A QUANTITATIVE STUDY OF THE EFFECTIVENESS OF A SECONDARY RTI² PROGRAM

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Abstract

A common goal of educational reform includes providing additional support for students who are struggling in the classroom. This study focused on the implementation of a reading intervention class to support students identified as being at-risk through the RTI2 process. The purpose of the study was to evaluate the effectiveness of a secondary RTI2 program. The following questions guided the study: (1) was there a significant improvement in students’ reading Lexile scores when comparing students who received intervention and those who did not receive intervention, and (2) given the two interventions of Read 180 and Lexia, did either intervention yield improvement in reading Lexile scores? Participants included 870 high school students in Tennessee using ex post facto data comparing the 2015 fall reading benchmark to the 2016 spring reading benchmark. The 870 students consisted of two groups: students who demonstrated a deficiency level in reading fluency or comprehension and students who did not demonstrate a deficiency level. A quantitative, non-experimental research method used a t-test for a single mean to compare the mean scores of the two samples to determine significance from one another. Results from the research questions revealed (1) the mean growth for the students not in intervention was higher than the students in intervention, and (2) there was no statistical significance between the interventions of Read 180 and Lexia. Future research on additional interventions is needed to determine if significant improvements can be made from the RTI² model at the high school level.

Keywords: RTI², intervention, secondary, Read 180, Lexia, Lexile
DEDICATION

This degree is dedicated to my family, my basketball players, and my friends who have supported me over the last three years. Without your patience and kind words of encouragement I would not have had the strength to finish. You reminded me over and over that I had what it took and to stay focused on the goal in mind. As many know, sacrifices have to be made when you want to push yourself to achieve more. Thank you so much to the ones who supported me through those sacrifices to help me get to where I am today.
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CHAPTER 1: Background to the Study

Educational reforms that demand greater accountability have been implemented by the federal government at the teacher, student, school, and district level. The common goal of the reforms was to provide additional support for students who were struggling in the classroom (U.S. Department of Education [USDOE], 2009; Gerzel-Short & Wilkins, 2009). According to the U.S. Department of Education (USDOE), some of No Child Left Behind (NCLB) goals were closing the academic achievement gap by using best practices of what works, describing what methods will be used, ensuring all students reach academic proficiency, and using data from the school district annual report card to inform stakeholders about the school’s progress.

With the implementation of NCLB, each state was required to test and document students’ academic progress at public schools on statewide tests. Since 1983, Tennessee has used summative tests to provide important information about the collective progress of students in the state. These assessments ultimately revealed the definition of proficiency, as demonstrated on the statewide tests was not aligned with proficiency expectations on the National Assessment of Education Progress (NAEP) or The Nation’s Report Card.

In 2009, Tennessee began systematically raising expectations through more rigorous standards and an aligned statewide assessment (State of Tennessee, 2016). Tennessee made progress in raising expectations for learning, moving more students to proficiency, and ensuring students are postsecondary and workforce ready. Compared to 2011, one-hundred and thirty-one thousand more students are on grade level in math, and nearly sixty thousand more students are
on grade level in science (State of Tennessee, 2016).

Concerns were raised about the quantity and quality of assessments. Some of this concern was directly connected to the number of formative assessments administered by districts and pilot tests administered by the state during the transition period. Other concerns were related to the amount of test preparation and testing logistics issues leading up to and during annual test administration.

Additionally, standardized tests also served as a means of identifying students’ strengths and weaknesses; test results were also used to recommend remediation. However, in spite of efforts, schools’ inability to narrow the academic achievement gap has continued to be an area of considerable concern at the state and national level (Fletcher, Coulter, Reschley, & Vaughn, 2004). At the state level, legislators’ concern about public school education and the nation’s educational gains prompted the creation of an intervention program known as Response to Intervention (RTI) geared toward targeting and improving at-risk students’ achievement (Burns, Jacob & Wagner, 2008). To address this concern, some schools have implemented RTI to assist students in their areas of literacy difficulty.

RTI is a customized approach to intervention geared toward struggling students in the general or regular education setting. Researchers have placed more emphasis on the implementation of RTI at elementary grade levels (Fuchs & Fuchs, 2006). For instance, at elementary levels, federal funds have been provided to states and local school districts to create reading intervention programs from kindergarten through third grade (Katz et al., 2008). At the high school level, early intervention has been administered through RTI in the general education classroom for students who may have learning difficulties (Mellard & Johnson, 2008).
In 2004, Response to Intervention (RTI) was approved as an intervention method. Also in 2004, the reauthorization of Individuals with Disabilities Act (IDEA) was introduced. “IDEA specifies that for the purpose of determining learning disability (LD) eligibility, a school district may implement a procedure that involves documentation of how a child responds to scientific, researched-based interventions as part of its evaluation procedures” (Bender & Shores, 2007, p.1). Leading up to this point, students with learning disabilities were identified using the “discrepancy” model. If there was a discrepancy between a student’s Intelligence Quotient (IQ) and achievement, a diagnosis of specific learning disability was given. This process sometimes took several months for the student to be referred for testing, and lead to an over identification of students who had a learning disability. It was a wait to fail model, because there was a focus on academic failure to trigger the need for help in schools. RTI is a systematic, researched based instruction method (Appelbaum, 2009). Gibbs (2009) stated RTI is about good teaching, seeing how it works, and making adjustments to the teaching. The instruction and interventions were matched to what the student needed. Throughout this process, assessments were administered to determine if the student needed help, as well as testing to determine if the intervention was working. It was important for teachers to get to know their students and their different ability levels in order to help them progress through the curriculum and be successful in school (Bender & Shores, 2007). For the RTI framework to be implemented, all teachers at the school needed to understand that everyone had an important contribution to make in order to help struggling learners become more successful (Gibbs, 2009).

The RTI process began with a universal screener administered to all students with the purpose of identifying those students in need of help. The universal screener was designed to be
given at the beginning, the middle, and the end of the year. In order for the screener to be effective, it needed to be efficient, time effective, have cut scores, and be norm-based. Cut scores provided dividing lines between students at risk and students who may be potentially at risk (Appelbaum, 2009). Norm-based screening provides a comparison of students in the same peer groups. All students were required to receive Tier 1 instruction in the general education classroom using evidence-based instructional strategies. The majority of school-aged students responded successfully to quality core instruction in the general education classroom. The problem with some alternative programming was that students were removed from the general classroom curriculum when they actually made more progress when intervention was supplemental to the general curriculum, as opposed to a replacement (Marchand-Martella, Ruby, & Martella, 2007). If students were not progressing in Tier 1, supplemental instruction was given in Tier 2. Once students were identified as needing Tier 2 help, systematic testing was given to provide evidence the intervention was working. This process allowed students to work toward grade level and also move in and out of Tier 2 once all necessary data points were collected. If students continued to not show progress they were moved to the most intensive level of intervention, Tier 3. Tier 3 was progress monitored more frequently and students were in smaller groups for longer periods of time than in Tier 2. Movement between the tiers was fluid and also showed more intensity at each level. In order to make a tier more intense, the teacher (a) used more systematic and straightforward instruction; (b) provided that instruction more frequently; (c) instructed for longer periods of time; and (d) placed students into smaller groups (Fuchs & Fuchs, 2006).

This study focused on the implementation of a reading class to improve at-risk students’
reading through the RTI process. Once these students were identified as having reading
deficiencies, an intervention plan was made to implement intervention early to bring students
back on track to reading at their grade level (Vaughn et al., 2009). Most research on RTI was
focused on the elementary level; however, more emphasis needed to be placed on developing
RTI frameworks that were research-based at the high school level (Johnson, Mellard & Byrd,
2005). In some instances, there was no clear cut definition of how RTI should work in high
schools. Samuels (2009) noted that research based evidence of what the RTI model should look
like was lacking at the high school level. Nonetheless, both elementary and high school students
profited from the interventions that addressed their needs in academic deficits which could result
in failure. Bender and Shores (2007) noted RTI’s procedures were based on instructional
practices that were scientifically based and high in quality, but more so, were a barometer for
measuring growth and effectiveness. These instructional practices could be differentiated to meet
the learning needs of the students while monitoring their progress and adjusting instruction
accordingly.

Duffy (2007) noted RTI has great potential and is a pinpoint focus for intervention at
high schools. At the research site for the study, the specific intervention was a reading class for
at-risk students with reading deficiencies. Students were enrolled in an intervention class in
which research based interventions were used and student progress was tracked according to RTI
guidelines. Students in high school were expected to read for content mastery and
comprehension. These students needed a collection of reading strategies that include pre-reading
activities, fluency, and word study to help them show comprehension of the text (Rasinski et al.,
2005). Researchers noted students with poor reading comprehension and reading skills often
became frustrated when reading difficult text and did poorly in course work (Booth, 2006; Lesesne, 2006; Tovani, 2004).

Furthermore, the complexity and level of text difficulty made it necessary to utilize instructional approaches that helped students develop comprehension of their reading (Rasinski et al., 2005; Tovani, 2004). Applegate, Applegate, and Modla (2009) noted students must be able to engage in critical thinking and also make inferences from what they read. In other words, high school students were expected to be able to read at grade level and understand and comprehend course content as they advanced in grade levels. Critical to the quality education that high school students were expected to receive was the ability to examine and understand a multiplicity of disciplines. Response to Intervention and Instruction (RTI²) promoted the use of research-based, high quality intervention and instruction in 2014 and provided an integrated model that supported student progress at every level.

**Statement of the Problem**

At the research setting, populations of students were having significant difficulties understanding text content in more than one subject area. Studies by Al Otaiba and Fuchs (2006) and Marchand-Martella, Ruby, and Martella (2007) revealed gains for elementary aged students; however, implementation of RTI² at the high school level has become an area of interest for school districts. It is inevitable some students will plateau no matter what interventions they are given. This is likely the result of a specific learning disability in reading (Ridgeway, Price, Simpson, Rose, 2012). The value of RTI² has not been researched as much as the effectiveness of each component of the model as well as the perceptions of those implementing RTI². In order to further the research of RTI², the effectiveness of the process must be addressed (Ridgeway,
Students who failed three or more classes were considered “at-risk” and were targeted for intervention, including students with reading difficulties. Students who scored below the 25th percentile on the universal screener were identified by the school’s Student Support Team (SST) and were targeted for tiered RTI² intervention. In order to meet the needs of these students, a reading intervention class was created for the 2015-2016 school year. This was the second year of the class implementation of RTI² at this school; tracking data on students’ progress was imperative for improving the program to ensure that students made gains toward positive outcomes.

Purpose and Significance of the Study

The purpose of this study was to evaluate the effectiveness of the RTI² program at a rural high school in Tennessee. This study was important because it could be used to inform teachers of instructional strategies for students who demonstrate reading deficiencies in comprehension and/or fluency at the high school level. There may or may not have been trends in the data to assist in making student gains with these deficiencies. It was useful to determine which procedures are most effective for high school students.

For many high school students who find reading to be challenging, completing the basic reading skills and thinking critically can be arduous. Research from Beers (2003) proposed that in order to be an effective reader, content analysis must be ongoing and done independently. The results from such strategies will yield positive reading outcomes. Beers (2003) also noted that effectively reading for understanding requires purposeful, strategic effort whereby teachers can provide learning opportunities that address reading comprehension deficiencies for at-risk
readers. If students are able to read for understanding, academic achievement may increase (Burns, Jacob, & Wagner, 2008).

**Research Questions and Research Hypothesis**

The study was guided by the following research questions: (1) was there a significant improvement in students’ reading Lexile scores when comparing students who received intervention and those who did not receive intervention, and (2) given the two interventions of Read 180 and Lexia, did either intervention yield improvement in reading Lexile scores? If so, was either improvement statistically significant? The research hypothesis stated there was a significant difference between Read 180 or Lexia and improvement in reading Lexile scores. The null hypothesis stated that there was no significant difference between Read 180 and Lexia and improvement in reading Lexile scores.

**Theoretical Framework**

The foundation for this research inquiry about RTI² was based on the Constructivist learning theory that takes into account the learner’s individual needs (Benjamin, 2002). Theorists such as Piaget, Dewey, Vygotsky, and Bruner contributed to the Constructivist theory of learning. Piaget based his ideas of Constructivism on his comprehension that children’s psychological development occurs in stages where they derive meaning and construct learning through progression. Likewise, Dewey affirmed learning occurs from doing or action. Piaget and Inhelder (1969) purported that the nature of knowing exists within the Constructivist domain. As such, all new learning is intertwined into a schema or a knowledge framework where new learning is established. According to Airasian and Walsh (1997), Constructivism is viewed as a philosophy that investigates the nature, methods, and limits of human knowledge.
Differentiated instruction, according to Benjamin (2002), is the process where the students are active participants in the learning process rather than being passive learners. Tomlinson and Edison (2003) believed that applying a differentiated approach to teaching helps students maximize their learning potential. Dantonio and Beisenherz (2001) noted that Constructivism requires students to demonstrate their understanding by actively constructing their learning based on instructional methods that include strategies of differentiation. Once teachers are in tune with who they teach, they are more likely to be flexible in how they impart instruction (Tomlinson and Edison, 2003). With Constructivist pedagogy, students are allocated time to comprehend and apply new concepts to what they learned (Carpenter, 2003). In a Constructivist classroom, the teacher becomes the facilitator as students continue to connect new information to prior knowledge and as they strive toward attaining meaningful goals (Tomlinson and Edison, 2003). Tomlinson and Edison (2003) encouraged the use of differentiated instruction as a way for both teacher and students to maximize instruction. Bender (2008) noted that when the teacher and student could focus on the specific skill that challenged the student, and the teacher could closely monitor struggling students’ progress, then RTI² provided the strongest basis for differentiation of instruction. The foundation for the purpose of this study was developed from combining the Constructivist theory and the RTI² framework to discuss the effectiveness of the two when considering improvements in reading difficulties in high school aged students.

Duffy (2007) recommended a student-centered, Constructivist approach to reading that is interdisciplinary in nature. This technique supported the use of challenging, though not overwhelming, reading materials were relevant to student interest. Duffy (2007) suggested that
student interest in reading materials was linked to motivation to read. Fletcher et al. (2004) claimed that there are good reasons for providing early intervention for younger students. However, improved knowledge about effective interventions for older students was needed. One of the significant issues related to providing standardized interventions to older students with reading difficulties was that the range of reading problems was greater than with younger students with reading difficulties. Consequently, for the vast majority of older readers with reading difficulties, intervention was likely to occur in group-sizes ranging from three to eighteen students. Therefore, RTI should be used as a diagnostic approach to shaping instructional strategies for students who are not meeting grade level standards (Duffy, 2007).

Limitations and Delimitations

Limitations of this study included the small amount of existing data available, as only two grade levels were tested during the benchmarking period. The benchmarking period was completed three separate times within the school year: winter, fall, and spring. The RTI² program began implementation during the 2015-2016 school year. The students were administered the initial benchmark in the fall of 2015. Another limitation included students identified with a disability. Cognitive abilities could not be ruled out as a variable that could affect reading scores. An additional limitation involved students who were English Language Learners (ELL). Class populations were not discriminated according to ethnicity, and students with language barriers may have possessed additional difficulties with reading.

Definition of Terms

For this study, the definitions of technical terms are defined:

Adequate yearly progress (AYP). A measurement defined by the United States Federal
No Child Left Behind Act that allows the U.S. Department of Education to determine how every public school and school district in the country is performing academically (USDOE, 2009).

**Assessment.** Assessment is a broad term used to describe the collection of information about student performance in a particular area. Assessments can be formative or summative (USDOE, 2009).

**At-risk students.** Students whose initial performance level or characteristics predict poor learning outcomes unless intervention occurs to accelerate knowledge, skill, or ability development (National Center on Response to Intervention, 2010).

**Constructivist Theory.** This theory states learning is an active, contextualized process of constructing knowledge rather than acquiring it. Knowledge is constructed based on personal experiences and hypotheses of the environment.

**Data-based instruction.** An instructional approach in which student performance data are used to assess the effectiveness of the instruction and to make changes in instruction based on data (USDOE, 2009).

**Differentiation.** Differentiation is a means educators use to provide access to core curriculum by changing the environment or the presentation of the material in order to meet the needs of each individual student. Curriculum can be differentiated in content, process, products, and learning environment (USDOE, 2009).

**Fidelity.** Fidelity refers to the delivery of instruction or presentation of materials the way the creator intended the product to be used. Other related terms to fidelity are intervention integrity or treatment integrity, which often refers to the same principle (National Center on Response to Intervention, 2010).
**Interventions.** Targeted instruction that is based on student needs. Intervention is in addition to the general education curriculum. Interventions are a systematic, researched or evidence-based specific instructional strategies and techniques (USDOE, 2009).

**Progress monitoring.** Progress monitoring is a scientifically based practice that is used to assess students’ academic performance and evaluate the effectiveness of instruction (USDOE, 2009).

**Reading comprehension.** Reading comprehension is the process of understanding written language (Snow, 2002).

**Reading intervention.** A reading intervention is one or more techniques, strategies, programs, and supports intended to prevent or remediate reading difficulties (Snow, 2002).

**Response to Intervention (RTI).** RTI is a multi-tiered approach to help struggling learners. Students' progress is closely monitored at each stage of intervention to determine the need for further research-based instruction and/or intervention in general education, in special education, or both (Preston, Wood, & Stecker, 2016).

**Response to Intervention and Instruction (RTI²).** RTI² is a method of academic intervention that is designed to provide early, effective assistance to struggling students. Placement into the program is based on progress monitoring results from assessments (Council for Exceptional Children, 2009).

**Tiered service-delivery model.** A multitiered model of service is a delivery plan in which instruction is differentiated to meet learner needs at various levels. Several specific factors or dimensions help distinguish among interventions at the various tier levels. In general, a higher
degree of specificity and intensity is associated with a higher tier of intervention (National Center on Response to Intervention, 2010).

Tier 1. The first level of a multitiered model, which is the core curriculum within the general classroom instruction with grade-level expectations for all students.

Tier 2. The second level of a multitiered model of instruction, which involves the identification of students not making adequate progress within Tier 1 followed by prescribed intervention with ongoing progress monitoring of the intervention’s effectiveness.

Tier 3. The third level of intervention is the most intensive layer of general education support following unresponsiveness to Tier 2 intervention. In some models, however, a progression to Tier 3 indicates a shift from general education due to a suspected disability and a provision for special education services (National Center on Response to Intervention, 2010).

Ethical Issues

In accordance with the guidelines set by a rural district in Tennessee, the following procedures were completed: a packet for approval of research was completed and submitted to the Chairman of Research Committee, an interview with the committee was completed, and permission to use district data were granted. The purpose of set guidelines for conducting research is to govern the approval and monitoring of research studies that require the use of school personnel, student and staff information, or school facilities. According to the identified school system criteria, research must be aligned with the system’s Comprehensive Plan. The researcher agreed to share complete results of the research project with the system’s research committee and with professional school personnel who cooperated in the study. Proposals were
extensively critiqued and meet the quality standards of the researcher’s institution before submission to this specific school system. Human subjects were included in the proposed study, submission included verification of approval by the institution’s human subject committee. The researcher completed the CITI program, Human Subjects Research, through Carson-Newman in order to complete the coursework requirements. Participation in research studies by students, parents, and school staff was voluntary. Informed consent was required from students and/or parents; a copy of the consent form was kept by the researcher. Anonymity of each participant was preserved.

The procedures for conducting research using data from the schools in this district have several requirements. The researcher provided a copy of the request form in writing to the Research Review Committee Chairperson. Requests must be complete with required support documentation, such as copies of surveys, forms, observations checklists, etc. A consent form was necessary; a copy was included with the proposal when it was submitted.

**Organization of the Document**

In the era of greater accountability for all levels of schools and districts, reading has become a focus for academic improvement. Through RTI², more opportunities have been provided for support for students with academic deficiencies without the need to be identified for a specific learning disability through special education. Chapter one included the purpose of this study. The effectiveness of the RTI² program was evaluated at a rural high school in Tennessee to determine if the program assisted in improving deficiencies in the areas of reading comprehension and fluency. Significant definitions were defined in this study to assist with understanding. Ethical concerns included involving the research alignment with the district’s
Comprehensive Plan in which the results of the project were shared with the district’s research committee and professional school personnel. Chapter two outlined how the Constructivist theory guided this research inquiry as it aligns with the theories of RTI². The chapter also described the history of RTI² and how it was utilized in public schools. Reading difficulties in the areas of reading comprehension and fluency were discussed in the chapter to identify the need for further research. In chapter three, it was explained how the population in the study was selected. Conducting research required procedures such as acquiring permission from the district’s Research Review Committee, providing copies of forms, observation checklists, consent forms, and meeting with the committee to attain permission. Chapter three provided information regarding the method, the research design, the appropriateness of the design choice, the population, the sampling, the geographic location, the data collection method, and the data analysis in order to answer the research questions. In Chapter 4, data related to the research of the effectiveness of the RTI² program in improving the reading deficiencies of reading comprehension and fluency was presented. Chapter 5 provided detailed research findings and implications for future research practices for the study.
CHAPTER 2: REVIEW OF LITERATURE

After the mandated use of Response to Intervention and Instruction (RTI²), schools began to implement intervention programs to assist students in their areas of literacy difficulty. RTI² was a process that was facilitated through the use of multi-tiered models. This study explored the effectiveness of a reading intervention program in improving reading skills of at-risk high school students with reading difficulties. For many high school students who found reading to be challenging, completing the basic reading skills and thinking critically could be difficult. The study focused on the implementation of a reading class to improve at-risk students’ reading through the RTI² process. According to the American College Testing (ACT) Program’s College Readiness, 78% of high school graduates did not meet the readiness benchmark levels for one or more entry-level college course in mathematics, science, reading, and/or English (Price, 2012). Identifying students’ targeted weaknesses and monitoring students’ progress provided guidance toward effective instruction. Once these students were identified as having reading difficulties, preparation was made to implement early intervention to bring them back on track to be reading on grade level (Vaughn & Fletcher, 2010).

The ideal RTI model entails continuous progress monitoring, tracking data, utilizing research-based practices, providing specific interventions for at-risk students, and maintaining effective instruction in the general education setting (Hollenbeck, 2007). According to Al Otaiba and Fuchs (2006), students who took part in an RTI² tiered intervention for a period of eight
weeks were more likely to see an increase in their learning outcomes. In this particular research setting, course credit was issued for intervention classes. Student progress was monitored once per month, but tier changes and graduation from the program happened at the end of each semester. This process was set in place in order to allow students who needed additional support to still receive a credit for those classes and stay on track to graduate. If a student was in intervention for more than one focus area and more than one school year, he or she then had intervention as a focus for their six-year plan and graduation plan of study.

The act of teaching, re-teaching, and working with struggling students is not a new concept for classroom teachers. Even in the 1900’s, students who attended school did not always work on the same assignments or subjects at the same time. Teachers would change assignments or order of instruction to help students who were struggling. Interventions have been common in schools for many years. Response to Intervention (RTI) was implemented to ensure that all students receive any needed instruction and interventions to achieve academic success. RTI is a formal process implemented by schools to provide intervention for all students experiencing academic and/or behavioral difficulties. The primary goal of RTI was to provide the interventions a struggling student needed to become successful in the general education curriculum. If the interventions were successful, that student continued in the general education setting. If interventions were not successful, the school district decided to implement different interventions or initiated a referral for special education eligibility testing. Similar to all approaches to the RTI process was: define a student’s problem, plan an intervention for the student, implement the intervention, and evaluate the student’s progress. Identifying problems, planning interventions, and evaluating a student were difficult. It was imperative that
interventions were reliable, accurate, and easy to implement (Martinez & Young, 2011).

Schools that had successful RTI procedures implemented research-based interventions using multiple tiers of instruction. Teachers provided high quality instruction starting in the general curriculum (Tier I) and continued with more intensive interventions (Tier II and Tier III). Tier II and Tier III often differed based on the time spent on the intervention. The possible use of RTI as a means of ruling out or identifying students who may or may not have had Learning Disabilities (LD) began in 1982 as part of a National Research Council (NRC) study. The NRC study proposed that special education classification should be based on three basic questions: was the quality of the general education adequate to address learning, was the special education program able to improve student learning, and was the assessment process used for identification meaningful? Since 1982, others proposed various models for the use of RTI to determine eligibility under the definition of a specific learning disability (SLD). In 2004, Congress amended the Individual with Disabilities Education Act (IDEA) in part, to address problems attributed to poor interpretation and misuse of the discrepancy model for identifying students with specific learning disabilities. With its 2004 amendments to the IDEA, Congress essentially incorporated and codified the use of RTI to determine a specific learning disability twenty-two years after the inception of the SLD category (Martinez & Young, 2011).

**Shift from RTI to RTI²**

Johnson, Mellard, and Byrd (2005) noted more research on RTI² has been at the elementary school level as opposed to the high school level. Samuels (2009) concurred that there is a lack of research based RTI² frameworks in high schools. Additionally, Duffy (2007) asserted there is great potential for RTI² at the high school levels. Bender and Shores (2007) concluded
that RTI²’s growth is measured through scientifically based instructional practices that are a true
barometer for measuring its effectiveness.

Reading is essential for skill development in school and for success in life and should be
interesting and fun (Appelbaum, 2009). Reading for pleasure in youth in the United States
depends each year (Carbo, 2009). For students to achieve higher reading gains, reading
comprehension and reading enjoyment must be the two main goals. Students who choose to
voluntarily read on their own for pleasure improve their reading skills and test scores at a much
higher rate than the students who do not read on their own (Carbo, 2009). Teachers are led to
consider diverse learners in their classrooms; therefore, it is important to become more
understanding of reading difficulties and student needs. Carbo (2009) suggested using emotional
memory to learn to read. Emotional memory is a date, time, or specific event that triggers a
memory. Carbo (2009) also stated when the reading instruction connected to the student’s style
strengths and preferences, reading was more fun and less work to the student. Carbo spoke of
two models: the analytical model and the global model. The analytical model teaches the reader
to see parts to whole, much the way teaching phonics works. The global model teaches the
reader to see the whole down to the parts, the way whole language suggests. Carbo (2009) stated
that analytical readers use logic to make sense of unknown words. Global readers recall words
they see and hear repeatedly when reading high interest pieces. Each piece a student read
required different reading strengths. If the piece aligned with the student’s strengths, he or she
read easier and was more apt to enjoy the work. On the contrary, if the piece did not match the
strengths of the reader, the work became laborious and less enjoyable. It is important to identify
the reader’s strengths, match reading methods, materials, and strategies to those strengths,
provide sufficient modeling of reading methods, and push students into higher reading levels using high interest materials (Hornery, Seaton, Danielle, Craven, & Yeung, 2014).

In the spring of 2012, the Common Core Leadership Council (CCLC) had a discussion surrounding the best instructional practice in reading and math. These discussions lead to the need for statewide RTI model to promote consistency and improved instruction. In the fall of 2012, these guidelines were released to districts and presented at Tennessee Educational Leadership Conference (LEAD) in 2012. Feedback was gathered from districts and the conversation around RTI in Tennessee continued throughout the fall of 2012. At that time, the Tennessee Department of Education (TDOE) searched for a partner organization with a strong research background to help with the developments of reading and math training relative to the Tennessee State Standards and tiered, supplemental intervention. In January of 2013, an RTI Task-force with members from various positions in leadership in Tennessee education was convened to discuss the possibility of a statewide RTI model. The group voted to proceed with a statewide plan and provided recommendations. A call for educators to serve on a Reading/RTI Leadership Team went out to districts across the state. The team met in February of 2013 to start researching and writing the Response to Intervention and Instruction Framework called RTI². The policy was changed in June of 2013 that RTI² was the criteria by which a student was identified as having a Specific Learning Disability in the state of Tennessee (State of Tennessee, 2016).

When students were not able to read at grade level standards, teachers realized there may be a problem. In the state of Tennessee, a student can be identified for a Specific Learning Disability (SLD) in reading under three areas: basic word reading, reading comprehension, and
reading fluency. It is important to determine the specific needs of the students in order to make adjustments to the core instruction. No two schools will have the same students’ needs. Comprehension deficits may be more prevalent than basic word reading (O’Donnell & Miller, 2011). It is important for the school to be systematic in its approach to design interventions specific to the needs of the students. For students who struggle with basic word reading, interventions that improve reading accuracy can have a positive impact on reading comprehension. Some effective strategies to improve basic word reading are: use kinesthetic and auditory cues in teaching phonics, use embedded phonics with contextual practice of skills, use interventions that provide intensive word study, and use interventions that increase word and passage reading fluency (O’Donnell & Miller, 2011). Gibbs (2009) suggested teaching students to identify and break words into syllable types, then teach the student to blend all the parts together. Once the student mastered those basic skills, he or she should be taught to break words into parts and continue to combine word parts to create words based on their roots, bases, or other features. Some strategies used to improve vocabulary and comprehension are: use explicit vocabulary and comprehension instruction (Gibbs, 2009). Gibbs (2009) suggested providing sufficient opportunities to use new vocabulary in many contexts through discussion, writing, and extended writing.

To determine if the intervention is working, evidence must be provided. Progress monitoring is the piece of the puzzle which provides that very information. Jones (2013) stated progress monitoring removes the teacher subjectivity out of the qualification process and replaces it with short, quick one-minute assessments called probes or curriculum based measurements (CBM’s). CBM’s served as documentation in the form of data points collected
over a period of time.

**High School Intervention**

The National Center on Response to Intervention (2010) interviewed high school officials on the different stages of implementation of RTI² in surrounding schools to investigate the initial issues in the process. It was determined the difficulty with high school RTI² implementation is due to the lack of training for administrators and teachers at that level on the tiers, problems with scheduling students for intervention courses, lack of collaboration time for teachers, and a lack of universal screeners that measure above the eighth grade level. Bartholomew (2016) conducted a qualitative research study to investigate high school principals’ knowledge at implementation of the RTI² service delivery model. The qualitative nature of the study allowed participants opportunities to explain what they knew about the RTI² model, barriers high schools faced when implementing interventions, and elements of successful RTI² programs in the high school setting.

The findings from the study supported the claims that most high school principals were unable to identify essential components of a successful RTI² program due to the lack of training. The principals reported to not know where to begin in order to implement RTI² in their respective schools. The principals also stated most of the knowledge they possessed about RTI² came from the elementary level. Principals discussed the most recent trainings they attended were focused on leadership, schools law, special education, and relationships with staff and students, rather than the intervention process (Bartholomew, 2016).

Also reported in the study was a common suggestion in using an academic period as an intervention to allow time for teachers to work with struggling students in smaller groups. Principals saw success with this approach in that teachers had smaller student-to-teacher ratios
and teachers were able to differentiate between if the student was struggling with content or if the student was not putting in effort to complete assignments. Teachers were able to connect more to the students while they were in small groups. Teachers participated in the academic period with minimal arguments. On the other hand, principals discussed the teachers’ attitudes as a main barrier in the intervention process. Principals explained frustration in coaching teachers to change their instructional approaches. Teachers did not feel the need to change the way they taught.

Lastly, Bartholomew (2016) reported principals requested a universal screener which provided overall class and individual class data. One screener suggested was the Measured Academic Progress (MAP) assessment. Teachers and principals liked the information given to them from the MAP to use for school improvement goals. This information was also used to inform teachers more about the academic needs of the students in their classes. In addition to the universal screening data, principals stated another issue high schools had was a lack of man power to perform the necessary progress monitoring requirement for tiers two and three. Schools who attempted to progress monitor large groups were unsuccessful. Once principals guided teachers to select small groups of students to monitor, the process was seen as more productive.

**Progress Monitoring**

Progress monitoring was the regular observation and recording of important program plans. Progress monitoring provided educators with realistic assessments of progress and informed communications students. There were three key components of progress monitoring: planning, assessment, and communication. When planning an intervention program, it was
important to clearly define goals and objectives, document required resources and activities, and define expected outcomes for each individual (Malone, Mark, Miller, & Kekahio, 2014).

Malone, Mark, Miller, and Kekahio (2014) stated the foundation of progress monitoring was planning. Continuous progress monitoring broke down the entire program into smaller parts that are easier to understand. Strong leadership during the planning process helped ensure limited resources were used effectively, that all components of a program complemented one another, that work did not need to be discarded or redone, and that the results of the program were achieved.

Program plan assessment used the data gathered through progress monitoring to determine whether a program was on track to meet its expected outcomes for each student. Continuous assessment and evaluation of a student’s intervention plan involved knowing where the program started from (baseline), where similar programs were (benchmarks), where the program was (actual progress), and where the program eventually wanted to be (targets) and then realistically deciding whether the program was on the right path (U.S. Department of Health and Human Services, 2010).

While it was important to track and assess the plan’s success, it was also vital to appropriately communicate with others about the intervention being observed. Intervention progress and results were shared individually with students and other interested stakeholders, including outside parents, intervention teams, and other programs within the school, district, or state (Malone, Mark, Miller, & Kekahio, 2014).

Before progress monitoring could begin, a baseline assessment was completed (Bender & Shores, 2007). If the student was not performing on grade level, his or her progress would begin
at the current level of performance. A vital goal when providing an intervention, is to ensure a student’s skills are growing and becoming closer to the grade level. The ultimate goal is to have at least one year’s growth by the end of the school year. Jones (2013) stated that RTI is not as much about what is going on in the student’s life, as it is more about the growth that can be made or not be made when it is found that the student is not performing on grade level.

Fidelity of implementation is the core to the integrity to any intervention program. Teachers must deliver instruction and intervention in the way it was designed in order for there to be fidelity (Jones, 2013). Fidelity of program implementation is essential and specifically refers to the delivery of instruction (Jones, 2013). In order for placement to be valid, a designated diagnostic team of intervention specialists should always be able to verify that a student receiving Tier 1 received appropriate and adequate instruction in the general education classroom. Therefore, implementing instruction with fidelity was essential when measuring outcomes of both the general classroom and individualized interventions. Additionally, adequate program fidelity met the legal requirements for appropriate instruction as indicated in the Individuals with Disabilities Education Act (Appelbaum, 2009).

RTI is governed by a set of principles. Some of these principles include adapting instruction on an as-needed basis, evaluating students’ responsiveness to intervention, monitoring students’ progress frequently, and providing evidence based instruction with fidelity (Vaughn & Fletcher, 2010). The American Association of School Administrators (AASA), Council of Administrators of Special Education (CASE), National Association of State Directors of Special Education (NASDSE), State Title One Directors, and Spectrum K12 School Solutions conducted a 2-year survey from March 2007 to March 2009, and found that the use of RTI
models have increased from 44% in 2007 to 71% in 2009 across school districts. The survey also revealed that in 2008 and 2009, the use of RTI in all grade levels increased from 16% to 51%.

Bianco (2010) stated it should be required for teachers to provide instruction and progress monitor student work according to the research-based method prescribed. If the program failed to have fidelity, the interventions went against the main goal of RTI, which was serving students according their need, as evaluated by formal assessments. Also, implementation with fidelity sets standards for valid determinations of disabilities, which could possibly exist. Once a successful system is completed for a student, replication cannot exist without documentation of fidelity. In contrast, if the system is unsuccessful, proper documentation of fidelity to show the intervention was actually implemented the way intended could lead a teacher to alternate plans for that student (Bianco, 2010). Fidelity of implementation and integrity will continue to be a challenge as long as student data is used to inform instructional decisions.

Several components of RTI, including high quality classroom instruction, research based instruction, universal screening, continuous progress monitoring, and fidelity have been examined to determine the credibility of the approach. Adding all these components together created an opportunity for educators to provide students with an appropriate education. Tier 1 must consist of high-quality instruction for all students. Before students were selected to receive specialized intervention, it was determined that instruction in the general classroom was considered “high-quality” and individuals in a decision-making position ensured that any student in question had been given an adequate opportunity to learn (O’Donnell & Miller, 2011). Furthermore, it was argued that effectiveness of instruction can be assessed by comparing student outcomes between classrooms at the same grade level or through formal and informal
observation and/or interviews (Hornery, Seaton, Danielle, Craven, & Yeung, 2014). These individualized research-based interventions should be implemented in eight to twelve week increments and were designed to increase learning, and should be guided by the student’s specific learning needs (Jones, 2013).

Once students make gains and demonstrate proficiency, it is important to enrich the student’s interest in reading. The decline in a focus of reading for pleasure in schools may be a hurdle to cross once students leave school (Hornery, Seaton, Danielle, Craven, Yeung, 2014). Advancement opportunities must be provided for students who show competency in reading. Particularly for those students who are advanced in reading, a combination of grade-level reading material that is insufficiently challenging and skill-based activities focusing on lower level skills limits their opportunities to grow as readers and to learn strategies for handling different text. A more individualized approach to this challenge is to allow students to read books of their choosing (Vaughn, & Fletcher, 2010).

Most studies which examined the positive impact of RTI on academic achievement or student performance reported a level of improvement. Those findings suggested a multi-tiered intervention approach can improve academics for students at risk. Unfortunately, some limitations existed which prevented how much the outcomes measured could be associated with the intervention approach. Most findings discussed an increase in early literacy skills while using the RTI process at the elementary level. Future research should include more comprehensive models that focus on higher level literacy skills, Tier 1 instruction, core curriculum, and teacher competency (Vaughn, & Fletcher, 2010; Hornery, Seaton, Danielle, Craven, Yeung, 2014).
**Problem Solving Model**

Burns and Ysseldyke's (2005) review of four large-scale RTI models (the Heartland Agency Model in Iowa, Ohio's Intervention-Based Assessment, Pennsylvania's Instruction Support Teams, and Minneapolis Public Schools' Problem-Solving Model) found that they all consistently emphasized the establishment of multidisciplinary collaborative teams. However, there was no consensus as to which professionals should make up the teams. In the four models, the general education teacher was the only consistently mandated member of the team. Depending on the RTI model implemented, other team members included special education teachers, school psychologists, school counselors, instructional support teachers, and principals.

Burns and Ysseldyke's (2005) review of four large-scale RTI models found that adequate implementation appeared to be a key obstacle.

Most states and districts used one of two primary RTI approaches: the standard protocol model or the problem-solving model. The standard protocol model used the same treatment for all students with similar problems and provided interventions individually or in small groups outside of the classroom. The problem-solving model provided interventions that were individual to each student and occur within the classroom. The problem-solving model was based on the assumptions that the success of an intervention could not be predicted based on student characteristics and that no single intervention would be successful for all students. The standard and problem-solving models varied in the number of tiers of intervention they offer, with the standard model using a two-tiered approach and the problem-solving model most frequently using a three-tiered approach (Klinger & Bryant, 2001).

RTI is not a one-size-fits-all process and implementation varies within schools and
districts. VanDerHeyden (2009) suggests that local resources and strengths were to be evaluated to determine the approach worked best within each unique context. Collaboration between general and special education teachers was essential to the success of the program. The Council for Exceptional Children (2007) recommended that general education teachers be responsible for Tier 1 interventions. At Tier 2, general education teachers collaborated with special education teachers and other specialized personnel to design appropriate interventions. At Tier 3, special education teachers played an integral role in providing appropriate educational services.

**Problem solving vs. standard protocol.**

Schools working within an RTI² framework may have different ways of placing students in intervention. Some schools use a problem-solving method. When a struggling reader was identified as having deficits according to STAR, teachers and specialists could do additional diagnostic testing and have a data team meeting to analyze the student’s deficits and plan specific intervention strategies. On the other hand, schools with more low-performing students used standard protocols. These schools did not have the resources to provide individualized interventions to large amounts of students. Instead, they initially provide a standard protocol, especially at Tier 2. Students with the same needs were grouped together and were placed in the same intervention. The staff chose the intervention from a bank of approved interventions which were proven to be successful with struggling learners. The advantages of a standard protocol were that decisions about placement could be made in fewer meetings and required fewer resources to make the intervention successful (Shaprio, 2012).

The problem-solving approach is distinguishable from the standard treatment response method in that students receive one on one instruction within the classroom. Fuchs et al. (2001)
claimed that the individualized nature of the approach is based on the belief that students’
characteristics cannot predict the success of an intervention, and no single intervention will work
successfully for all students. Canter and Cowan (2008) defined the problem-solving model as a
systemic approach which evaluated the students’ strengths and weaknesses. In addition, it also
evaluated the effectiveness of the instruction the students received. The problem-solving
approach had different versions that vary in the number of intervention tiers used. However, the
common thread between the problem-solving and standard treatment method was the 4-step
process aligned to each intervention tier. The 4-step process included (1) identifying the
problem, (2) analyzing the problem and selecting the intervention, (3) implementing the
intervention, and (4) monitoring the response to intervention (Fuchs et al., 2001). The people
involved in the process may include school psychologists, educators, and parents (Fuchs &
Fuchs, 2006).

**Standard Treatment Protocol**

Implementation of a standard treatment protocol involved a specific time for each trial.
Fuchs and Fuchs (2006) researched this approach and asked first-grade teachers to identify their
lowest readers at the beginning of the school year. After the first semester, the children were
assigned to tutoring groups. For the students in the tutoring group, a 30-minute, one-to-one
intervention was provided five days each week. The intervention totaled between 70 and 80
tutoring sessions, which focused on phonemic awareness, decoding, sight-word practice,
comprehension strategies, and reading connected text. Fall of the following school year, students
in the tutoring group who scored below the 40th percentile on the Basic Skills Cluster
participated in a second eight to ten weeks of tutoring. Two thirds of the students in the tutoring
group demonstrated growth after one semester of first-grade tutoring. The students had caught up to their classmates academically. Fuchs and Fuchs (2006) suggested that these students had not really been reading disabled but “instructionally” disabled. The remaining one third of the readers in the tutored group remained in the lowest 30th percentile on the Word Identification and Word Attack subtests of the Woodcock Reading Mastery Test–Revised (WRMT–R), despite receiving tutoring in both first and second grade. The researchers described these children as “difficult to remediate” (Vaughn, & Fletcher, 2010; Hornery, Seaton, Danielle, Craven, Yeung, 2014).

Regardless of which RTI approach is implemented, there must be two components of the assessment process. First, a system of measuring how students responded to the instruction must be identified. Second, once a student’s response has been measured, a definition must be stated for the meaning of a non-responsiveness student. Last, after the two components of the assessment process were met, students were classified as having reading disabilities or not. Bianco (2010) specified non-responsiveness in terms of post-treatment status. However, their approach involved a criterion-referenced benchmark associated with future reading success. Another research study suggested measuring student monitoring progress frequently by using curriculum-based measures so that if a student was labeled as non-responsive it could be identified earlier in the school year. (Marchand-Martella, Ruby, & Martella, 2007). Students classified as “non-responders” showed a level of performance at least one standard deviation below their class mean. These methods produced different rates of reading disability and different subsets of nonresponsive children. This method is important as the IQ-achievement discrepancy model was unreliable for a correct diagnosis of a specific learning disability.
Students were prematurely identified by multiple assessment procedures, which did not take into effect if students could respond to appropriate intervention. Using assessment methods alone were not appropriate to identify responsive and unresponsive groups to intervention. A common approach to determine and assess students who are nonresponsive to intervention is needed to correctly identify students with specific learning disabilities.

While Response to Intervention has been a method to reach struggling students for some time, it has become the popular way to identify students with learning disabilities (Appelbaum, 2009). Core instruction, Tier 1, provided best instruction for students. Unfortunately, many students needed extra support above and beyond what was administered in the general education classroom alone. Studies have revealed increasing gains, especially in reading instruction, when students are provided intentional guidance on the skills revealed as deficit skills. After students have increased reading skills and reading scores, access to all curriculums should become easier and reveal success for many students.

The Tennessee State Board of Education (TDOE) developed guidelines and standards concerning evaluations for Specific Learning Disabilities (SLD) under special education. On July 1, 2014 standards for identifying SLD turned to the Response to Intervention and Instruction (RTI²) as opposed to the discrepancy model used in the past. This new approach required all districts and schools to use RTI² to determine eligibility for students to receive special education services in the category of SLD. RTI² was developed to provide opportunities to any student struggling with grade level instruction to succeed and was not being seen as a way to identify students for special education eligibility.
**STAR Enterprises**

Renaissance Learning is a computer-based assessment technology with products used in all grade levels. This method of benchmarking students was purchased by the district to use system wide. The particular district purchased nine school licenses. The assessments purchased from Renaissance are STAR Early Literacy Enterprise, STAR Reading Enterprise, and STAR Math Enterprise. STAR provided teachers with Lexile data and percentile ranks as compared to national norms which assisted with targeting instruction, monitoring progress, providing students with the most appropriate instructional materials, and intervening with at-risk students. Administrators also use this data to make decisions about curriculum, assessment, and instructions at the classroom, school, and district levels. STAR Reading was designed to be appropriate for students in grades 1 through 12. Table 1 shows the breakdown of percentiles into tiers (Shapiro, 2012).

Table 1

*STAR Scores Used for Tier Placement in RTI²*

<table>
<thead>
<tr>
<th>Percentile Score</th>
<th>Tier Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%-10%</td>
<td>Tier 3- Immediate intervention needed</td>
</tr>
<tr>
<td>11%-25%</td>
<td>Tier 2- Intervention needed</td>
</tr>
<tr>
<td>26%-40%</td>
<td>Tier 1- On watch, no intervention needed</td>
</tr>
</tbody>
</table>

*Note.* Tier percentiles are from RTI² manual. Percentiles are used to place students in the appropriate tier level of intervention based on skills.
Computer adaptive testing (CAT).

STAR Reading is a computer adaptive test (CAT). A CAT changes the difficulty of each test by selecting items based on how the student answered previous questions. The STAR reading test began by populating the same three beginning questions for all students, and then depending on the number correct, populated a test of thirty-four questions. The students’ answers were then measured and compared to national norms in order to present an instructional level measure, percentile rank, and list skill areas in which the student was non-proficient (Lord, 1980; McBride & Martin, 1983). Students were benchmarked on grade level and compared to a baseline of similar demographics (Shaprio, 2012).

Bridge between assessment and instruction.

STAR reports several statistical relationships for student scores: percentile rank (PR), grade-equivalent (GE), student growth percentile (SGP), and zone of proximal development (ZPD). By using percentile rank, it was easier to compare student performance to national norms. GE shows the approximate grade level on which the student was working. SGP expressed the percentage of academic peers who grew less than the national norm. Lastly, ZPD represents an appropriate level the student could work and show success. Teachers use the ZPD measure to assist students in finding books within his or her range to read in class or independent reading (Shaprio, 2012).

Reliability and validity.

The National Center on Response to Intervention and Instruction is funded by the U.S. Department of Education’s Office of Special Education Programs (OSEP) and works in conjunction with researchers from Vanderbilt University and the University of Kansas. When
creating an assessment, length is key. STAR Enterprise assessments utilize computer-adaptive technology to make each assessment unique using fewer items. Psychometricians evaluate reliability in different ways. One way was to use test-retest reliability, test to the same students within the same time frame, and check to see if there was a theme in the students’ scores (Shapiro, 2012).

Along with being reliable, a test must be valid. Validity means the test actually tests what it is meant to test. As with reliability, there are many ways to measure validity. Content validity is the relevance of skills and objectives to reading and math curricula as well as state standards and Common Core Standards. To evaluate validity one should examine the degree to which one assessment correlates with other commonly accepted assessments. STAR assessments were compared to other assessments such as DIBELS, TCAP, and Stanford Achievement Test to show this correlation (Shapiro, 2012).

**Benchmark screening.**

Fall universal screening was completed at the beginning of the school year in order to set a baseline for each student. Winter universal screening was completed mid school year to measure the progress thus far and compare any deficiencies. Spring universal screening was completed at the end of the school year to have a complete measure of growth over the course of the school year. By analyzing the screening reports for fall, winter, and spring and comparing the movement of students among the categories, teachers can judge the effectiveness of core instruction and intervention strategies. In following the RTI² model students must either referred for intervention by a teacher with the referral packet or students can be placed in a score according to Table 1 (Shapiro, 2012).
Easy CBM

Easy CBM (Curriculum Based Measurement), a norm-referenced curriculum based measurement, is a commonly used method for progress monitoring. Students can take assessments online or a printed version to allow easy identification of skill deficits. Charts, graphs, and past testing data were saved in the server to allow interventionists and administrators to monitor student growth. While the typical student in intervention will be progress monitored every two weeks, this tool can be utilized more or less as needed. Easy CBM reports provide information that supports evidence-based decision making, and the Interventions interface streamlines the process of keeping track of students' instructional program.

Educators use the theoretical view of Constructivism as a foundational basis for teaching and learning. In the Constructivist classroom, a variety of teaching practices are employed to facilitate students’ learning. One model of the theoretical view of Constructivism in the classroom is small group instruction with a concentration on teaching reading skills and strategies. Benefits to the Constructivist learning approach include differentiated instruction with small groups based on the ratio of student to teacher (Benjamin, 2002).

Differentiated instruction, according to Benjamin (2002), is the process where the students are active participants in the learning process rather than being passive learners. Tomlinson and Edison (2003) believed that applying a differentiated approach to teaching helps students maximize their learning potential. Dantonio and Beisenherz (2001) noted that Constructivism requires students to demonstrate their understanding by actively constructing their learning based on instructional methods that include strategies of differentiation. Once teachers are in tune with who they teach, they are more likely to be flexible in how they impart
instruction (Tomlinson & Edison, 2003). With Constructivist pedagogy, students are allocated time to comprehend and apply new concepts to what they learned (Carpenter, 2003). In a Constructivist classroom, the teacher becomes the facilitator as students continue to connect new information to prior knowledge as they strive toward attaining meaningful goals (Alesandrini & Larson, 2002; Tomlinson & Edison, 2003). In essence, students learn by discovering their own answers in comparison to listening to a lecture. Tomlinson and Edison (2003) encouraged the use of differentiated instructions as a way for both teacher and students to maximize instruction.

Bender (2008) noted that when the teacher and student can focus on the specific skill that challenges the student, and the teacher can closely monitor struggling students’ progress, then RTI² provides the strongest basis for differentiation of instruction.

**Reading difficulties for secondary students**

At the secondary level students are required to think critically and apply higher level thinking skills to reading text. English/ language arts classes have become environments where students are expected to apply with ease the phonemic, decoding, and fluency skills taught to them at prior levels. However, many students enter the secondary level without these skills, either because of chronic absences, ineffective teaching methods, or learning difficulties (Lange & Yesseldyke, 1998). For those students who have limited skills in basic reading, the secondary curriculum presents many challenges because fluency is an essential step toward comprehension of text. Also, at the secondary level peer influence is important. It is difficult to provide adequate levels of instruction in basic skills without presenting stigma or isolating the individuals in need (Lange & Yesseldyke, 1998). Since high school is the last step where educators can make substantial change to prepare students with learning disabilities for post-school transition, it is
critical to provide effective literacy instruction to help these students gain academic success.

In an extension of Peer-Assisted Learning Strategies (PALS), Fuchs et al. (2001) trained high school students to use peer-mediated instruction and structured reinforcement systems to improve academic achievement in life skills courses and social relationships. Peer-mediated instruction provided peer support and greater opportunities for the successful academic responding needed to keep students engaged and participating in academic tasks. The supplemental strategies under investigation, peer-mediated instruction using repeated reading and continuous reading of narrative text, were interventions that focus on reading fluency development and comprehension skills of adolescent struggling readers. The research of Josephs and Jolivette (2016) examined the effects of using peer-mediated oral reading fluency instruction on the reading fluency and comprehension skills of high school-aged struggling readers in a high school. This investigation attempted to answer the following research questions: (1) which peer-mediated fluency strategy, repeated reading or continuous reading, was more effective in improving the oral reading skills of adolescent struggling readers; (2) which peer-mediated fluency strategy, repeated reading or continuous reading, was most effective for improving the reading comprehension skills of adolescent struggling readers; and (3) how did the participants perceive the effectiveness of the interventions?

The peer-mediated sessions were held three times a week, for 45-minutes each, in an assigned and structured study hall period created to enhance the reading achievement of struggling readers in the high school. Students were placed in the instructional focus class if they scored less than grade six on the Test of Adult Basic Education assessment. Students were invited to participate in this study if they: (1) were placed in the instructional focus class, (2) had
current reading scores between grade levels 4.0 to 7.0 as determined by the Test of Word Reading Efficiency (TOWRE) with a standard score less than 100, and (3) scored between 2.5 to 6.5 on the Woodcock Johnson-III (WJ-III) reading subtests (word reading fluency, word attack, letter-word identification, and passage comprehension). Pre- and post-assessments were conducted to determine each participant’s oral reading fluency. The TOWRE, four subtests of the WJ-III, and the Oral Reading Fluency rate of AIMSweb Assessment were administered to each student by Josephs and Jolivette. Four students were chosen for the study, Student A, Student B, Student C, and Student D. The summary of the findings reveals Student A made significant growth in the area of words read per minute. Student B did not show as much gain as Student A during the most effective intervention. Student C made the least amount of growth with words read per minute. Lastly, Student D showed growth, but not as much as Student A.

Adolescent struggling readers, specifically those with reading difficulties have a myriad of challenges to face in school, especially the successful navigation of the national Common Core Standards. At the secondary level the high school curriculum is based on effective reading skills (Dudley, 2005). Yet, oral reading is not common practice in schools at the high school level. Noting the possible long-term negative consequences of limited reading skills; involvement in the juvenile justice system, low academic achievement, and under-employment, it is imperative that classroom teachers be supplied with research-based supplemental strategies that are specifically geared toward increasing the reading fluency and comprehension skills of adolescent struggling readers (Brunner, 1993). Research in a variety of classroom settings has shown the positive effects of repeated reading and peer-mediated instruction on reading fluency and comprehension skills for a variety of students (e.g., age, ability levels) (Yurick, Robinson,
Cartledge, Lo, & Evans, 2006). Josephs and Jolivette (2016) extended the research-base by investigating the effects of viable supplemental reading strategies (i.e., repeated and continuous reading) on the oral reading fluency and comprehension skill deficits of adolescent struggling readers in an alternative high school. The results of the investigation for all participants suggested that the peer-mediated repeated reading (PRR) strategy was most effective in improving oral reading fluency (i.e., WCPM); however, the effects of both strategies on comprehension were mixed.

In conclusion, based on the findings of this preliminary research and that of other investigators, Peer-mediated reading fluency instruction is an efficient method to increase a student’s reading fluency. This study examined the use of PRR and PCR of narrative texts on the reading fluency and comprehension skills of adolescent struggling readers in a high school setting. The results of this study indicate that PRR appears to be the most effective intervention for these students.

**Read 180**

Read 180 is a multimedia program that was designed to meet the specific needs of students whose reading achievement was below grade level. The program combined instruction from the teacher with computer software that tracked student progress and organized instruction to meet the individual needs of each student.

In a study conducted by Vogel (2013), a high school had approximately 80 students in the Read 180 program divided among three teachers. The most experienced teacher of the Read 180 program had six years of experience and was used for purposes of fidelity with Read 180 and for
the trustworthiness of the study. Because of limitations with the school schedule, students received the core 60-minute model in a one-hour class Tuesdays through Fridays, with Mondays offering Read 180 students support in their English classes. The whole group component, which totaled 20 minutes, was implemented on Tuesdays and Thursdays with the three rotations being used for the remainder of class. Wednesdays and Fridays were used for the three Read 180 rotations (computer software, small group instruction, and independent reading). The divided implementation of these components had little effect on the fidelity of the program due to the consistency of implementation with small group and whole group instruction, the utilization of regular rotations four times per week, and reading support being offered to students on the one day Read 180 was not taught.

There was an appropriate amount of Read 180 materials that included R books, L books, and Read 180 library books, and there was a sufficient supply of computers, headphones, novels, and dictionaries for each student in the program. Leadership at the school was supportive of the program as consistent technical assistance was offered, Read 180 support materials were always sufficient, and limited professional training through Scholastic was given once per year. In addition, the consultant from Read 180 was in contact three times per year with the instructor to ensure the program was implemented with fidelity and to offer support with materials, assessment, and best teaching practices.

The cognitive skills developed by READ 180 materials were reviewed in relation to the three components of small and whole group instruction, computer software, and independent reading. The R book, which is the primary tool for small and whole group instruction, was divided into nine units with each unit containing approximately 105 reading and vocabulary
questions for student response. 65% of the questions were on the lower spectrum of Bloom’s Taxonomy. In addition, just two of the analysis questions required explanation and only five evaluation questions had depth in their responses. As a result, only seven percent of all questions in each unit necessitated higher level thought and justification. A review of the READ 180 instructional software data gave no clear indication of overall student progress due to the range of effort, and the varying comprehension and vocabulary scores. For example, the student effort in regard to time demonstrated a wide range from 17 minutes of completed work to 451 minutes. The student with 451 minutes was on a level two program, or fifth grade level, with a mediocre comprehension score and a poor vocabulary score. However, an evaluation of subgroups indicated that males completed higher level tasks with stronger comprehension and vocabulary scores while females put more effort into the completion of READ 180 software. The lowest performers in terms of effort, level of difficulty, comprehension and vocabulary scores were ELL students. (Vogel, 2013).

**Lexia**

Computer-assisted instruction (CAI) was found to be a valuable supplementary aid to support reading acquisition, particularly for struggling students. CAI allowed students to work at their own pace so they could receive sufficient, independent practice that may not have been possible within a traditional classroom setting. Struggling readers in grades 6–12 required an instructional approach that provided fundamental early reading skills development in a manner that was different from traditional practices in the classroom and used tactics that were not seen as elementary. Lexia is an online reading program commonly used in intervention classes as well as general education classes. Lexia was designed to provide teachers with the technology to
target skill deficit areas for struggling readers, while providing the progress monitoring data and resources in order to guide teachers to develop a plan for each student (Ness, Couperus, Willey, 2013).

Ness, Couperus, Willey (2013) found that Lexia Reading helped develop phonological awareness in kindergartners, with the greatest benefits seen in students identified as low performers at pretest. Follow-up studies showed significant gains in word reading for a larger sample of students identified as low performers, and in both phonological awareness and word reading for ELL students. Core5 is a supplementary program from Lexia in which provided systematic instruction through six strands of reading skills: phonological awareness, phonics, structural analysis, automaticity/fluency, vocabulary, and comprehension. The content in Core5 aligned with recommendations from the National Reading Panel (2000) and Common Core Standards (Ness, Couperus, Willey, 2013).

Lexia Strategies was designed for struggling readers in grades six and above. Those students had difficulty with their fundamental literacy skills. Using age-appropriate activities and graphics, the program began with skills at the first-grade level, covering basic phonological awareness through advanced decoding skills, vocabulary development, and comprehension activities. Students worked independently to develop reading skills in a structured, sequential manner while teachers received the data and resources they needed to support intervention and direct instruction (Schechter, Macaruso, Kazakoff, & Brooke, 2015).

**Lexile Measure**

Lexile measure is provided information about either an individual's reading ability or the difficulty of a text, like a book or magazine article. The Lexile measure is shown as a number
with an "L" after it, 880L is 880 Lexile. A student gets his or her Lexile reader measure from a reading test or program. For example, if a student receives an 880L on her end-of-grade reading test, she is an 880 Lexile reader. Higher Lexile measures represent a higher level of reading ability. A Lexile reader measure can range from below 200L for emergent readers to above 1600L for advanced readers. Readers who score below 0L receive a BR for Beginning Reader. In some cases, for readers, a BR code is followed by a number and L (BR150L). A Lexile reader measure of BR150L indicates that the Lexile measure of the reader is 150 units below 0L. The smaller the number following the BR code, the more advanced the reader is. For example, a BR150L reader is more advanced than a BR200L reader (Wilkins, Hartman, Howland, & Sharma, N., 2010).

A book, article, or piece of text gets a Lexile text measure when it is analyzed by MetaMetrics. For example, the first Harry Potter book measures 880L, so it is called an 880 Lexile book. A Lexile text measure is based on the semantic and syntactic elements of a text. Many other factors affect the relationship between a reader and a book, including its content, the age and interests of the reader, and the design of the actual book. The Lexile text measure is a starting point in the book-selection process. Lexile text measures are rounded to the nearest 10L. Unlike the reader measure, all text measures below 0L are currently reported as BR. MetaMetrics has conducted research to differentiate the BR text measures.

The idea behind The Lexile Framework for Reading followed a method of knowing how well a student can read, how difficult a specific book is to comprehend, and then predict how well that student will likely understand the book. For example, if a reader has a Lexile measure of 600L (600 Lexile), the reader will be projected to comprehend approximately 75% of a book
with the same Lexile measure (600L). When the Lexile measures and the Lexile scale were developed, the 75% comprehension rate was set at the point where the difference between the Lexile reader measure and the Lexile text measure is 0L. The 75% comprehension rate is called “targeted” reading. This rate is based on independent reading; if the reader receives help, the comprehension rate will increase. The target reading rate is the point at which a reader will comprehend enough to understand the text, but also will face some reading challenges. At this point, a reader is not bored by text that is too easy, but also does not experience too much difficulty in understanding. When used together, Lexile measures help a reader find books and articles at an appropriate level of difficulty, and determine how well that reader will likely comprehend a text. Lexile measures were also used to monitor a reader's growth in reading ability over time (Wilkins, Hartman, Howland, & Sharma, N., 2010).
CHAPTER 3: Research Methodology

The purpose of this study was to evaluate the effectiveness of the Response to Intervention and Instruction (RTI²) program at a rural high school in Tennessee. Research for this study was quantitative in nature. Existing benchmark scores from universal screeners in the STAR database were used to measure a baseline. Universal screeners were taken three separate times within the school year to benchmark student progress and grade level proficiency in reading. According to the National Center on Response to Intervention (NCRTI, 2010) reliability level of .60 and higher is considered good; .80 is very good. STAR Enterprises has a reliability level of .90. This study was used to discover relationships between the groups in the study. Two groups were included in the study: students who tested at a level which demonstrated deficiency in reading fluency or comprehension, and students who did not demonstrate a deficiency. A statistical analysis was done to compare means for the difference for a pre-test and posttest for each group in the study.

Population and Sample

The participants in the study were 870 students (437, 9th and 433, 10th grade) at a high school in Tennessee. Students were recruited to the study by participating in the universal screener and qualifying with deficit scores for RTI² reading services. The ex post facto data from the 2015 Fall Benchmark was compared to the 2016 Spring Benchmark to examine growth and reading gains by using a t test for a single mean. Benchmark scores were retrieved from STAR Reading Enterprise. The benchmark scores used were the students’ reading Lexile levels.
A difference was calculated between the Lexile scores for each student with comparing the pre-
test and posttest in order to measure growth. STAR was designed for students in grades 1
through 12. The tests measured specific skills as well as overall reading ability. STAR compared
students’ achievement to that of other students across the nation (Table 2), forecasted student
proficiency on state tests, and estimated mastery of state standards and Common Core Standards,
and report on growth over time.

Table 2

*National Norms Table from STAR for grades 9th-10th students*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentile</th>
<th>Fall September</th>
<th>Winter January</th>
<th>Spring May</th>
<th>Moderate Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>10</td>
<td>580</td>
<td>605</td>
<td>630</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>699</td>
<td>727</td>
<td>769</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>773</td>
<td>902</td>
<td>836</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>911</td>
<td>934</td>
<td>963</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>991</td>
<td>1044</td>
<td>1092</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>1295</td>
<td>1295</td>
<td>1312</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>1343</td>
<td>1343</td>
<td>1344</td>
<td>0.1</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>637</td>
<td>637</td>
<td>638</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>777</td>
<td>777</td>
<td>795</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>844</td>
<td>844</td>
<td>860</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>968</td>
<td>974</td>
<td>1001</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>1101</td>
<td>1118</td>
<td>1154</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>1315</td>
<td>1317</td>
<td>1323</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>1344</td>
<td>1344</td>
<td>1344</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

*Note.* Scaled scores for each grade level and time of year change as the year progresses.
Description of Instruments and Procedures

The quantitative research study used district level, archived, collected data. Ex post facto data were collected from the STAR data base to collect pre-test and posttest data. A \( t \) test for a single mean depends on three assumptions about the obtained scores. The first assumption is that scores form an interval or ration scale of measurement. The second assumption is that scores in the populations under study are normally distributed. The third assumption is that score variances for the populations under the study are equal. Statisticians have found \( t \) tests for a single mean provide accurate estimates of statistical significance, even under the conditions of substantial violation of these assumptions (Gall, Gall, & Borg, 2007). A \( t \) test for a single mean was used in this study to compare the mean scores of the two samples to determine whether they were significantly different from each other. This test also demonstrated whether a sample mean differed significantly from the specified population mean (Gall, Gall, & Borg, 2007). The data were collected from the STAR online database from a purchased license through Renaissance. Students participated in the assessment through the RTI\(^2\) program in Tiers 1, 2, or 3 according to the set guidelines. All same students completed the universal screener. Each student in the 9\(^{th}\) and 10\(^{th}\) grade was administered the STAR assessment at least three times per school year.

Data Analysis

The quantitative, non-experimental research method provided the opportunity to analyze archived numerical data from the study participants. Archived data from the two intact groups of high school RTI\(^2\) classrooms from the 2015-2016 school year were used for analysis when addressing the research questions. Fidelity of the program was measured and documented to ensure proper implementation. Using the Statistical Package for the Social Sciences (SPSS) data
analysis computer program and independent samples, $t$ tests for a single mean were used to compare the means of the data sets. A growth measure was established by evaluating the difference of the pre-test and posttest. Visual representation of assessment data in the form of tables assisted in revealing student growth and ease of understanding. Also, using descriptive analytics the population and historical data were summarized to yield useful information.

In order to find if there was a statistically significant improvement for the students with deficiencies, a comparison of pre-test and posttest scores in reading was used. To determine if the pre-test scores for Read 180 and Lexia differed from posttest scores for students with reading deficiencies, a one group pre-test/posttest design was conducted. The pre-test data were compared to posttest data after a thirty-six intervention phase was completed. The mean scores linked to Read 180 and Lexia were compared to the growth of students who were not in intervention to determine the impact of each intervention strategy. A $+/-$ change of differences for each group was recorded from the individual groups of intervention.

One goal for education and struggling students was for academic decisions to be based on research and data; therefore, instructional and curriculum evaluations and changes should be based upon research studies such as this one. In Chapter 4, data related to the research of the RTI² model and the lasting effects of the program for high school students in the chosen school system for the study will be presented.
CHAPTER 4: Analysis of Data

Education cycles in a phase of redevelopment. The reauthorization of the No Child Left Behind (2001) Act, as well as Response to Intervention and Instruction (RTI²) resulted in a more focused effort on continual improvement in educational systems. With these and other initiatives, pressures for improvement, many at the federal government, state, and district levels have looked for a means to begin to transform our educational design; one of the reform efforts examined and recommended has been RTI².

The purpose of this research study was to investigate the effectiveness of a secondary RTI² program. The students in the study all participated in the universal screener test, STAR, in the 2015-2016 school year. The students were given the test at three separate times throughout the school year: fall, winter, and spring. As discussed in Chapter 1, RTI² is a tiered process in which student deficiencies are analyzed and an intervention plan is developed in order to monitor student progress on that deficiency until the student is working at grade level. RTI² works within the context of analyzing the manner in which student progress is monitored and documented, and then changing the outcome of students' success in a systematic way.

This study was conducted as a single-phase, one-year study using quantitative methods to analyze the pre-test and posttest scores of students in the study. Once student scores were collected, an independent $t$ test was used to analyze the means of the data sets. Two separate $t$ tests were run using the SPSS data system. The first test was to compare the means of the test
scores of students in intervention with those of students who were not in intervention. If a student scored below the 25th percentile, according to the RTI² manual, the student was placed in intervention. Once students were placed in an intervention class, there were two different intervention programs in which students may have been grouped. Group A was given the intervention program of Lexia. Group B was given the intervention program of Read 180. Both groups received the same amount of time in the given intervention, fifty-five minutes, five days a week, and were assessed at the same points in the school year. The second t test was to compare the means of the test scores of students in intervention A and intervention B.

This chapter begins with an overview of the analysis of the quantitative data collected from 200 of the 870 students in the study. The overview of the analysis will include the procedures within the analysis and descriptive statistics of the study design. The results of the students’ scores on the pre-test and posttest were collected in a spreadsheet in order to be examined. The data were used to address the following hypothesis questions: (1) was there a significant improvement in students’ reading Lexile scores when comparing students who received intervention and those who did not receive intervention, and (2) given the two interventions of Read 180 and Lexia, did either intervention yield improvement in reading Lexile scores? If so, was either improvement statistically significant during a one-year evaluation of the RTI² implementation process?

Sample

There were 870 9th and 10th grade students enrolled in the secondary school used for the research site. Once the test scores were collected from the STAR Renaissance Database, the researcher used systematic random sampling to ensure a population size was sufficient for the t
test and the population selected was representative of the same. In order to complete the systematic random sampling, every 5th unit was selected from the list of test scores of students in intervention and not in intervention.

After the fall universal screener, the students who scored below the 25th percentile were placed in an intervention class. The students who were not identified for intervention were not pulled for a supplementary class to assist in increasing their reading abilities. The RTI² program at the study site was organized with three reading interventionists who taught six classes of reading intervention each all day. The students placed in intervention were divided into classes of Read 180 or Lexia. The students stayed in intervention for the entire school year.

Data Analysis Procedures

The researcher utilized data collected from the universal screener that were conducted three times throughout the school year: fall, winter, and spring. The fall and spring scores are the actual scores collected and used for the study. The difference between the pre-test and posttest was calculated. This difference was referred to as the growth measure. The STAR test was internet based and was computer adaptive. Each student was assigned a specific login that was connected to the students’ identification number with the state. Each student was given the same first five questions, and according to the results of those questions, the other twenty-nine questions were populated to determine a Lexile score. The STAR Database developed a diagnostic report for each student who participated in the assessment (Figure 1). The report showed a multitude of scores to represent the students’ abilities. For the purposes of this study, the Lexile measure was selected to be analyzed.
Figure 1. Student diagnostic report from STAR reading. This figure was used to show a sample score report from STAR. The score report was used to identify students for Tier levels, as well as beginning points for the intervention progress monitoring level. The Lexile measure from the report was used for this study. The report for this student shows a Lexile measure of 795L. SS= Scaled score; PR= Percentile Rank; GE= Grade Equivalent; IRL= Instructional Reading Level. Adapted from Renaissance Learning, Inc. (2010). Diagnostic Report. Retrieved from www.renlearn.com
The research questions were examined using descriptive statistics including means and standard deviations. The mean provided the central tendency for the area studied, while the standard deviations offered an available definition to explain potential variations for each distribution. The data were analyzed using an independent $t$ test. The standard error of measurement was 95%. This statistical method compared the two groups on one dependent variable, in this case the fact that intervention was given or not. Statistically significant relationships were determined based on an alpha level of $.05$ or less. A $t$ test requires that the researcher follow the assumptions of normality, random sampling, and independence. The independence assumption is based on the way data were collected. The normality assumption concerns the sampling distribution of means. The equal variance assumption addresses variances in the populations (Privitera, 2012).

**Research Question One**

Was there a significant improvement in students’ reading Lexile scores when comparing students who received intervention and those who did not receive intervention? Student scores from both groups were extracted from the STAR Database in order to assess the Lexile scores using the SPSS data analysis tool. The following figures and tables show the results. One hundred students of the 685 students not in intervention, representing 14.5% of the population, were randomly sampled in a systematic way. Every 5th student score was recorded and used in the analysis of the non-intervention population. One hundred students of the 185 students in intervention, representing 54% of the population, were also randomly selected. In the SPSS data system, students in intervention were coded with a one. Students who were not in intervention
were coded with a zero. These details were entered so that the system would know to
differentiate the two groups. Table 3 shows the mean for each group as well as the standard
deviation.

Table 3

Descriptive Analytics for Intervention v No Intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Intervention</td>
<td>100</td>
<td>164.5</td>
<td>1429.14407</td>
<td>142.91441</td>
</tr>
<tr>
<td>Intervention</td>
<td>100</td>
<td>76.6</td>
<td>205.37214</td>
<td>20.53721</td>
</tr>
</tbody>
</table>

*Note.* The mean score for the non-intervention group was 164.5 Lexile. The intervention group mean score was 76.6 Lexile. The table displays how much the higher the non-intervention group was than the intervention group. n= number in the sample; m= mean.

The *t* test reported the mean growth for the students not in intervention was higher than the students who were in intervention. A growth measure was calculated in Excel using a simple subtraction formula. The students’ posttest scores were subtracted by their pre-test scores to get a growth score. The students who were not in intervention grew on average by 164.5 Lexiles. The students in intervention grew 76.6 Lexiles. To answer the research question concerning improvements, the researcher used a growth score as opposed to a raw score for ease of reporting the improvements for each intervention and the non-intervention group. The *n* for the two groups was 100.

Students scoring below the 25th percentile of the STAR Reading Test were placed in an intervention class. Therefore, student scores in the intervention group began at a lower level than the non-intervention group. Using growth scores eliminated the different starting level differences and focused on the change from intervention or not. The independent variable was intervention, Read 180 or Lexia. The dependent variable was the Lexile score. According to the
results from the $t$ test, intervention did not have a significant effect on the dependent variable, Lexile score. Table 4 shows the significance of the difference in the two means.

Table 4

**Independent Samples Test**

<table>
<thead>
<tr>
<th></th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F$</td>
<td>Sig.</td>
</tr>
<tr>
<td>Equal variances</td>
<td>1.530</td>
<td>.218</td>
</tr>
<tr>
<td>assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances</td>
<td>.609</td>
<td></td>
</tr>
<tr>
<td>not assumed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Table 4 shows the significant difference between the intervention and not intervention groups. $F =$ informs if the means between two populations are significant. Sig= significance. $t =$ evidence of a significant difference between population means. df= degrees of freedom.

The difference measure between the two means reports a .218. In order for this measure to be considered significant the value would have to measure .05. The mean difference between the two groups was identical. This statistic supports the claim that the independent variable did not yield a significant difference for the dependent variable. While the results of this study were not statistically significant, the independent variable of intervention did reveal increased Lexile levels of students. Table 5 demonstrates the mean difference between the two groups.
Table 5

*t-test for Equality of Means*

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances</td>
<td>87.90000</td>
<td>144.38250</td>
<td>-196.82480</td>
</tr>
<tr>
<td>not assumed</td>
<td></td>
<td></td>
<td>372.62480</td>
</tr>
<tr>
<td>Equal variances</td>
<td>87.90000</td>
<td>144.38250</td>
<td>-198.44575</td>
</tr>
<tr>
<td>not assumed</td>
<td></td>
<td></td>
<td>374.24575</td>
</tr>
</tbody>
</table>

*Note.* Table 5 shows the standard deviation between the two sample groups.

**Research Question Two**

Given the two interventions of Read 180 and Lexia, did either intervention yield improvement in reading Lexile scores? If so, was either improvement statistically significant?

The research hypothesis stated there was a significant difference between Read 180 or Lexia and improvement in reading Lexile scores. The null hypothesis stated that there was no significant difference between Read 180 and Lexia and improvement in reading Lexile scores.

Using random, systematic sampling, fifty students from the one hundred, representing 50% of the population, students in the Read 180 group were chosen. Every 5\textsuperscript{th} student score was recorded and used in the analysis of the non-intervention population. Fifty students of the eighty-five students in Lexia, representing 59% of the population, were also randomly selected in a systematic way. In the SPSS data system, students in Read 180 were coded with a one. Students who were in Lexia were coded with a two. These details were entered so that the system would differentiate between the two groups. Table 6 shows the mean for each group as well as the standard deviation.
Table 6

Descriptive Analytics for Read 180 v Lexia

<table>
<thead>
<tr>
<th>V</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>47.00</td>
<td>228.460</td>
<td>32.309</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>106.20</td>
<td>176.732</td>
<td>24.994</td>
</tr>
</tbody>
</table>

Note. Table 6 displays the description for the two groups of Read 180 and Lexia. V= variable; n= number in sample.

To examine research two, the selection of the interventions was discussed. The 285 students in intervention were divided into classes for intervention. There were three interventionists who each taught six classes. The Read 180 group was smaller because of the budgeting of licenses (one hundred licenses for Read 180). The first one hundred of the 185 students were chosen to be placed in the Read 180 group. One teacher taught Read 180 for six classes, with ten students per class. The other two interventionists taught two classes of Read 180 and four classes of Lexia each. The Lexia students were divided into the eight Lexia classes, and the mean growth scores for the two groups were compared. The Read 180 group increased, an average of, by forty-seven Lexile points, while the Lexia group increased by 106.2 Lexile points. Table 7 shows the significant difference between the two intervention groups.
Table 7

**Significant difference for Read 180 v Lexia**

<table>
<thead>
<tr>
<th>Levene’s Test of Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>1.558</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-1.449</td>
</tr>
</tbody>
</table>

*Note.* Table 7 examines the significant difference between the interventions of Read 180 and Lexia. F= informs if the means between two populations are significant. Sig= significance. t= evidence of a significant difference between population means. df= degrees of freedom.

The difference measure between the two means reports a .215. In order for this measure to be considered significant the value would measure .05. The mean difference between the two groups was identical. This statistic supports the claim that the independent variable did not yield a significant difference for the dependent variable. This data resulted in acceptance of the null hypothesis. Table 8 demonstrates the mean difference between the two groups.

Table 8

**Mean Difference or Read 180 v Lexia**

<table>
<thead>
<tr>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>.150</td>
<td>-59.200</td>
<td>40.848</td>
<td>-140.262 - 21.862</td>
</tr>
<tr>
<td>.151</td>
<td>-59.200</td>
<td>40.848</td>
<td>-140.326 - 21.926</td>
</tr>
</tbody>
</table>

*Note.* Table 8 displays the difference between the mean of the two groups. There was no significant difference between the two groups.

The interpretation of these data shows that the intervention of Lexia resulted in a higher mean growth than that of Read 180 while implemented within the RTI² model. However, there was not a significant difference between the two groups. Both groups showed improvement, but
the improvement was not significant. The increase in scores was consistent with the research of both programs; with systematic progress monitoring and fidelity of implementation, student reading levels increased.

**Summary**

This chapter began with an overview of the data analysis procedures and description of the demographic characteristics of the 200 students chosen from the 870 students in the study. The students were all given the same computer adaptive test, STAR Reading, three separate times throughout the school year. The main focus of the study was to determine if there was a significant difference in one intervention or the other. There was also an inquiry into whether or not the interventions showed a significant difference for high school aged students.

The data suggested there was no statistical significance between the two interventions. Both interventions yielded a positive growth when evaluating the mean growth scores of the participants. The insights gained by this research study will contribute to the quantitative data in existence regarding the use of intervention for high school aged students to significantly change student Lexile scores. This will assist educational leaders, at the federal, state, and district levels, in making decisions regarding district change and reform models. Chapter 5 will provide an interpretation of the data and conclusions. Findings will be presented in a manner that extends the knowledge base contained within the accompanying literature review. In addition, suggestions for policy, practice, and further research will be discussed.
CHAPTER 5: Conclusions, Implications, and Recommendations

Response to Intervention (RTI), a general education initiative, was created to ensure students were appropriately placed into special education programs for learning disabilities, but only after the regular education teacher addressed these students’ assessed needs (Bender & Shores, 2007). The purpose of this study was to determine the effectiveness of a secondary Response to Intervention and Instruction (RTI²) program at a rural school. Data were collected from the previous school year (2015-2016) to analyze the two groups: intervention and non-intervention. There were 870 students from the school enrolled in the STAR Database who took the universal screener. Renaissance Learning is a company who created a computer adaptive program named STAR Reading, which was purchased by the system to be used for universal screening in all schools. Once the students completed the STAR assessment, percentile rank was used to place the students in intervention or not in intervention. Students scoring below the 25th percentile were placed in intervention. Two interventions were used for the control group, Read 180 and Lexia. The mean growth was compared for students in intervention and not in intervention to identify if there was a significant change in the student’s Lexile measures. A t test was used to measure the significant difference between the intervention group and non-intervention group. Another t test was used to compare the two interventions of Read 180 and Lexia. A summary of conclusions, implications, and recommendations for future research is presented in this chapter.

High school students who found reading to be a difficult task at school struggle with
different areas in academics. To place a focus on improving reading skills can be challenging at the high school level. Reading is a fundamental building block students must possess in order to be successful in school. Age appropriate resources and research for the secondary level is limited when concerning RTI² and reading interventions. The study focused on the implementation of a reading class to improve at-risk students’ reading through the RTI² process. According to the American College Testing (ACT) Program’s College Readiness, 78% of high school graduates did not meet the readiness benchmark levels for one or more entry-level college course in mathematics, science, reading, and/or English (Price, 2012). Following progress monitoring guidelines from the RTI² handbook provides direction in identifying a skill and measuring that skill specifically to determine growth or to identify a significant deficit, which could suggest testing for special education services may be needed.

A Lexile measure was the focus of the study when comparing growth. Both percentiles and grade levels were reported; however, the researcher selected Lexile as the main identifier for the t tests in Chapter 4. A Lexile measure provided information about either an individual's reading ability or the difficulty of a text, like a book or magazine article. The Lexile measure is shown as a number with an "L" after it, 670L is 670 Lexile. A student gains his or her Lexile reader measure from a reading test or program. STAR reading, the universal screener, reported the Lexile measure for each participant in the study.

A Lexile reader measure can range from below 200L for emergent readers to above 1600L for advanced readers. Readers who score below 0L receive a BR for Beginning Reader. A Lexile reader measure of BR150L indicates that the Lexile measure of the reader is 150 units below 0L. The smaller the number following the BR code, the more advanced the
reader is. For example, a BR150L reader is more advanced than a BR200L reader (Wilkins, Hartman, Howland, & Sharma, N., 2010).

The Lexile Framework for Reading followed a method of knowing how well a student can read, how difficult a specific book is to comprehend, and then predict how well that student will likely understand the book. For example, if a reader has a Lexile measure of 400L (400 Lexile), the reader will be projected to comprehend approximately 75% of a book with the same Lexile measure (400L). When the Lexile measures and the Lexile scale were developed, the 75% comprehension rate was set at the point where the difference between the Lexile reader measure and the Lexile text measure is 0L. The 75% comprehension rate is called “targeted” reading. This rate is based on independent reading; if the reader receives assistance, the comprehension rate will increase. The target reading rate is the point at which a reader will comprehend enough to understand the text, but also will face some reading challenges. At this point, a reader is not challenged by text that is too easy, but also does not experience too much difficulty in understanding. When used together, Lexile measures help a reader find books and articles at an appropriate level of difficulty, and determine how well that reader will likely comprehend a text. Lexile measures were also used to monitor a reader's growth in reading ability over time (Wilkins, Hartman, Howland, & Sharma, N., 2010).

**RTI² Program**

This study investigated a particular RTI² program at the only high school in a rural county in Tennessee. Gaining an understanding of actual practices may assist in making further improvements to the RTI² model to facilitate success for struggling students and students with learning disabilities in all academic areas. The program placed an emphasis on progress
monitoring and research based materials used in the intervention classrooms. During the Fall of 2015, English I and II teachers were given a schedule by the coordinator to require all classes to go to the computer lab for universal screening testing during the assigned time for each class. Each class was given the same amount of time to take the test, and in the event of an absence, the student could make the test up at a later date. STAR Reading is the benchmark test all schools in this school system use for screening to determine which students may need intervention services. There were three reading intervention teachers at the research site. Two of the interventionists have special education backgrounds, while the other teacher had experience teaching high school English. The 2015-2016 school year was the pilot year for the RTI² program. Once students were placed in intervention services, they were enrolled in an intervention class for two semesters in order to receive one full credit towards graduation. The program was fully implemented during the 2015-2016 school year, with fidelity monitoring data points collected three times during the school year. Information from the study will help guide decisions for future placement in the intervention classes for the following school year and help educators make informed decisions about resources available for intervention at the high school level. In addition, information from this study will help guide educators and school districts to properly identify students with learning disabilities and those students in need for interventions to support their deficit areas.

**Study**

This was a quantitative research study using ex post facto data. Existing benchmark scores (Lexiles) from the universal screener in the STAR database were used to establish a baseline. The archived data results were used to examine the relationships of the independent
and dependent variables in this research study. The independent variable was reading intervention which was then analyzed deeper in two groups of specific reading intervention: Read 180 and Lexia. The dependent variables were the measured Lexile scores. The research questions provided the structure for the conducted study.

A universal screener was taken three separate times within the school year to benchmark student progress and grade level proficiency in reading. The fall and spring benchmark scores were used to measure the change in each student’s Lexile measure and compare the scores over the course of a school year. This study was used to discover relationships between the groups in the study. Two groups were included in the study: students who tested at a level which demonstrated deficiency in reading fluency or comprehension, and students who did not demonstrate a deficiency. A statistical analysis was completed to compare means for the difference of a pre-test and posttest for each group in the study.

Conclusions

In order to connect the theoretical framework to the methodology, attention must be directed to the findings of Piaget, Dewey, and Vygotsky and their contributions to the Constructivist Theory. The Constructivist Theory states instruction should meet the individual needs of students and learning happens by doing. Benjamin (2002) and Tomilson and Edision (2003) also believed a differentiated approach to education where the teacher is the facilitator maximizes the learning potential of students. This theory was used to drive decisions in the following areas: What money is spent on intervention? Did Read 180 and Lexia differentiate to maximize learning? Do tiers of RTI² base learning on individual needs of students? How does all this tie into meeting the needs of students? The research in this study addresses these questions
by backing the claims that small group instruction and using best practices that are rich in research are effective in making gains with students. Being purposeful and intentional with instruction does make a difference in reaching struggling students.

These data were used to address the following questions: (1) was there a significant improvement in students’ reading Lexile scores when comparing students who received intervention and those who did not receive intervention, and (2) given the two interventions of Read 180 and Lexia, did either intervention yield improvement in reading Lexile scores? If so, was either improvement statistically significant during a one-year evaluation of the RTI² implementation process? Each research question is listed below accompanied by a summary of the findings and conclusions associated with each analysis.

**Research Question One.**

Was there a significant improvement in students’ reading Lexile scores when comparing students who received intervention and those who did not receive intervention? Student scores from both groups were extracted from the STAR Database in order to assess the Lexile scores using the SPSS data analysis tool. The t test reported the mean growth for the students who were not in intervention was higher than the students who were in intervention. The scores of the students who were not in intervention grew an average of 64.5 Lexiles. The scores of the students in intervention grew by 76.6 Lexiles. To answer the research question concerning improvements, the researcher used a growth score, as opposed to a raw score, for ease of reporting the improvements for each of the two groups. The n for each of the two groups was 50 per group. Using the scores of 100 students, there was not a statistically significant difference between the students not in intervention and the scores of the students in intervention. These
finding indicate students in intervention did not make significant gains in the program because the difference between the mean observed scores was minimal.

**Conclusions for Question One.**

Although there was not a significant growth for students in intervention when compared to those not in intervention, there was a growth in Lexile scores for both groups. Students scoring below the 25th percentile of the STAR Reading test were placed in an intervention class. When comparing the two groups, there was a difference in the beginning Lexiles before intervention was applied. The students below the 25th percentile began with a Lexile measure of 80L on average. The students above the 25th percentile began with a Lexile measure of 165L on average. The use of random, systematic sampling assisted in creating a sample representative of the total 870 students who took the universal screener.

Results of these analyses support Yurick, Robinson, Cartledge, Lo, & Evans’s (2006) idea that repeated reading and peer-mediated instruction on reading fluency and comprehension skills for a variety of students at different levels would show improvement if completed with fidelity. While statistically significant student growth is not immediate, students are increasing their observed Lexile scores as RTI² process becomes more refined and teachers adjust the plan to meet student needs. While the mean observed score of the students not in intervention is higher than the mean observed score of the students in intervention, the analysis revealed that there is not a statistically significant difference between the Lexile scores of the two groups. This indicates there may need to be more research on interventions used at this school as the intervention group is not improving at a significant rate. In order to evaluate the intervention group at a deeper level, a second research question was stated.
Research Question Two.

Given the two interventions of Read 180 and Lexia, did either intervention yield improvement in reading Lexile scores? If so, was either improvement statistically significant? The research hypothesis stated there was a significant difference between Read 180 or Lexia and improvement in reading Lexile scores. The null hypothesis stated that there was no significant difference between Read 180 and Lexia and improvement in reading Lexile scores. A t test was conducted to compare the growth scores of Read 180 and Lexia. The analysis revealed a statistically significant difference did not exist between the two interventions. Therefore, the null hypothesis was accepted. The observed scores of students receiving Read 180 were lower than the scores of students receiving Lexia. This indicates students receiving Read 180 did not grow as much as Lexia. As with the t test to compare the intervention and non-intervention groups, in the absence of a statistical difference, there was still growth. Neither intervention is producing results at the level administration would prefer for the financial investment in the two reading intervention programs.

Conclusions for Question Two.

Using the STAR reading assessment, students receiving Read 180 reported lower observed scores than the students in the Lexia group. Therefore, no significant positive effect is associated with either intervention of the increase of students’ Lexile scores. There was an increase in Lexile measures in both groups. This is evidenced showing the difference as not negative. Growth was noted to be higher using Lexia as the intervention.

Concluding Statements

A variety of strategies have been discussed to increase a student’s fluency and reading
comprehension skills. Little research exists to support or negate the strategies and resources available for high school aged students. This study sought to determine the effectiveness of the RTI² program at the study school. Universal screener data were analyzed using $t$ tests. Results indicated an increase in Lexile scores for all students throughout the school year; however, no statistically significant positive effects were associated with the scores of students receiving intervention. This research topic can be expanded by incorporating surrounding high schools in other counties and including a larger number of school districts. This would result in a larger samples size and may change the findings from this study.

Teachers begin the RTI² process with a focus on identifying academic interventions within the core curriculum to assist students in being successful. The ultimate goal of any high school intervention program is to provide the students with the skills they are lacking in order to ensure the students graduate with the proper skill set to lead successful, productive lives. Investigating the program in the first year of implementation provided several insights to allow administration to make more informed decisions about the following year; these included other intervention resources and materials that should be considered in order to have statistical differences in growth. Researching additional resources and materials could be found to be more effective than current resources. Further professional development in intervention at the high school level may also assist the interventionists in being more effective in the classroom. By providing more professional learning opportunities to educators on skill based learning, educators will be more cognizant of the students in their classroom and how to assist them in deficient areas.
Recommendations

It is the recommendation of the researcher to redesign the intervention groups the following year. Students with disabilities should be placed in a class taught by interventionists with special education backgrounds. By placing students with disabilities in specific classes, a service would be developed for student Individualized Education Plans (IEP). Students without disabilities should be enrolled in an intervention class with the general education teacher. RTI² is not a level of special education; special education is a more intense intervention (Bender, 2008). If students are not successful in intervention and do not make the necessary gains, then students should be referred for an evaluation for eligibility of special education. Teachers trained in special education would then work with the student in a smaller setting if the student qualified for those services.

School district leadership is important to the successful advancement and fulfillment of the RTI² process in schools. Administrators are the crucial contact between instructional policies and the operative changes in schools (Malone, Mark, Miller, & Kekahio, 2014). Based on the data and findings of the study, recommendations for professional development and Tier 1 instruction have been noted. The recommendations are as follows: professional development opportunities for all teachers and administrators involved in the RTI² process should first include simplifying the understanding of the data collection processes, the necessary data sources, and the data analysis that are necessary to meet the needs of struggling students. Teachers and administrators gather, review, discuss, and attempt to make decisions based upon all the data obtained on identified students, but they are often unclear on the appropriate steps to follow in the process (Price, 2012). Further investigation should be made into the financial investments in
the programs purchased by the high school to determine the effectiveness of improving academic gains. As far as the RTI² program is concerned, interventionists need more professional development in the researched-based RTI² programs, and the administration should invest funds in other resources for the program. Research drives change, especially in education.

Professional development in reaching struggling high school aged students is needed. Elementary interventionists view and teach reading in fundamental building blocks. Teachers trained to teach older students and more complex standards would benefit from more training in teaching basic reading. Elementary teachers are trained to address skills as opposed to high school teachers who are more concentrated on standards (Schechter, Macaruso, Kazakoff, & Brooke, 2015). Computer programs and curriculums are beneficial when used with fidelity and used as supplemental materials, but research supports one on one instruction at all levels to improve reading deficits. Although results demonstrated no differences between the groups of interventions, results chosen represented the average growth of both groups. There are students in the sample group and those not chosen in the sample group that showed great increases in Lexile scores. Therefore, it is suggested that this data represents a lack of a full report of the gains students made with each intervention.

Additional recommendations based upon the results of the research study include providing the teachers who apply interventions related to the three tiers of the RTI² process with professional developmental training in the areas of differentiation and scaffolding instruction. Remediation, intervention, and strategies to address the needs of struggling students require teaching methods to be specialized and intensive to pinpoint the skills in which students are deficient. Closing the achievement gap between subgroups is the purpose behind providing
remedial instruction. Future research based upon the results derived from this study could include providing additional professional development opportunities. Training in the academic interventions and designing individualized intervention plans would be beneficial training opportunities.
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