and five being not knowledgeable at all. The data collected from the survey

was used to respond to the second research question: To what extent were the students' needs being met at their functional level?

Data Analysis

A series of one-way repeated measures ANOVA were conducted using the MAP data to determine whether there was a statistically significant difference in reading and math achievement over an academic school year. Prior to data analysis, the assumptions of the analytic procedure were assessed. Each level of the data was not normally distributed. Due to the assumptions being violated, the Friedman nonparametric test was used to determine the impact of RtI on students' math and reading proficiency. Additionally, quantifiable survey elements were analyzed using descriptive statistics to measure central tendency.

The open-ended qualitative questions were inductively analyzed using the thematic analysis method to better understand the participants' perceptions (Hewitt-Taylor, 2001). The researcher downloaded all survey responses from the Qualtrics surveys software and reviewed each respondent's answer to each question. After the initial reading, the researcher coded each response by summarizing each sentence with a word or phrase (Linneberg & Korsgaard, 2019). After the initial coding, the codes were classified into categories with aligned key elements (Saldaña, 2015). Lastly, themes were identified between respondents for each question. In order to increase credibility of the findings, the researcher engaged in extensive iterations of refining the codes and themes as well as directly quoting participants in the discussion of results (Thomas & Magilvy, 2011).

Results

The results of Friedman's test indicated statistically significant improvements in the student's third grade reading proficiency across the measurement points, with χ^2 (2) = 70.46, $p < .001$, Kendall's W = 0.44 which fell above Cohen's (1992) convention for a moderate effect. Conover's

post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 104.50) to winter (M_{rank} =166.00, $p_{bonf} < 0.001$), fall (M_{rank} = 104.50) to spring (M_{rank} = 209.50, $p_{bonf} < 0.001$), and winter (M_{rank} = 166.00) to spring (M_{rank} = 209.50, $p_{bonf} < 0.001$).

The results of Friedman's test indicated statistically significant improvements in the student's fourth grade reading proficiency across the measurement points, with χ^2 (2) = 46.98, $p < .001$, Kendall's W = 0.44 which fell above Cohen's (1992) convention for a moderate effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 69.50) to winter (M_{rank} =116.50, $p_{bonf} < 0.001$), fall (M_{rank} = 69.50) to spring (M_{rank} = 138.00, $p_{bonf} < 0.001$), and winter (M_{rank} = 116.50) to spring (M_{rank} = 138.00, $p_{bonf} = 0.04$).

The results of Friedman's test indicated statistically significant improvements in the student's fifth grade reading proficiency across the measurement points, with χ^2 (2) = 38.18, $p < .001$, Kendall's W = 0.31 which fell above Cohen's (1992) convention for a moderate effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 86.50) to winter (M_{rank} =135.50, $p_{bonf} < 0.001$) and fall (M_{rank} = 86.50) to spring (M_{rank} = 150.00, $p_{bonf} < 0.001$). However, there was not a statistically significant increase in the RIT score from winter (M_{rank} = 135.50) to spring (M_{rank} = 150.00, $p_{bonf} = 0.18$).

The results of Friedman's test indicated statistically significant improvements in the student's sixth grade reading proficiency across multiple measurement points, with χ^2 (2) = 17.16, $p < .001$, Kendall's W = 0.13 which fell above Cohen's (1992) convention for a small effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 101.50) to winter (M_{rank} =139.50, $p_{bonf} < 0.001$) and fall (M_{rank} = 101.50) to spring (M_{rank} = 143.00 $p_{bonf} < 0.001$). However, there was not a statistically significant increase in the RIT score from winter (M_{rank} = 139.50) to spring (M_{rank} = 143.00, $p_{bonf} = 0.75$).

The results of Friedman's test indicated statistically significant improvements in the student's seventh grade reading proficiency across the measurement points, with χ^2 (2) = 30.65, $p < .001$, Kendall's W = 0.24 which fell above Cohen's (1992) convention for a small effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 97.00) to winter (M_{rank} =134.00, $p_{bonf} = 0.001$), fall (M_{rank} = 97.00) to spring (M_{rank} = 159.00 $p_{bonf} < 0.001$), and winter (M_{rank} = 134.00) to spring (M_{rank} = 159.00, $p_{bonf} = 0.03$).

The results of Friedman's test indicated there were not statistically significant improvements in the student's eighth grade reading proficiency across the measurement points, with χ^2 (2) = 4.48, $p = .11$, Kendall's W = 0.05 which fell below Cohen's (1992) convention for a small effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did not reveal a statistically significant increase in the RIT score from fall (M_{rank} = 75.00) to winter (M_{rank} =90.5,

p_{bonf} = 0.09), fall (M_{rank} = 75.00) to spring (M_{rank} = 92.50 p_{bonf} = 0.06), and winter (M_{rank} = 90.50) to spring (M_{rank} = 92.50, p_{bonf} = 0.83).

The results of Friedman's test indicated statistically significant improvements in the student's third-grade math proficiency across the measurement points, with χ^2 (2) = 127.50, $p < .001$, Kendall's W = 0.80 which fell above Cohen's (1992) convention for a large effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 86.00) to winter (M_{rank} =166.00, $p_{bonf} < 0.001$), fall (M_{rank} = 86.00) to spring (M_{rank} = 228.00, $p_{bonf} < 0.001$), and winter (M_{rank} = 166.00) to spring (M_{rank} = 228.00, $p_{bonf} < 0.001$).

The results of Friedman's test indicated statistically significant improvements in the student's fourth-grade math proficiency across the measurement points, with χ^2 (2) = 89.98, $p < .001$, Kendall's W = 0.83 which fell above Cohen's (1992) convention for a large effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 64.50) to winter (M_{rank} =98.50, p_{bonf} = 0.001), fall (M_{rank} = 64.50) to spring (M_{rank} = 161.00, $p_{bonf} < 0.001$), and winter (M_{rank} = 98.50) to spring (M_{rank} = 161.00, $p_{bonf} < 0.001$).

The results of Friedman's test indicated statistically significant improvements in the student's fifth-grade math proficiency across the measurement points, with χ^2 (2) = 75.83, $p < .001$, Kendall's W = 0.63 which fell above Cohen's (1992) convention for a large effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant

increase in the RIT score from fall (M_{rank} = 77.00) to winter (M_{rank} =113.00, p_{bonf} = 0.001), fall (M_{rank} = 77.00) to spring (M_{rank} = 170.00, p_{bonf} < 0.001) and winter (M_{rank} = 113.00) to spring (M_{rank} = 170.00, p_{bonf} < 0.001).

The results of Friedman's test indicated statistically significant improvements in the student's sixth-grade math proficiency across the measurement points, with χ^2 (2) = 58.65, p < .001, Kendall's W = 0.47 which fell above Cohen's (1992) convention for a moderate effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 81.50) to winter (M_{rank} = 130.00, p_{bonf} < 0.001), fall (M_{rank} = 81.50) to spring (M_{rank} =166.50, p_{bonf} < 0.001), and winter (M_{rank} = 130.00) to spring (M_{rank} = 166.50, p_{bonf} = 0.001).

The results of Friedman's test indicated statistically significant improvements in the student's seventh-grade math proficiency across the measurement points, with χ^2 (2) = 56.39, p < .001, Kendall's W = 0.50 which fell at Cohen's (1992) convention for a large effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 69.50) to winter (M_{rank} = 119.50, p_{bonf} < 0.001), fall (M_{rank} = 69.50) to spring (M_{rank} =147.00, p_{bonf} < 0.001), and winter (M_{rank} = 119.50) to spring (M_{rank} = 147.00, p_{bonf} = 0.01).

The results of Friedman's test indicated statistically significant improvements in the student's eighth-grade math proficiency across the measurement points, with χ^2 (2) = 65.38, p < .001, Kendall's W = 0.73 which fell above Cohen's (1992) convention for a large effect. Conover's post hoc comparisons with the Bonferroni correction were used to determine the nature of group

differences detected in the omnibus test. Post hoc analysis did reveal a statistically significant increase in the RIT score from fall (M_{rank} = 49.00) to winter (M_{rank} = 96.00, $p_{bonf} < 0.001$), fall (M_{rank} = 49.00) to spring (M_{rank} =125.00, $p_{bonf} < 0.001$), and winter (M_{rank} = 96.00) to spring (M_{rank} = 125.00, $p_{bonf} = 0.003$).

Furthermore, teachers identified their perceived knowledge of the RtI process on a Likert scale. The Likert scale consisted of a five-point scale, with one being extremely knowledgeable, two being very knowledgeable, three being moderately knowledgeable, four being slightly knowledgeable, and five being not knowledgeable at all. Two of the surveyed teachers selected one, indicating they felt they were extremely knowledgeable; four teachers selected a four, suggesting they had some knowledge of the RTI process; while one reported little to no knowledge of RtI by selecting five.

The survey included open-ended questions to identify the teachers' perceived strengths and growth areas regarding the RtI process. Two areas of strength emerged from the responses, which focused on student identification and intervention strategies. All but one of the teachers noted they were proficient in identifying the students struggling to reach academic mastery in the content area. For example, Teacher A reported their strength was "identifying struggling students," while Teacher F stated that their strength was "identifying students who need to move a tier." Additionally, more than half (57%) of the teachers felt they could select interventions to support the student toward proficiency in their content area. For instance, Teacher C described their strength of "planning intervention using the students' classroom and benchmark data," while Teacher D stated they could "gather data, look at numbers, and take the actions that are prescribed based on numbers." Additionally, they could "use data collected on students to create intervention plans and track to see

what changes need to be made" (Teacher E). However, the teachers needed more professional learning in the RtI documentation process.

Specifically, Teacher B stated that "an explanation of the documentation process and how to use it to improve lessons for the students" would be beneficial. Teacher D stated that "more teachers would have buy-in if they had more training on the reliability and validity of the measures used to track growth." Furthermore, 42% of the teachers felt they needed more professional learning in utilizing the intervention strategy resources. For example, Teacher B stated they would like "a list of useful resources," while Teacher C highlighted the need for more professional learning in "reading intervention strategies as a whole." The teachers also provided feedback on areas to make the RtI process run more efficiently, including "faster measures for progress monitoring" (Teacher D) and "consistent expectations for the RtI process" (Teacher E).

Two questions were posed about the teachers' perceptions of their effectiveness in serving students in Tier Two and Tier Three to better understand if students are being met at their functional level. For each question, the teacher could select yes or no. If the teacher selected yes, they answered an open-ended question describing their Tier Two and Tier Three instructional strategies. If the teacher selected no, they described what supports they needed to implement Tier Two and Tier Three effectively. More than half of the teachers selected yes, they were adequately prepared to serve students in Tier Two, using varied instructional strategies and student-to-teacher ratios to meet the students' functional level. The instructional strategies included technology platforms such as "IXL or Lexia PowerUP," as noted by Teacher C, and "personalized blended learning" by Teacher A. The size of Tier Two reported by the teachers varied from "one-on-one" (Teacher C) to "small-group instruction" with students with similar deficits (Teacher G). However, only three of the seven teachers felt prepared to serve students in Tier Three. The teachers who did not feel adequately

prepared to instruct students in Tier Three requested additional support with resources and time allocation used in this tier. For example, Teacher B requested a “specific curriculum to work with small groups,” while Teacher D highlighted the need for “dedicated Tier 2 instructional time.”

Interestingly, the teachers did not provide explicit examples of what instruction looked like in Tier Three. For example, Teacher A stated that Tier Three instruction concentrated on “targeted and intense focus on what students need,” while Teacher E described “having intervention options to close learning gaps and get on grade level.” The teachers that did not feel they could effectively implement Tier Three instruction needed more support with “instructional strategies” (Teacher G) and “personnel to help manage targeted intervention within the classroom” (Teacher D).

Lastly, the teachers identified if they felt that the academic gap of their students had decreased through a yes or no response. The teachers then answered an open-ended question to elaborate on what they attributed to the decrease or increase of the academic gap. Four of the seven teachers felt that the academic gap of their students had decreased. They attributed the decrease to high student engagement in assigned interventions, as noted by Teachers B and D, and “intentionally addressing the gaps through blended learning,” as noted by Teacher C. However, the teachers that did not feel the academic gap had decreased attributed this to staffing issues and lack of time. The responses varied from the need for “consistency in staff” (Teacher A) to not being able to provide interventions “early and often” (Teacher E). Furthermore, Teacher G stated they were “not sure whether the student's academic gap had increased or decreased.”

The quantitative and qualitative data collected provided insight into RtI's impact on student achievement. Additionally, the findings have led to suggestions for future research and accentuated the study's limitations.

Discussion

RtI focuses on increasing student achievement by meeting the students' instructional needs, which can be difficult for staff who need help understanding the process or how to individualize interventions (Vaughn et al., 2012). Therefore, job-embedded professional learning is paramount in preparing teachers to grasp and implement the model effectively and improve student academic proficiency.

In response to question one, to what extent does the RtI model affect the students' proficiency in reading and math, the mean RIT scores validated that most students' reading and math proficiency progressed over the academic year. The fifth and sixth grade reading scores did not have a statistically significant improvement from winter to spring as well as eighth grade overall. However, since there was not a control group within the study, it is difficult to determine if results are attributed to the implementation of the RtI framework or other factors. The results are consistent with the findings from Hughes and Dexter's (2011) study, where they evaluated the impact of RtI from 13 published field studies which illustrated the positive impacts on student achievement through RtI implementation. The data reflected that students' achievement is progressing, leading to decreased academic gaps. Decreased academic gaps positively impact social and economic costs, including wages, crime, welfare, and employment (Mason et al., 2019).

Concerning question number two, to what extent were the students' needs being met at their functional level, staff must understand how to identify academic gaps and target instruction to the individual needs, which is the basis of RtI. The culmination of all survey responses provided data for the extent that teachers could implement RtI effectively. The evidence highlighted that teachers are more proficient in Tier Two instruction than Tier Three. Most teachers could identify students needing additional support and select interventions to address academic mastery. However, the

survey indicated that teachers needed additional training on how to implement the selected interventions. If teachers do not fully understand how to implement the necessary interventions, this can decrease the potential positive impact the intervention could have on student academic achievement.

Overall, the staff needs additional support to meet the students at their functional level, especially in Tier Three. The survey responses were vague regarding the types of instruction in Tier Three, highlighting a minimal foundational understanding of Tier Three pedagogy. For staff to positively impact the students with the highest achievement gaps, they must be knowledgeable and able to provide Tier Three support tailored to their needs with individualized intervention (McIntosh, 2010). Therefore, sustained professional learning is needed to continue developing teachers' knowledge and skills in supporting students at their functional level (Hughes & Dexter, 2011).

The survey also emphasized the necessity for teachers to receive further professional learning regarding the RtI process, encompassing time allocation, documentation, and staff support for RtI implementation. If teachers do not have a solid understanding of the process that is followed in RtI, there will be variations in deployment, which can further impact the fidelity of the model. Moreover, the lack of fidelity in implementation can limit the outcome gains of the students (Sanetti & Luh, 2019). The findings provided information to improve future iterations; however, there were limitations that may have weakened the validity and reliability of the findings.

Limitations are weaknesses within the research design and were evident within this study. For example, a benchmark survey was not given prior to the implementation of job-embedded professional learning that would allow for a comparison of perceptions after job-embedded professional learning had been provided throughout the year. Additionally, there was not a control group to compare the proficiency rates to determine if the RtI implementation made the positive

impact on student achievement. The teachers' perceptions are also a limitation in the research because they may be unreliable and include bias due to the teachers wanting their response to be socially acceptable by the researcher, who was a district administrator (Qualtrics, 2022). Moreover, the study did not include a pilot test of the survey questions prior to administration to obtain feedback on the validity of each question. Furthermore, the study participants' demographics were not fully representative of the demographics of the entire faculty. Lastly, there was not a variable of the study that focused on the fidelity of implementation of the RtI framework, which could impact the results.

Conclusion

The findings from this study highlighted the student achievement gains made using the RtI framework. However, it also spotlighted a need to provide increased professional learning on Tier Three instructional strategies. Furthermore, the findings revealed limitations that could be refined in future research. It would be beneficial for future studies to disaggregate teacher surveys by content area to determine if the subject taught influenced teacher perceptions and how this correlated to the data, which showed significant gains in reading and lower gains in math. For future iterations of the study, it is recommended that a professional learning plan is created to focus on a few identified RtI skills each year to master before adding additional skills. For example, in a study conducted by Castillo et al. (2016), the professional learning in the first year focused on the background of RtI and Tier One instruction, the second year centered on Tier Two pedagogy, and the third year concentrated on Tier Three interventions.

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Chapter 5

Discussion, Conclusion, and Recommendation

The study investigated the impact that Response to Intervention (RtI) had on student achievement. The National Center on Response to Intervention (2010) defined RtI as a multi-tiered system that includes progress monitoring, screening, and data to make decisions to support the student in their academic and behavioral progress, while student achievement is the ability of a student to generate learned content or tasks (Ballafkih & Van Middelkoop, 2019). To ascertain the impact of RtI on student achievement, the following questions were examined in this study: 1) to what extent did the RtI model affect the students' proficiency, and 2) to what extent were the students' needs being met at their functional level? This chapter will discuss the results, implications for practice, future research, and the correlation of the study to the improvement science framework.

Discussion of Results

Regarding question one, the extent to which the RtI model affected the students' proficiency, the study results indicated that student achievement did increase with the use of the RtI. In the evaluation study, the growth in the math IXL scores were statistically significant for all grade levels. In the intervention iteration, the growth of the math and reading Measure of Academic Progress (MAP) Rasch Unit (RIT) scores were statistically significant in all grades except for fifth and sixth grade reading from winter to spring and eighth grade reading overall. However, since there was no control group, it was difficult to determine if the results would be comparable with targeted support provided by teachers in the general education classroom that did not utilize the RtI process.

Survey data was collected to gather teachers' interpretations of various items influencing their ability to meet students' functional needs. The data collected was utilized to answer research question two: To what extent were the students' needs being met at their functional level? Results

indicated that teachers had a firm grasp of identifying students who were not meeting academic standards within the classroom. The first step of identifying struggling learners is paramount so interventions can be implemented based on the student's demonstration of knowledge to improve learning outcomes (Xue & Niu, 2023). Identifying the students who are not meeting mastery of the standards early provides the opportunity to negate the expansion of academic gaps (Foushee, 2011). Nevertheless, teachers needed additional assistance to provide instruction at the student's functional level.

Surprisingly, the teachers reported that they knew what interventions needed to be implemented in Tier Two but needed additional training on utilizing them with students correctly. Evidence-based interventions are proven approaches that demonstrably enhance targeted outcomes (California Department of Education, 2022). When evidence-based interventions are not followed with fidelity, this can lead to variations in implementation, which can affect the intended outcome (Cutbush et al., 2017). There could be limited knowledge of how to employ the Tier Two interventions appropriately due to the large number of resources available to teachers within the district to utilize for instruction. For example, in math alone, teachers utilized IXL, Eureka, Reflex, LoneStar Target Practice, iReady, ThinkUP!, ST Math, Carnegie Learning, and Maneuvering the Middle. The resources tended to change yearly, so it was difficult for the teachers to become proficient through long-term experience. These findings also align with King and Coughlin's (2016) description of the Problem-Solving Approach (PSA), which requires teachers to thoroughly comprehend expansive skills and require comprehensive professional learning on interventions to meet the student's needs.

The data suggested that the teachers struggled with the fidelity of Tier Three implementation, including knowledge of interventions needed, the lack of time to devote to students in this higher

tier, and the campus needed additional staff to support the students. Terse and Albrecht (2015) highlighted that additional curriculum, or an adaptation of the current curriculum could be utilized for Tier Three. In this study, many teachers altered their current curriculum utilized with the general population to support students in Tier Three. The study also emphasized that teachers need additional professional learning on effectively modifying their current curriculum to instruct students at their functional level. For example, the district could explore purchasing scripted Tier Three research-based interventions that the teachers could follow to minimize the content development that would be required if they modified their current curriculum. Many teachers noted that they provided Tier Three instruction in a small group setting; however, as Gersten et al. (2009) recommended, one-on-one support is a better option so students can receive instruction tailored to their needs instead of the overarching needs of the group. The staff struggled to find time to provide one-on-one individualized support due to the caseload of students who required Tier Three interventions. Compounding the lack of time as a resource, the district did not provide transportation to students. Therefore, many students could only attend Tier Two and Tier Three interventions scheduled during regular school hours. Additionally, the teachers taught multiple grade levels and in various content areas, so limited afterschool time allocated for tutorials was split between all courses the teacher instructed.

The study included many limitations where the research design needed improvements to acquire better data to guide improvement efforts. For instance, it would be beneficial to have participant feedback on the specific professional learning activities completed throughout the year to evaluate their effectiveness and identify areas for improvement. Additionally, the research included a small set of teachers willing to participate, which lends to poor generalizability in other settings. Furthermore, it would be beneficial to disaggregate the student and teacher data to look for trends

from different subgroups (Roegman et al., 2018).

Recommendations for Practice and Further Study

The study provided insight into the positive impact that RtI had on student academic achievement. However, there are recommendations for the district to improve the RtI process. First, it is recommended that the district develop a RtI process manual that can be used for evaluating implementation fidelity. The manual would ensure that consistent practices are outlined for the framework that could be referenced when collecting data and providing guidance. The guide should also include explicit details about the amount of time, group make-up, and resources utilized within each tier. Furthermore, the district should evaluate when and how the Tier Two and Tier Three interventions are provided. Once the framework is established, expanding the RtI process to subjects other than reading and math is recommended. Additionally, it would be valuable for the district to create a professional learning plan to identify specific components of the RtI process to focus on and master each year. For example, the first year could focus on Tier One instruction and universal screeners, while year two could focus on Tier Two instruction and progress monitoring. Lastly, year three could focus on Tier Three instruction and special education referrals.

Recommendation for Further Study

Reading is a fundamental skill that impacts proficiency in other content areas (University of Buffalo, 2021), which is why it has been a core course since the commencement of the educational system (Whitten et al., 2016). Additionally, math has been a priority to prepare students for post-secondary education and the workforce, which has been increasingly focused on critical thinking and analysis (Larson, 2018). While these two areas are undoubtedly pivotal for students to be proficient in, science and social studies are also critical due to their influence on individuals' achievement. The National Council for Social Studies (2016) argued that social studies is as significant as reading and

math because it builds the capacity of individuals to be active contributors in a democratic society. Furthermore, science is crucial for achievement as it builds 21st-century skills such as problem-solving and collaboration (Shafer, 2015). Future studies should include a focus on subjects outside of reading and math in the RtI process.

Additionally, more research is needed in the application of the RtI process in secondary grades. RtI had a heavy emphasis at the elementary level when it first launched due to the research focused on younger grades, the funding that was allocated to elementary RtI processes, and the proactive approach to reducing academic gaps in the early years prior to them expanding through the secondary grades (Vaughn & Fletcher, 2012). In a study by Lesh et al. (2021), the special education teachers and administrators had higher confidence in implementing RtI at the secondary level than the general education teachers who felt they were not qualified to be interventionists.

Conclusion

Through the Plan-Do-Study-Act (PDSA) phases of this study, the aim was to identify and refine RtI's impact on student achievement by instructing students at their functional level. In the first cycle, the RtI model was evaluated using student achievement data from IXL and survey responses from teachers who taught math in STAAR-tested grades on one of three campuses. The IXL data showcased that student achievement did improve; however, the gains were not significant enough to meet grade-level expectations. The survey responses highlighted the need for additional professional learning on the RtI process and how to provide Tier Two and Tier Three intervention effectively. Based on these findings, professional learning was a focus for the second iteration of the study.

The second iteration expanded the study to include teachers from all three campuses who taught math or reading in a STAAR-tested grade. Additionally, staff were provided professional

learning to increase their capacity to implement the RtI process effectively. The professional learning occurred through multiple avenues, such as at the beginning of the year, which focused on Tier Two and Tier Three instruction. Additionally, instructional coaches provided targeted support to staff members on instructional strategies and the RtI process through individual meetings. Furthermore, PLCs focused on RtI improvements through identifications and strategies to work with struggling learners, and specific strategies for Tier Two and Tier Three were discussed in the RtI meetings that occurred at least once each nine weeks. Data was collected from MAP RIT scores of students in reading and math STAAR-tested grades and teachers' survey responses. The data illuminated that student achievement grew with the implementation of professional learning, focused on building the teachers' ability to implement RtI, and targeted teacher support on Tier Three instructional strategies.

RtI positively impacted students’ academic performance in the district of study. Therefore, the district will continue implementing the framework through an iterative cycle of improvements.

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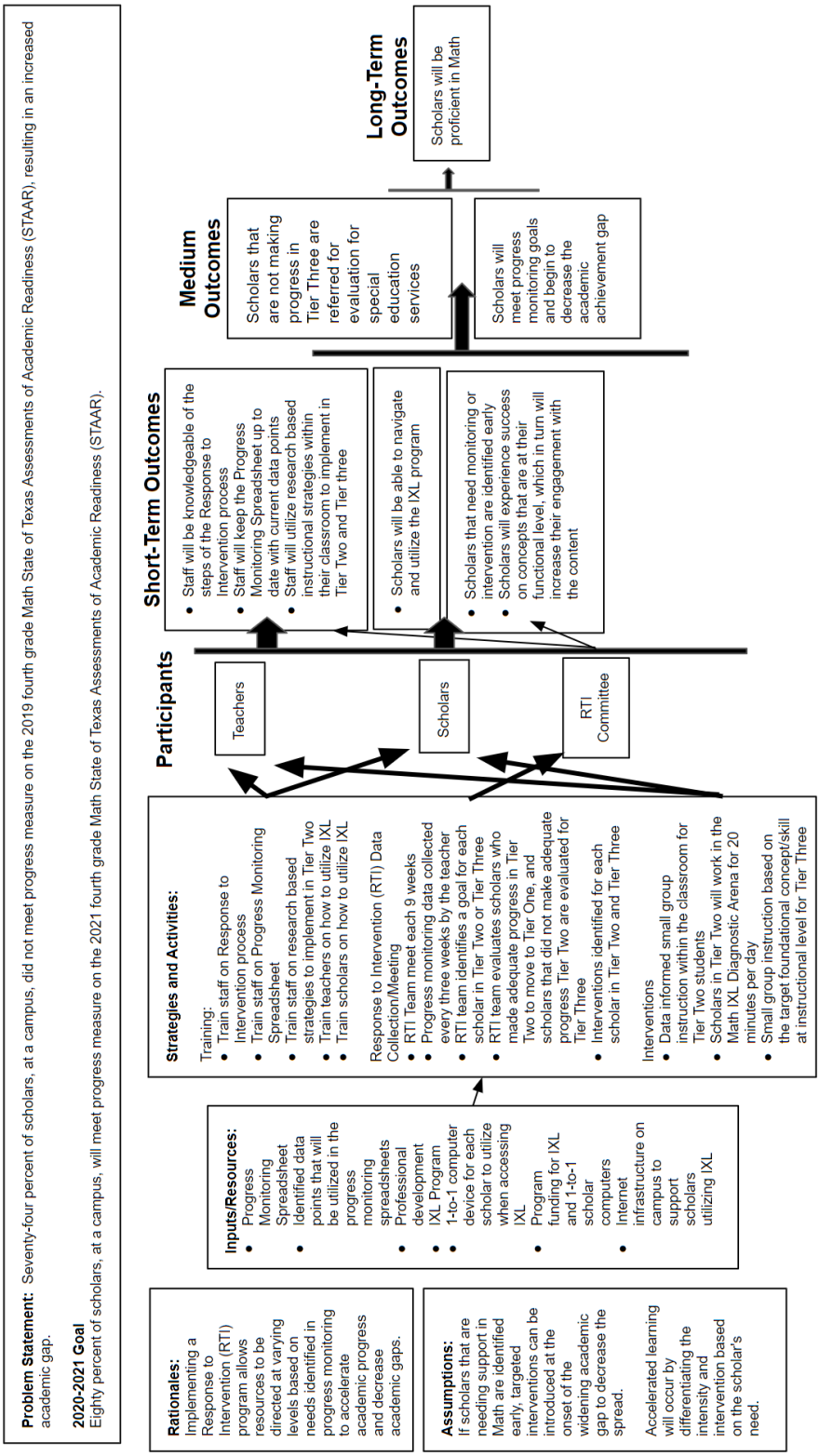
Appendix A

Logic Model



Appendix B

Survey One Teacher Protocol

1. What instructional strategies are you utilizing during the intervention period with each student in Tier Two?
2. What instructional strategies are you utilizing during the intervention period with each student in Tier Three?
3. How well do you feel students are able to navigate and utilize the IXL program? (0- extremely inadequate, 1- somewhat inadequate, 2- neither adequate nor inadequate, 3- somewhat adequate, 4- extremely adequate)
4. Do you feel that Tier Two and Tier Three students are successful on concepts when taught at their functional level?
5. Do you believe that engagement increased or decreased based on the student's success at their functional level?

Appendix C

Survey Two Teacher Protocol

1. On a scale of 1 to 5 (1 being not knowledgeable and 5 being extremely knowledgeable), how knowledgeable are you about the RtI process?
2. In regards to the RtI process, what areas do you feel are your strengths?
3. In regards to the RtI process, what areas do you feel you need more professional development?
4. Are there any suggestions for changes that you feel would make the RtI process run more efficiently?
5. Do you feel adequately prepared to serve students in Tier Two?
    a. If yes, what does Tier Two Instruction look like with your students?
    b. If not, what support would you need to effectively implement Tier Two instruction?
6. Do you feel adequately prepared to serve students in Tier Three?
    a. If yes, what does Tier Three instruction look like with your students?
    b. If not, what support would you need to effectively implement Tier Three instruction?
7. Do you feel the academic gap of your students has decreased?
    a. If yes, what do you attribute to the decreased academic gap?
    b. If not, what do you attribute to the stagnation or increased academic gap?

Biosketch

Aimee Dennis is an accomplished education professional with a strong background in leadership and instructional expertise. Aimee's educational journey began at University of Texas at Tyler, where she pursued her Bachelor’s degree, followed by her Masters and Doctorate in Education. Her commitment to lifelong learning and continuous professional development has been a driving force behind her success. Aimee's passion for education and dedication to improving the lives of students have been evident throughout her diverse career where she has served as teacher, instructional coach, assistant principal, principal, director of special programs, and executive director of operations.