The Reading Intervention Program Making Connections Intervention and Tennessee Comprehensive Assessment Program Scores in One East Tennessee School District

Jami H. Corwin
East Tennessee State University

Follow this and additional works at: https://dc.etsu.edu/etd

Part of the Educational Leadership Commons, Junior High, Intermediate, Middle School Education and Teaching Commons, Secondary Education and Teaching Commons, and the Special Education and Teaching Commons

Recommended Citation

This Dissertation - Open Access is brought to you for free and open access by the Student Works at Digital Commons @ East Tennessee State University. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of Digital Commons @ East Tennessee State University. For more information, please contact digilib@etsu.edu.
The Reading Intervention Program *Making Connections Intervention* and *Tennessee Comprehensive Assessment Program* Scores in One East Tennessee School District

A dissertation presented to the faculty of the Department of Educational Leadership East Tennessee State University

In partial fulfillment of the requirements for the degree Doctor of Education in Educational Leadership

by

Jami H. Corwin

August 2016

Dr. Virginia Foley, Chair
Dr. John Boyd
Dr. Don Good
Dr. Karin Keith

Keywords: Response to Intervention, RTI, Literacy, Progress Monitoring, Fidelity Monitoring
ABSTRACT

The Reading Intervention Program *Making Connections Intervention* and *Tennessee Comprehensive Assessment Program* Scores in One East Tennessee School District

by

Jami H. Corwin

The purpose of this quantitative study was to examine the relationship between the reading intervention program *Making Connections Intervention* (MCI) and pre-intervention and post-intervention Tennessee Comprehensive Assessment Program (TCAP) reading scaled scores in one East Tennessee school district. Participants included 99 Tennessee students in grade levels six through nine who received reading intervention instruction through MCI and were frequently monitored following the requirements stipulated in the Tennessee Response to Instruction and Intervention (RTI^2) Framework. This study assessed pre- and post-intervention data specific to gender, special education classification, Title I classification, and instructor classification through a series of *t*-tests. Findings indicated that although there were no significant differences in TCAP reading scaled scores for the grouping variables of gender, Title I classification, special education classification, and instructor classification, students’ TCAP reading scaled scores were significantly higher after participating in *Making Connections Intervention*. 
DEDICATION

Without the love and support of my family, this endeavor would have never come to fruition. I am so thankful for the village that raised me during this experience.

To my biggest fan Charles, I am so blessed to have you beside me in this thing called life. Your eternal patience is my fuel - I am so thankful that you are ready and willing to join me on every journey along the way. Our projects have been waiting, so let’s get back to work.

To my precious children, I hope that for each time you had to “wait a few more minutes” you gained a sense of what it means to be persistent, to endure, and to dive in and make it happen. There will be times in your life that the climb seems impossible. Just remember that there is no need to look any further than what surrounds you: your family. I believe that it’s time to catch up on some fun.

To my mother, I feel so fortunate to be “yours.” You instilled in me a true love of learning. You encouraged me to set my goals higher than anyone expected. You never seemed surprised that I was able to accomplish what I sat out to do. Simply said, thank you for where I am today.

To my father, I only wish you were here to share this special time in my life, but I know you are smiling down upon me and bursting with pride. I made it Dad!
ACKNOWLEDGEMENTS

I would like to express my sincerest appreciation to all those that have supported me during this process, especially during the times that I surely thought I’d never really make it.

Dr. Virginia Foley, words cannot express my gratitude, particularly for your incessant confidence in my abilities, your ceaseless persistence, and of course your no-nonsense guidance. Although I greatly thank you for your time and dedication as my committee chair, I am most thankful for the insurmountable knowledge that you’ve been so kind to share with me over the past few years; I view our profession through a much more grounded lens than I ever did before. I value your opinions, I appreciate your support and guidance, and I feel fortunate to call you both colleague and friend.

Dr. Don Good, as a self-professed math-challenged individual, I must say that your undying patience and guidance have been so appreciated. From the days of asking too many questions in Educational Statistics to running my own dissertation data, you gave me the confidence to battle the numbers and come out winning.

Dr. John Boyd, it’s not often that I meet someone that can challenge my gift-of-gab, but it was through our many conversations that I met a mentor and made a friend. You are likely unaware of how often your words of wisdom have shaped my perspective – thank you for sharing in the most humble of ways.

Dr. Karin Keith, beyond your time and dedication to my dissertation process, I greatly appreciate you offering up such expertise in the area of literacy. I feel so privileged to have had your vast knowledge as a guidepost and plan to continue to lean on you in the years to come.

Dr. Kyle Loudermilk, your undying persistence, paired with your many humorous attempts at encouragement, kept me writing and smiling - particularly when the numbers made me manic.

Dr. Lesley Fleenor, I truly believe that dissertations go smoother with a healthy dose of friendship - what a blessing you are to me in more ways than I can count.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ABSTRACT</th>
<th>DEDICATION</th>
<th>LIST OF FIGURES</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

Chapter

1. INTRODUCTION | 9
   - Statement of the Problem | 12
   - Research Questions | 12
   - Significance of the Study | 13
   - Definition of Terms | 14
   - Delimitations and Limitations | 17
   - Overview of the Study | 17

2. REVIEW OF THE LITERATURE | 18
   - History of Response to Intervention | 18
   - Models of RTI | 24
      - Student Identification for RTI | 32
      - Fidelity Monitoring | 35
      - Tennessee Model RTI \(^2\) | 39
   - The Role of Technology in RTI | 44
   - The Role of Paraprofessionals in RTI | 58
   - Making Connections Intervention | 63
   - Chapter Summary | 66

3. RESEARCH METHOD | 67
   - Research Questions and Null Hypothesis | 67
   - Population | 68
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Reading scaled scores on the TCAP assessment before and after implementation</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>of the intervention program <em>Making Connections Intervention</em></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Reading scaled scores for male and female students on the 2015 TCAP</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>assessment</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Reading scaled scores for Title I and non-Title I students on the 2015</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>TCAP assessment</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Reading scaled scores for special education and nonspecial education students</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>on the 2015 TCAP assessment</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>2015 TCAP reading scaled scores for students instructed by a licensed</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>teacher and student instructed by a paraprofessional in the intervention</td>
<td></td>
</tr>
<tr>
<td></td>
<td>program <em>Making Connections Intervention</em></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

The 2015 NAEP, commonly referred to as The Nation’s Report Card, reported that, “the overall average reading score of eighth-grade students in 2015 declined in comparison to the previous assessment in 2013” (NAEP, 2015, Reading-National Average Scores section, para. 1). Moreover, because of legislation such as the No Child Left Behind Act (U.S. Department of Education, 2002) and the 2015 reauthorization of the Elementary and Secondary Education Act (ESEA), educators report feeling the pressure to pursue the most effective reading instruction available. Research has helped educators realize that reading instruction is not one-size-fits-all and has led to the development of programs, initiatives, and frameworks to address the wide spectrum of needs concerning struggling readers, or reading remediation. A prevalent, current framework used across the United States is called Response to Intervention (RTI). The three-tiered structure of intervention, based on screening and progress monitoring procedures, focuses on providing intervention to students that score low on nationally normed assessments and suggests beneficial outcomes for early identification of academic deficits and subsequent intervention for students in the early grades (Denton, Fletcher, Anthony, & Francis, 2006). Traditionally, reading intervention has been emphasized in the elementary grades, specifically the lower grades of kindergarten, first, and second; however, new studies indicate a strong need for continued reading interventions well-beyond third grade for students with reading difficulties, particularly those with the most severe reading deficiencies (Solis et al., 2011). With an increase in student accountability measures paired with the pressure of meeting the demands of increasingly complex text and rigorous outcome assessments, secondary students are finding
reading difficulties harder and harder to overcome. Without effective instruction, the future for secondary students with reading difficulties looks grim (Edmonds et al. 2009).

Much debate is now surrounding the methods of reading intervention for below grade-level struggling students leading educators to investigate effective modifications when implementing intervention beyond elementary school (Solis, Miciak, Vaughn, & Fletcher, 2014). Many educators assume that reading intervention practices with demonstrated efficacy in early grades are equally as effective when used with older struggling readers (Edmonds et al. 2009). When taught isolated from comprehension, the long-term efficacy of phonics-based intervention in upper grades is surrounded by conflicting findings. Furthermore, the demand for navigating more complex text has increased and requires students to be able to use more sophisticated comprehension strategies. In response, educators are now seeking programs that offer a mixed approach which includes both decoding and comprehension components paired with nationally normed outcome measures (Suggate, 2014). Moreover, many general education teachers are becoming increasingly aware of the need to provide reading interventions to struggling readers as a means of increasing their understanding of the content area text. A large portion of science and social studies texts are written above grade level and prove to be a challenge for even the best of grade-level readers suggesting that struggling readers find these texts almost impossible to adequately comprehend. Studies propose that the intensive intervention required for these students becomes a school-wide practice which occurs across the curriculum. In addition, explicit interventions for students with reading deficits in secondary grades should include texts that build background knowledge and understanding of content as found in science and social studies (Solis et al., 2014). In essence, this can only be accomplished when school-wide
practices that increase outcomes for all students, including those with reading deficits, are developed and implemented (Bryant et al., 2000).

As the need for supplementary reading instruction increases so has the need for additional support in personnel. Many reading intervention programs and frameworks make specific suggestions as to instructor-student ratios which often determines the intensity of the intervention students receive. This is putting pressure on schools to reorganize personnel to accommodate the newly added need for intervention services. In many cases, those that have traditionally held paraprofessional positions are being asked to teach struggling readers. According to Suggate (2014) little research exists concerning the efficacy of upper grades reading intervention programs taught by paraprofessionals, however, studies reveal that effective implementation of interventions in general depends on both the content and the administrator of the content. The problem now lies in attracting and retaining paraprofessionals to embrace this new and challenging role, minimizing their conventional roles as instructional and clerical support. Studies point to a few critical keys to success when strategically staffing for intervention. These include matching expectations of teachers and administrators with those of the paraprofessional, respect and shared responsibility from teachers and administrators, as well as explicit ongoing training and support (Giangreco, Edelman, & Broer, 2001).

According to Edmonds et al. (2009), “The ultimate goal of reading instruction at the secondary level is comprehension – gaining meaning from text” (p. 263) and with only 34% of eighth grade students at or above proficiency levels (National Assessment of Educational Progress, 2015), the research sends a compelling message about the need to effectively support struggling readers in upper grades.
Statement of the Problem

Many students throughout the years have been forced to endure the “waiting to fail” model: struggling from grade to grade before eventually being referred for special education services. Brown-Chidsey and Steege (2011) noted that the most unfortunate aspect of this model is that by the time that a waiting to fail student meets special education eligibility requirements, the most optimal years of learning to read may be long gone. The eventual outcome for such a student may look very different with systematic, responsive intervention paired with a framework of built-in, data-driven decision stages (Kavale, Kauffman, Bachmeier, & LeFever, 2008; Wright, 2007). Questions remain for those students that fall somewhere in-between, not qualifying for special education but still struggling with grade-level instruction. For many schools, the search for effective intervention programs and practices continues to focus on this group of students which now stretches beyond the once thought of “fix” in the primary grade levels of Kindergarten through second grade. A response to intervention (RTI) is becoming increasingly evident as an upper grades’ need (Edmonds et al., 2009; Solis et al., 2014), therefore, the purpose of this study is to examine the relationship between the reading intervention program *Making Connections Intervention* and pre-intervention and post-intervention TCAP scores in grade levels six through nine in one East Tennessee school district.

Research Questions

The following research questions guided this study:

RQ1 - Is there a significant difference between students’ TCAP reading scaled scores before and after implementation of *Making Connections Intervention*?

RQ2 - Is there a significant difference between TCAP reading scaled scores of male and female students who participated in *Making Connections Intervention*?
RQ3 - Is there a significant difference between TCAP reading scaled scores of Title I and non-Title I students who participated in Making Connections Intervention?

RQ4 - Is there a significant difference between TCAP reading scaled scores of special education and non-special education students who participated in Making Connections Intervention?

RQ5 - Is there a significant difference between TCAP reading scaled scores of students taught by a certified teacher and students taught by a paraprofessional that participated in Making Connections Intervention?

**Significance of the Study**

According to a 2015 study conducted by the U.S. Department of Education and the National Institute of Literacy, 32 million adults in the U.S., or 14% of the population, cannot read, and 21% of adults in the U.S. read below a 5th grade level. Moreover, close to 20% of high school students cannot read when they graduate (Fast Facts, 2015). Research suggested literacy intervention positively impacts student success and postsecondary outcomes (Bryant et al., 2000; Denton et al., 2006; Edmonds et al., 2009; Fuchs, Compton, Fuchs, Bryant, & Davis, 2008), therefore, this study can add to the literature that supports the need for systematic and explicit reading intervention, even for struggling students in the upper grades of middle and high school. Although a substantial amount of research exists pertaining to the positive impacts of reading intervention, very little focuses on specific, currently-available intervention programs (Fuchs & Fuchs, 2006; Fuchs & Fuchs, 2007; Shinn, 2010). The researcher investigated the program Making Connections® Intervention, a widely used intervention program developed by Educational Publishing Services. The need for such specific research is increasing due to both
district and state-led intervention mandates, thus, educators are more actively seeking research to aid their decision-making concerning the purchase of quality, effective intervention programs. In response to an insignificant amount of literature regarding the certification levels of those delivering tiered intervention support to students, one primary focus of this study will be to investigate the scores of students taught by licensed teachers versus those taught by paraprofessionals. Subgroups gender, special education classification, and Title I classification are also included to further investigate the effects of the intervention program.

**Definitions of Terms**

The following operational definitions were used for the purpose of this research:

1. *At-risk* – a term used to define students that are not progressing at the same rate as their grade-level peers. These students typically require more intensive instruction to close their gaps in skill acquisition (Buffman, Mattos, & Weber, 2010).

2. *Curriculum-based measure* – a measurement that employs direct observation and the recording of student performance in the local curriculum as a basis for gathering data to inform instructional decisions (Deno et al., 2009).

3. *Fidelity* – the accurate and consistent facilitation or delivery of instruction per developers intended design or prescribed specifications. Also called *treatment integrity* (Bianco, 2010).

4. *IQ Achievement Discrepancy Model* – a model traditionally used to identify learning disabled students by assessing whether there is a significant difference between a child’s score on a test of general intelligence and scores obtained on an achievement test (Brown-Chidsey & Steege, 2010).
5. *Individuals with Disabilities Education Act* – Federal law mandating that every student with a disability receive a Free Appropriate Public Education (FAPE) in the Least Restrictive Environment (LRE) with related and supplementary aids and services (Wright, 2007). The act was reauthorized in 1997 and 2004.

6. *Interventions* – modifications, accommodations, differentiated instruction, or the use of alternate materials to address at-risk academic deficit areas (Tennessee Department of Education, 2015a).

7. *No Child Left Behind Act* – A landmark act in education reform built on four pillars: accountability for results, scientifically-based research to inform instruction, expanded parental options, and expanded local flexibility and control. The No Child Left Behind Act of 2001 (NCLB), a reauthorization of the *Elementary and Secondary Education Act* (ESEA), endorsed the theories of standards-based education reform with the belief that student academic outcomes would improve by setting high academic standards and establishing measurable goals. NCLB 2001 required states to develop basic skills assessments to be given to all students at certain grade levels. In 2015, the NCLB Act was replaced by a reauthorization of ESEA, now called the *Every Student Succeeds Act* (ESSA) and commits to building upon key areas of progress to ensure an equal educational opportunity for all students (U.S. Department of Education, 2015).

8. *Paraprofessionals* – “an individual who works in a school in an instructional capacity alongside school professionals and is supervised by the certified or licensed professionals who hold ultimate responsibility for the student and programmatic outcomes” (French, 1999, p. 65)
9. *Response to Intervention* – A systematic and data-based method of identifying, defining, and resolving students academic or behavior difficulties through a tiered approach of services at increasing levels of intensity, specifically investigating and responding to the cause-effect relationship between a prescribed intervention and the student’s response to such intervention (Brown-Chidsey & Steege, 2010; Wright, 2007).

10. *Specific Learning Disability* – “A disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include a learning problem that is primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage” (IDEA, 2004, §602.30).

11. *Technology-based solutions* – educational technology tools designed to provide quality instruction, engage and motivate students, as well as assist schools in the management of instructional time (Smith & Okolo, 2010).
Limitations and Delimitations

The limitations of this study include:

1. the personnel that delivered the intervention instruction,
2. and the total amount of hours a student received intervention between pre- and post-
   Tennessee Comprehensive Assessment Program (TCAP) scores.

The delimitations of this research study potentially affecting the generalizability of the study to
other school systems include:

1. the study’s identified population was from one school in one East Tennessee school
   district, therefore, the results of this study may not be generalized beyond the population,
2. and the researcher only studied the impact of one intervention program, Making
   Connections Intervention (MCI).

Overview of the Study

This study is organized into five chapters. Chapter 1 contains an introduction to the
study, significance of the study, statement of the problem, research questions, definitions of
terms, limitations and delimitations, and an overview of the study. Chapter 2 provides a review
of relevant literature. Chapter 3 is an explanation of the methodology used to conduct the study.
Chapter 4 details the findings of the data analyses. Chapter 5 is comprised of the summary of
findings, conclusions, and recommendations for further research in response to this study.
CHAPTER 2
REVIEW OF THE LITERATURE

This review centers on the role of RTI as a multi-tiered system of support for struggling students, including students that have been identified as having a specific learning disability. The Tennessee Department of Education’s RTI² Framework is central to this study and is included in this review. The reviewed literature also focuses on the challenges schools face regarding RTI in the area of reading instruction, specifically the integration of technology as a delivery method and the use of paraprofessionals as literacy-based support personnel.

*History of Response to Intervention*

In 1965 President Lyndon B. Johnson signed into law The Elementary and Secondary Education Act (ESEA) as a part of his War on Poverty. He believed that a “full educational opportunity” should be our “first national goal” (Johnson, 1965, To Congress section). The civil rights law provided federal grants to states to help them increase the quality of elementary and secondary education. One avenue was via the Title I program: a provision of the ESEA which distributed funding to schools and districts with a high percentage of students coming from low-income backgrounds, and bolstered one of ESEA’s main focuses of closing the skill gap in reading, writing and mathematics between students from low-income households who attend schools in urban or rural settings and students from the middle-class who attend school in suburban settings (Farkas, Hall, Finn, Carmine, & Meeder, 2000).

In 1975, Congress identified a need to provide a separate federal law that would ensure schools met the educational needs of students with disabilities. The law would mandate all
districts provide information concerning the identification of students with school-related
disabilities (Kavale et al., 2008). The law was titled Education for All Handicapped Children
Act, and since its passing over 40 years ago several updates have occurred, including a new title
in 1990: The Individuals with Disabilities Education Act (IDEA).

The most recent version of IDEA was passed by Congress in 2004 and provides guidance
for schools wishing to meet individual student needs in addition to a new alternative for states to
determine learning disability (LD) status. The United States Office of Education provided the
following definition for a specific learning disability:

The term “specific learning disability” means a disorder in one or more of the
psychological processes involved in understanding or in using language, spoken or
written, which may manifest itself in an imperfect ability to listen, speak, read, write,
spell, or to do mathematical calculations. The term includes such conditions as perceptual
handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia.
The term does not include children who have learning disabilities which are primarily the
result of visual, hearing, or motor handicaps, or mental retardation, or emotional
disturbance, or of environmental, cultural, or economic disadvantage. (p. G1082)

IDEA also aids in the prevention of the misidentification and over-identification of
students with a specific learning disability (SLD) by defining additional supports such as
scientifically-based prereferral and early intervention services, paired with systematic
frameworks of screening assessments and monitoring of student progress. States are now
afforded the opportunity to determine the presence of a SLD by measuring a student’s response
to scientific, research-based interventions as part of the evaluation process (Palenchar & Boyer,
2008). This is referred to as Response to Intervention, or RTI, and is both born out of the
problem-solving frameworks of IDEA and tied to the 2001 landmark education reform titled No
Child Left Behind (NCLB), an updated version of the 1965 ESEA.

As the “cornerstone” of President George W. Bush’s Administration, NCLB set a goal
for 100% of the nation’s students to reach proficiency levels in both reading and math by the
year 2014. This would be achieved by requiring states to hold schools and districts accountable for the progress of every child toward the goal of proficiency on state assessments; this was called adequate yearly progress (AYP). Schools that missed AYP for a subgroup for 2 or more consecutive years were targeted for improvement. NCLB made efforts to support struggling schools by encouraging states to utilize its programs, services offered by IDEA, or a combination of both. Although local education agencies (LEAs) now had more flexibility as to the use of their federal funding, NCLB placed a specific emphasis on programs and practices that demonstrated effectiveness through rigorous, scientific research for LD students as well as non-LD students that struggled in the general education classroom (Cortiella, 2006; Taylor, Le Floch, Naftel, O’Day, & Stecher, 2010). This emphasis championed the launch of the Reading First program which aided in the development of research based reading programs at the district and school levels.

Considered to be the “most critical educational priority facing the country,” the U.S. Department of Education (2004) stated, “The purpose of Reading First is to ensure that all children in America learn to read well by the end of third grade” (p. 1). Under NCLB, states received over six billion dollars in Reading First formula grants which were awarded according to the following criteria: a state’s proportion of students age 5 to 17 that lived below the state’s identified poverty line, evidence in the proposal of an intent to implement a successful program to raise student achievement, as well as proof of a scientific foundation for the chosen reading program or programs (U.S. Department of Education, 2009). At the request of Congress, the program of choice had to contain an adequate amount of content in the five essential reading components highlighted by the work of National Reading Panel in 1997: phonemic awareness, phonics, fluency, vocabulary, and comprehension (National Reading Panel & International
One main focus of Reading First was to increase teacher professional development towards a deep conceptual knowledge of research-based instructional routines and adaptive strategies to meet the instructional needs of struggling readers. This was to be achieved through training and support in explicit, systematic procedures such as direct teacher modeling, scaffolding of content, guided practice, corrective feedback, cumulative review, and monitoring; reaching more than 100,000 teachers by the year 2008. Another main focus was to assist states and districts in the selection and development of valid and reliable formative assessments to measure and monitor the progress of student learning (U.S. Department of Education, 2004). These assessments were meant to provide immediate feedback to inform planning, further instruction and differentiation, as well as regularly advise grade, school, and district teams as to the effectiveness of the implementation. Furthermore, an overarching goal of Reading First was to spawn a nationwide effort to reduce the identification of students for special education due to the absence of appropriate early grades reading instruction.

A longstanding traditional method of identifying students with a SLD has been the IQ Achievement Discrepancy Model. In order to qualify for special education services under this model, a student’s academic achievement test scores are compared to his or her individualized test scores of general intelligence (IQ) and analyzed for discrepancies. A student is then identified as having a SLD if a substantial difference, typically two standard deviations, is noted in one or more of the following specific areas: oral expression, listening comprehension, written expression, basic reading skills, reading comprehension, mathematics calculation, or mathematics reasoning (U.S. Department of Education, 1977). The 2004 reauthorization of IDEA added reading fluency to the criteria and changed mathematics reasoning to mathematics problem solving (Fletcher, 2008). Current research indicates that many problems exist when it
comes to utilizing an IQ discrepancy to dictate a student’s qualification for special education. These include: assumptions of adequate IQ scores can sometimes be naïve; comparisons to academic achievement scores are many times inaccurate considering there are vague guidelines on which specific IQ and achievement tests must be administered; some school-level personnel exhibit noncompliance with guidelines that have been set; and state-to-state discrepancy formulas differ, making it possible for a student to lose their special education services if he or she moves out of state (Denton et al., 2006; Fuchs, Fuchs, & Compton, 2004; Restori, Katz, & Lee, 2009). Such inconsistencies have contributed to a widespread negative view about the IQ Discrepancy Model as a gate-keeping mechanism for SLD identification, as well as a pervasive opinion that SLD identification is whatever educators and parents want it to be (Fletcher, 2008; Fuchs & Fuchs, 2006; Lyon et al., 2001). Moreover, a sufficient amount of achievement failure must exist to produce a reliable enough discrepancy to be measured. This typically does not occur until a student reaches about nine years of age, constituting the “wait-to-fail” model: we wait while they fail. Pair these problematic issues with the manpower and monies it takes to determine eligibility, many argue that the most efficient and valid approach of delivering early, on-time intervention is through regular education, all the while preserving the SLD construct for identifying those students with actual learning disabilities (Lyon et al., 2001; Restori et al., 2009).

The new 2004 IDEA allows for the use of an alternate process to identify students as LD (Yzquierdo & Tyler, 2009). One such process involves regularly monitoring a student’s academic response to increasingly intensive levels of scientifically-based intervention and assessing whether his or her response is dramatically inferior to that of his or her peers (Fuchs et al., 2004; IDEA, 2004). Local education agencies can elect to use a student’s response to
intervention as a chief component for identifying LDs alongside the determination of his or her eligibility for special education services. What makes RTI unique is that in addition to an ability-achievement discrepancy, a student must also not be responding to high-quality, systematic, research-based intervention. Lyon et al. (2001) and Shinn (2007) indicate that models of RTI enhance the validity with which SLDs are identified, while they also reduce eventual student failure that would otherwise occur without intervening. Therefore, the authors argue that opportunities now exist for students to close academic achievement gaps without a need for referral.

NCLB was scheduled for revision in 2007, and over time, NCLB’s prescriptive requirements became increasingly unworkable for schools and educators. Recognizing this fact, the 2010 Obama administration joined educators and families in an effort to create a better law that clearly focused on fully preparing every student for success in college and careers. In 2011, the Obama administration announced its first comprehensive plan to fix NCLB through executive action: a waiver program designed to close achievement gaps, improve instructional quality, and increase equity and outcomes for all students. In exchange for more comprehensive and rigorous state-developed strategies, the waivers granted states some flexibility regarding the specific requirements of NCLB. In February, 2012, Governor Bill Haslam of Tennessee joined President Obama to announce the first round of ESEA approved waivers, with Tennessee being among the first of the ten approved states (U.S. Department of Education, 2015). This initiated the Tennessee Department of Education’s mission to be “the fastest improving state” by empowering districts to help all students succeed. The strategic plan included a statewide implementation of a Response to Intervention model titled RTI², or Response to Instruction and Intervention, a framework to give every student an opportunity to meet high expectations and the
support to reach them. Backed by every academic division in the department, the following guidelines were communicated in the Tennessee Department of Education’s RTI² Framework (Tennessee Department of Education, 2015a) concerning SLD identification, the IQ Discrepancy Model, and the specific role RTI² plays in the greater mission:

The Tennessee State Board of Education has approved Special Education Guidelines and Standards regarding Evaluations for Specific Learning Disabilities (SLD). This change in current standards from use of a discrepancy model of identification to a Response to Instruction and Intervention (RTI) model becomes effective July 1, 2014. This change will require all districts and schools to use RTI² to determine eligibility of students to receive Special Education services in the category of Specific Learning Disability. RTI² is a path to providing instructional opportunity to any student struggling to succeed and should not be viewed as a path to special education eligibility. (p. 60)

July of 2015 signaled the first time both the U.S. House and Senate agreed to pass the reauthorization of a bill – Every Student Succeeds Act (ESSA) would replace its predecessor, No Child Left Behind. By December of that year, The Obama Administration signed the reauthorization of ESEA, regarded as the nation’s 50-year-old longstanding commitment to equal opportunity for all students. In response, states began building upon the foundations of tried-and-true models of ensuring effective instruction for students with differing levels of academic ability, which included the model of response to intervention. Since then, an array of RTI models exist due to the common occurrence of modifying the original concept (e.g., Tennessee’s RTI² framework), however, RTI continues to rise to the top as one of the most sought-after scientifically-based models and can be found in some form or fashion all across the nation (Fuchs et al., 2014; Wright, 2007).

Models of RTI

Some researchers merely consider RTI as a commonsensical approach to an ever-present issue in education based on the theory that teachers have always provided assistance for and
reported regular progress on struggling students. Others consider RTI as a fulfillment for defining alternative methods of identifying students with learning disabilities. No matter the scenario, the fact remains that the specific components that constitute current RTI models have been used for many years, but have just recently been organized into the framework now referred to as response to intervention, or RTI (Fuchs & Fuchs, 2006; Wright, 2007). Within the overarching frameworks of response to intervention, two preventative models dominated the literature: a problem-solving approach and a standard treatment approach. The problem-solving approach involves the use of interventions that are specifically tailored to meet students’ individual learning needs, and rather than targeting the development of new skills, this approach attempts to increase students’ performance on skills that have already been acquired. The second approach relies upon standard protocols that have been shown to improve academic achievement via randomized controlled studies. In contrast to the problem-solving approach, the standard treatment approach supports the development of new skills alongside the incorporation of standard treatments, or protocols, to address a student’s behavioral or attention problems that may be preventing his or her academic progress. This approach works to ensure student progress by minimizing transitions, maintaining a suitable pace, encouraging high levels of on-task behavior, and incorporates the teaching of goal-making and self-regulation strategies (Fuchs & Fuchs, 2007). Although a large majority of the RTI frameworks that schools choose to implement follow a problem-solving approach, an increasing number of schools are choosing to use a combination of the two approaches to increase the connected academic and behavioral success of struggling students (Torgesen et al., 2001; Vaughn & Fuchs, 2003).
The 15 member panel of the 1982 National Research Council study (Holtzman & Messick, 1982) proposed the following process for the identification of special education classification:

The validity of any special education classification must be judged according to three criteria: (a) that mainstream education was generally effective; (b) that special education improved student outcomes, thus justifying the classification; and (c) that the assessment process used for identification was valid. Only when all three criteria are met, is a special education classification justifiable. (p. 217)

In 1995, Fuchs borrowed the panel’s framework to define a three-phase process for the assessment of a SLD. Phase one was designed to use assessment data to track the growth rate of all students and determine whether or not the instructional environment sufficiently nurtures student progress. Phase two continues by identifying students whose level of performance and growth rate are significantly below those of their peers in a generally effective instructional environment. For example, a student’s mean growth rate would be compared to other students’ mean growth rate in the same class, grade, school, district, or even the entire country; if the student’s mean growth rate is lower than those held in comparison, then a decision to intervene would be made based on his or her unresponsiveness to generally effective instruction. This student would be grouped with a subset of students with like data that signals potential academic failure. Phase three focuses on this subset of students and individualized instructional adaptations within the mainstream setting. These systematic problem-solving attempts help to determine whether or not the general academic classroom can adjust to become a constructive learning environment for this specific group of at-risk students. Educators can only consider special services if such adaptations fail to improve student growth, assuming that some inherent disability or deficit underlies the attempts to increase academic progress. Attending to the National Research Council’s third criterion regarding a valid process of assessment prior to the
classification of special education status, Fuchs’s design involved the use of a curriculum-based measurement system (CBM) to quantify mean performance levels and student growth rates across all three phases of the framework (Fuchs et al., 2004).

In more recent years, Phase three of Fuch’s model has been reformulated to more strongly emphasize specific deficit remediation of at-risk students through an iterative problem-solving process. This includes a fixed-duration trial of intervention (typically in number of weeks), the delivery of intensive individual or small-group instruction, as well as some sort of validated standard treatment protocol. Vaughn, Linan-Thompson, and Hickman-Davis (2003) presented this problem solving process in their 2002 study. They observed the identification of at-risk students based on pre-determined assessment cut points who were then provided 10 weeks of small-group supplemental reading instruction. Students were reassessed to determine if any growth had occurred. The students identified as no longer in need of remediation returned to the general classroom, while the remaining students were regrouped and provided with another 10 weeks of instruction. The process continued for 30 weeks and until a subset of students that still did not meet the determined criteria for dismissal were identified. This subset was then referred for a special education evaluation.

While this intensive approach transforms what has traditionally been an identification process into a process of prevention (Fuchs et al., 2004), many variations exist and include varying numbers of phases, or tiers, as well as differing types of intervention activities and materials that are tailored to address specific areas of deficit (Fuchs, Mock, Morgan, & Young, 2003). As early as 1970, Deno presented a model consisting of a cascade of services for at-risk students with differing learning needs. This conceptualized model included three tiers of prevention which are further fleshed out in subsequent sections below: tier one, the layer of
primary intervention delivered in the general education setting; the secondary layer, tier two, consisted of targeted, fixed-duration intervention using research-based small group instruction; the tertiary layer, tier three, was the most intensive layer of intervention and involved targeted, research-based instruction for a very small group of students with like areas of deficit. Instruction at this tier even occurred at the individual level for those students with a higher risk of academic failure.

Deno’s 1970 model was later revised to include features that emphasized tier one instruction as both universal and comprehensive and provided to all students at each grade level. Therefore, RTI frameworks began to focus more on effective data-based problem solving which complemented Fuchs 1995 three-phase model. One such approach (Deno et al., 2009) included five steps positioned around two main concepts: assessment procedures and evaluation decisions. Step one, problem identification, listed the assessment procedure as observing and recording student performance. The model posed the question, “Does a problem exist?” (p. 25) as a way to initiate the evaluative decision-making process. To answer this question, models of RTI began to require the use of a screening assessment to differentiate between those students that are making progress and those who are experiencing problems and may be in need of additional support. According to Jenkins (2007), screening should satisfy three criteria. First, a screener should accurately classify students as at-risk or not at-risk. Second, the screening process should be efficient, not too time-consuming or cumbersome to administer, score, or accurately interpret. Third, students identified as at risk via the screening process should receive timely and effective intervention. Most often referred to as a universal screener, the assessment should rely on a standardized curriculum-based measure (CBM) designed for use with all students. It must also be both reliable and valid (Fuchs & Fuchs, 2007). Universal screener results provide educators a
snapshot of a student’s current state of performance as well as a basis for predicting likely performance if no intervention is delivered. According to Fuchs and Fuchs (2007), in most cases all enrolled students take a universal screening assessment three times during a school year, with the initial screen given early in the year to maximize resources and allocated instructional time. This tri-annual schedule produces consistent baseline and follow-up yearlong data tracking each student’s academic progress. Screens consist of brief assessments focused on target skills at differing level of development and yield normed measurement data to drive the placement of students in the most appropriate tier of intervention. Nationally normed measurement data are reported in relation to specified cut points or benchmarks, most commonly at the 25th percentile to separate tier one and tier two and likewise, the 10th percentile for tier three. Historically, educators have struggled to choose the most appropriate screeners to implement, and in response, a growing number of published screening tools have become readily available; some even offer free versions with the most basic of features. Educators also have an increasing need for instant data results to assist in a more efficient placement process, therefore online screening tools are quickly becoming the norm, not the exception (Ardoin & Christ, 2008; Brown-Chidsey & Steege, 2010; Deno et al., 2009; Fuchs & Vaughn, 2012; Jenkins, Zumeta, Dupree, & Johnson, 2005; Shernoff, Kratochwill, & Stoiber, 2002; Shinn, 2010).

In 2007, Fuchs and Fuchs used the most current empirical research, paired with their own observational data, to define six components of a well-run RTI framework: the number of intervention tiers to use, what strategy to use to target students for intervention, the nature of the intervention, how responses are to be classified, the nature of the evaluation prior to special education referral, and the design and specific functions of special education. These six components continue to serve as a benchmark for which researchers and educators not only
measure the efficacy of RTI implementations, but also tailor the specifics to best meet the needs of their struggling students.

The most common visual representation of basic RTI models is an inverted triangle which divides the three tiers into sections based on the ideal percentage of students in each tier. The top section of the triangle represents the approximately 80% to 85% of students that should be able to successfully progress solely with tier one instruction. The middle of the triangle represents the roughly 10 to 15% of students that are not successful with tier one instruction and require the addition of tier two targeted interventions alongside tier one instruction. The lower section of the model represents the smallest student subset, the three to five percent that do not respond well enough to both tier one and tier two interventions and require more intensive daily instruction targeting individual specific areas of deficit (Deno, 1970; Jenkins, Hudson, & Johnson, 2007; Stanovich & Stanovich, 2003). More specifically, tier one is general on-level, high-quality instruction provided to all students. Teachers in tier one employ methods of differentiation to meet the specific needs of students that show signs of academic struggle in one or more areas of a screening assessment. These students may not fall into a tier of intervention based on cut points, but still require additional support to prevent future academic decline. Tier two provides students that generally fall between the 25th and 11th percentiles on a screening assessment with supplementary intensive support in addition to tier one instruction. Tier two teachers are highly-trained personnel that deliver small-group instruction and provide students with more frequent and focused corrective feedback as well as an increase in time for targeted practice. Students that fall below the 10th percentile on a screening assessment or have not made sufficient progress with tier two interventions receive the most intensive intervention possible (outside of special education) in tier three. Tier three students may also require an evaluation to
identify the presence of a specific learning disability. Much like tier two, small-group instruction in tier three is led by highly-trained personnel, such as a reading specialist or a literacy coach. When such specific personnel are unavailable, districts and schools have been known to employ educational assistants to deliver either, or both, tier two and tier three interventions. Because RTI is a problem-solving model, a student that has been responsive to the intervention presented in tier three may move into a less intensive tier two intervention, and may eventually move back into general, tier one instruction. Similarly, if a student in tier two proves to have positively responded to the intervention presented, then he or she is seen as remediated and returns to the general education classroom. Regardless of the tier, if a student is non-responsive to the process, a possible disability is in question and further evaluation is necessary (Fuchs et al., 2004; McMaster, Fuchs, Fuchs, & Compton, 2005; Vaughn, Linan-Thompson, & Hickman, 2003). In essence, each tier is key in a systematic process of high-quality teaching and assessment practices, designed to give students that have been unsuccessful with one set of instructional methods an opportunity to succeed with others (Bradley, Danielson, & Doolittle, 2005).

Though the instructional duration of tiers two and three varies depending on established school or district guidelines, the goal is for a student to remain in an intervention tier long enough to show signs of change: progress, decline, or stabilization. This is typically calculated in number of weeks and is accompanied by a review of collected data. Based on the criteria set forth by IDEA 2004, these data must come from a specified, continuous, adequate system of progress monitoring. The system must show evidence that the use of a specific progress monitoring tool results in teacher planning changes as well as an improvement of student achievement in identified areas of specific skill. Such tools afford teachers the opportunity to construct scientifically-based decision-making practices that are student-centered and continuous.
across tiers. As with universal screening, a large majority of RTI models support the use of a CBM as a progress monitoring tool. Because CBM tests are standardized, brief, easy to administer and score, technically adequate, and sensitive to improvement, schools have found progress monitoring to be unobtrusive and consider the additional testing to be imperative to the success of an effective RTI implementation. RTI models vary in the suggested frequency of progress monitoring, ranging from one to four weeks; the majority of models suggest a schedule of once a week for tier three students and every two weeks for tier two students. Regardless, researchers argue that the use of a systematic monitoring system of student progress far outweighs the benefits of summative assessments for intervention purposes (Shinn, 2010; Wright, 2007).

**Student Identification for RTI**

Regardless of the number of tiers in an RTI model, schools continue to struggle with one necessary part of the six components of a well-run RTI framework: the way in which students are targeted to receive support beyond the core program, or tier one (Fuchs & Fuchs, 2007; McMaster et al., 2005). And because the conceptual model of RTI is continuing to develop, experts have yet to reach any agreement about the specific type or progression of the decision-making rules that should be used during the student identification process (Barnett, Daly, Jones & Lentz, 2004). One widely accepted approach for identifying students is Fuchs’ (2003) dual discrepancy model. The first discrepancy is documented when a student exhibits a significant academic delay compared to his or her grade-level peers. This is considered a skill gap and indicates the need for a referral to the RTI team as well as the creation of one or more intervention plans to assist in the closing of the student’s specific academic skill gap. The lack
of expected student progress to catch up with grade-level peers, despite the best efforts of the intervention providers and the RTI team, documents the second discrepancy. This is considered an improvement gap. Fuchs’s model indicates a referral to special education only when the combined documentation of both skill and improvement gaps exists (Fuchs et al., 2008; Wright, 2007).

According to Wright (2007), the first discrepancy charges RTI teams with the decision as to how they will determine expected, or average, levels of academic achievement. Local norms, research norms, and criterion-referenced benchmarks are three widely used methods for calculating this level, or rate of improvement (ROI). Local norms are determined by sampling the academic abilities of typical students across a grade level in one school or district. This is generally collected via CBM tools at intervals throughout the school year: fall, winter, and spring (Shinn, 2010). Some researchers, such as Hasbrouck and Tindal (2006), compiled data on the typical rates of academic performance collected from samples of students. These data, also known as research norms, were then published and serve as a starting point for estimating expected levels of student performance. Although both local and research norms can be developed for those academic skills that are easily quantified and reliably measured, RTI teams will inevitably run upon specific concerns for which no official norms exist. In this case, Fuchs and Fuchs (2006) suggested setting a criterion-referenced benchmark, or an “assessment that compares a student’s performance on an academic task to a pre-selected standard of mastery” (Wright, 2007, p. 172). All three methods have their advantages and potential drawbacks. While local norms precisely show the gaps in academic skill between a struggling student and his or her grade level peers, they can vary substantially across districts and within schools, meaning that this variability may result in student identification inconsistencies. Research norms are typically
based on the data of thousands of students across a multitude of states therefore they may not reflect an accurate picture of average student performance across the entire nation. In addition, the student samples used in the studies may not be representative of the ethnic and racial diversity found in a specific district’s student population, thereby restricting the usefulness of the norms. Nonetheless, Wright pointed out that many research norms are robust and draw from an impressive amount of data, suggesting their value in the process of identifying students for targeted support. Like local and research norms, criterion-referenced benchmarks have their advantages and disadvantages. Fuchs and Fuchs (2006) stated that these benchmarks can be somewhat arbitrary due to their grounding in teacher judgment. Yet, the researchers also indicate that the use of criterion-referenced benchmarks allow for a flexible application to a wide range of academic skills for which no formal norms are available, providing teachers with the ultimate decision as to whether or not a student is proving to be sufficiently successful.

According to Fuchs and Fuchs (2006) the second discrepancy in Fuchs’s 2003 dual discrepancy model focuses on those students that fail to close their academic gap, indicating a possible learning disability, which in these cases, is partly determined by the findings of the RTI team. The RTI team employs the use of problem-solving forms to chart and calculate a student’s response to intervention based on an initial goal for improvement. This is accomplished through monitoring the student’s progress towards attaining the goal (Vaughn et al., 2003). Wright (2007) emphasized the following most common methods that RTI teams use to calculate the expected rates of student improvement: growth norms based on research, growth norms based on the distance between target student performance and local norms, and growth rates based on criterion-referenced benchmarks. As with research norms in discrepancy one, published research norms of average student rates of progress over time can be helpful starting points, but are
intended to be followed by more investigative measures. Both research and local norms assist RTI teams in the calculation of a student’s rate of improvement in comparison to the rate of improvement for a typical grade-level peer, settling on a rate at which the struggling student must progress in order to catch up with his or her peers (Shinn, 2010). This is generally reported in number of weeks. Wright (2007) suggested that, as found with discrepancy one, the process of establishing student performance goals can also be accomplished through the use of criterion-based benchmarks. These benchmarks then serve as a sequence of goals toward which a struggling student works, again typically organized in number of weeks.

Shinn (2007) stated that for more than 25 years compiled evidence has strongly suggested that the majority of students labeled SLD have been those with performance discrepancies compared to their grade-level peers. And although the evidence of an academic discrepancy is a necessary requirement for SLD identification, it is not sufficient; student data must also indicate an unresponsiveness to high-quality general instruction. Therefore, Shinn argued that, from a legal perspective, RTI should be seen as a viable SLD eligibility option for LEAs. In addition, he posited that the use of Fuchs’s (2003) dual-discrepancy model should also be considered critical within both the special education eligibility process and a tiered problem-solving model for all students in need of academic support.

Fidelity Monitoring

As teachers, administrators and RTI implementation teams use universal screening and progress monitoring data to inform instruction and make decisions, researchers agree that there still remains the most challenging goal of an effective RTI implementation: maintaining and assuring fidelity of the implementation itself. Used interchangeably with the term treatment
Integrity, fidelity of implementation is rooted in the field of school psychology (Roach & Elliot, 2008) and is defined as “the act of monitoring whether all elements of an intervention or plan were implemented as originally intended” (Keller-Margulis, 2012, p. 3). Fidelity is arguably considered by researchers as the most essential component of an RTI model (Bianco, 2010). As early as the 1990s, researchers were considering what measurable components should be included in an effective model of fidelity monitoring. Dane and Schneider (1998) offered five aspects of fidelity monitoring: (1) adherence – the extent to which an intervention is delivered as prescribes; (2) exposure – the amount of intervention content received by students; (3) quality of program delivery – the extent to which teachers approach a theoretical ideal in terms of delivering the content and processes of the intervention; (4) participant responsiveness – the extent to which students are engaged; and (5) program differentiation – uniqueness of the characteristics of the intervention that can be distinguished from others. Dane and Schneider (1998) assert that measurement of all five aspects provides a comprehensive report of the fidelity of an intervention. Since, systems of fidelity monitoring around these five aspects have been developed and include multiple measurable steps organized in a cyclical process. Among the most notable is the multidimensional model presented by the National Research Center on Learning Disabilities (NRCLD, 2006) and is comprised of three dimensions: frequent predictable and unpredictable fidelity checks to allow for a true reflection of implementation, as well as insight into possible behavioral changes as a response to an observation; applying both direct and indirect methods to assist in the full-spectrum collection of fidelity data; and putting support systems in place that emphasize opportunities for quality professional development and training. Other researchers (Brown-Chidsey & Steege, 2011; Hill, King, Lemons & Partanen, 2012; Keller-Margulis, 2012) agree that models of monitoring fidelity are critical to the success of RTI
implementation and make additional suggestions, including the use of specific tracking forms to document observational data, the hiring of specialized personnel such as reading coaches to support implementation efforts, the review of video taken during intervention instruction for the investigation into overall integrity and the identification of possible need for adjustments. These videos can also provide models of effective implementation for training purposes. Moreover, researchers recommend the development of a system to collect feedback concerning the RTI implementation as well as a matching system to provide ongoing feedback to all RTI stakeholders (Hill et al., 2012; Ruiz-Primo, 2006; Torgeson, 2009). Wright (2007) referred to the fidelity process as *intervention follow-through* and advocates the use of a self-monitoring checklist for teachers to rate their performance. Because some teachers may initially be uncomfortable with direct observations, self-monitoring provides a good alternative method and can be phased in as a combination with direct observations. Wright argued that, although teacher ratings can be subjective and should always be viewed alongside other collected data, teachers are less likely to skip essential steps in the intervention plan with the use of this method.

As the first of Dane and Schneider’s (1998) five aspects of fidelity monitoring, research suggested that *adherence* rises to the top as the most crucial component of a fidelity monitoring system. There are many reasons educators need to know if an intervention is being delivered according to the prescribed research-based method in the way in which it was intended. First, a solid intervention implementation paves the way for a more accurate, valid determination of a SLD and satisfies one of the 2004 IDEA legal requirements for appropriate instruction. Second, student data are more accurately interpreted when the intervention implementation has been evaluated for its intended frequency, intensity, and duration, therefore, high-stakes decision-making based on student RTI data rests in solid evidence of implementation fidelity. In addition,
when an intervention’s initial implementation proves unsuccessful through a fidelity-monitoring system, appropriate measures can be taken to remedy the implementation before abandoning the entire effort. The lack of a fidelity monitoring system can result in the continuation of an intervention that is not being implemented correctly or consistently, resulting in compromised student data. Not to mention, a weak or non-existent fidelity monitoring system can inadvertently circumvent the main RTI goal of providing immediate support the moment data indicates possibly deficiencies without having to wait for a formal evaluation.

Researchers such as Keller-Margulis (2012) recommend that a system of monitoring fidelity must look closely at the required intervention materials and resources. Fidelity observed to be weaker than planned typically occurred with programs containing an overabundance of required materials or resources, making it difficult for intervention providers to deliver targeted, focused instruction. Fidelity can also be adversely affected by the number of intervention providers. Programs requiring more than one intervention provider are likely to be implemented with less fidelity than those programs requiring only one provider. Quality implementation guides or program manuals have shown to improve implementation fidelity, particularly when they include criteria for the evaluation of student competency as it relates to data-based decision making. Researchers agree that undoubtedly, quality guides or manuals are insufficient without the fundamental support of teacher training concerning the intended implementation methods of a chosen program (Keller-Margulis, 2012; Ruiz-Primo, 2006).

Although the research suggested a significant correlation between higher implementation integrity and improved academic outcomes for students, it also uncovers a lack of current research concerning the fidelity of Tier I instruction. Models of fidelity monitoring tend to target interventions in Tier II and III, however current studies indicate that Tier II student data may be
associated with weaker Tier I programs. And because the complex nature of RTI results in an assortment of activities, each part must be monitored for fidelity as it occurs in each tier of intervention (Hill et al., 2012; Keller-Margulis, 2012).

Tennessee Model RTI²

Considering that the implementation of RTI has surpassed the confines of special education to include significant implications for general education, up to one third of public school students will in some way be directly affected by RTI. This number encompasses all students, not just those with identified disabilities (Kavale et al., 2008) and Tennessee is no different. According to the Tennessee Department of Education’s RTI² Framework (Tennessee Department of Education, 2015a):

The Tennessee Department of Education (TDOE) believes that the framework surrounding positive outcomes for ALL students in Tennessee is the Response to Instruction and Intervention (RTI²) model. This framework integrates Tennessee State Standards, assessment, early intervention, and accountability for at risk students in the belief that ALL students can learn. (p. 8)

The long-standing knowledge that struggling students do not simply exist in isolation, instead their eventual success or failure rests heavily upon an effective instructional environment (Kavale et al., 2008; Lentz & Shapiro, 1986) set the foundation for TDOE’s problem-solving RTI² approach; a model which “relies on the premise of high-quality instruction and interventions tailored to student need where core instructional and intervention decisions are guided by student outcome data” (p. 8) and traverses from general to special education. As with many other models of intervention, TDOE’s RTI² scaffolds student support in the areas of math and reading and reserves the most intensive layer of support for students suspected of having a SLD which may require special education services. More specifically, TDOE’s framework is a
continuum of intervention services grounded in shared knowledge and commitment, collaborative problem-solving, and data-based decision making.

The 2004 reauthorization of IDEA corresponded to Tennessee amending its criteria for the determination of eligibility for students with a SLD, allowing LEAs the choice between a discrepancy model or methods based on conceptual model of intervention, or RTI. Since Tennessee had not yet adopted a consistent RTI model at that time, a string of events prodded a change in policy. These included: a spring 2012 discussion of best instructional practices for both reading and math by the Tennessee Common Core Leadership Council, leading to the decision that a substantial need for a statewide RTI model existed; the fall 2010 release of new guidelines for public review and feedback, as well as the search for a partner organization to provide a strong research background for the development of standards and tiered-intervention training; the 2013 convening of a state-wide RTI Task-force that voted to proceed with a Tennessee-specific model of intervention, followed by the development of the Tennessee Reading RTI Leadership Team which was charged with the research and writing process of the TDOE RTI² Framework, as well as the assembly of a psychologist RTI² task force to review interventions and eligibility standards for students with a SLD. In June of 2013, the Tennessee State Board of Education passed the proposal for identifying students with a SLD using the RTI² problem-solving model. As of July 1, 2014, Tennessee identified the RTI² framework as the official criteria by which a student may be identified as having a SLD, concluding that RTI² must be viewed as a path to success for all struggling students through intensive support and should not solely be considered a path to special education eligibility. The change in policy allowed LEAs to extend the effective implementation date of a research-based instructional method in grades 6-8 until July, 1, 2015 and likewise in grades 9-12 until July, 1, 2016, at which time the
implementation of a research-based instructional method is mandatory. TDOE developed a comprehensive, state-specific RTI² manual and implementation guide which was made available to all LEAs in August 2013. The Response to Instruction and Intervention Manual assists LEAs with school wide problem solving endeavors and equips them with tools that embrace decision-making from a practical standpoint. As stated in the manual, Tennessee strives to maintain the integrity of the RTI² framework by utilizing, “evidence-based practices, instructionally relevant assessments, data-based decision making, and effective professional development in order to ensure the success of ALL students” (p. 10). This is evidenced in the guiding principles section of the manual where the three legs of the implementation plan include assessment alignment and transparency, instructional materials and curriculum, and quality training and meaningful support. TDOE stated that the foundation of the RTI² framework rests in the guiding principles and the the following essentials: strong state, district, and building level leadership; a culture of collaboration focused on student achievement for all students; and using assessment data for instruction and intervention to effectively target prevention, early intervention, and transitions between tiers of support.

The Response to Instruction and Intervention Manual posits that the success of the RTI² framework is grounded in both leadership and a culture of collaboration and is a joint effort between special and general education, with general education leading the initiative. In response, LEAs must develop a district RTI² leadership team and school level RTI² support teams to regularly analyze student data, ensure program and process fidelity, and make data-based decisions regarding appropriate student placement matched to specific areas of deficit. While the frequency of district RTI² leadership team meetings may vary, the manual requires that school level RTI² teams meet at least every 4 ½ to 5 weeks to review student outcome data.
derived from universal screeners and progress monitoring probes. The manual requires that explicit, systematic, research-based interventions be provided daily between progress monitoring administrations: 30 to 45 minutes per day for tier two and 45 to 60 minutes per day for tier three.

Additionally, the guiding principles found in the Response to Instruction and Intervention Manual state that the RTI² framework focuses on prevention and early intervention via assessment data, a major component of the RTI² framework, to drive the process of data-based decision making. At-risk cut scores are established using universal screeners based on national norms and identify students below the 25th percentile as at-risk. A substitute for national norms, relative norms can be used to guide the selection of intervention groups in schools with large numbers of students falling below the 25th percentile. Relative norms can also reveal those students with the highest need among a high population of struggling students. The Tennessee RTI² framework identifies students in need of tier two support as scoring between the 11th and 25th percentiles, and students in need of tier three support as scoring at or below the 10th percentile. Both tier two and tier three conduct frequent progress monitoring in specific areas of deficit “using an instrument that is sensitive to change” (p. 40). This is to assess a student’s academic performance, quantify his or her rate of improvement, and evaluate the effectiveness of the targeted instruction he or she received. The Response to Instruction and Intervention Manual mandates tier two and tier three progress monitoring probes to be administered at least every other week.

Closely mirroring the tiered model presented by Douglas Fuchs in 1995, the Tennessee RTI² framework is a 3-tiered model of ongoing instruction and intervention that encourages student to make progress at each level. The inverted triangle graphically represents the three tiers of intervention in well-run RTI² system, including the corresponding percent of students in
each tier of support. The Response to Instruction and Intervention Manual states that even though this model is ideal and sets a goal for the future, that the state department “recognizes that most school systems in Tennessee are continuing to work toward this goal” (p. 13), acknowledging that the implementation of a large-scale systems change takes time and likely experiences multiple versions before reaching specified guidelines.

As with other RTI models, the Tennessee RTI\textsuperscript{2} framework assesses the accurate use of tiered intervention materials via a process called fidelity monitoring. Intervention materials and curricula are designed to be implemented in a specific way for optimum results, therefore the systematic monitoring helps instructional leaders determine whether or not the delivery of the intervention “adheres to the protocols or program models as originally developed” or at what extent the materials or curricula are being used (p. 44). The Tennessee RTI\textsuperscript{2} model’s fidelity monitoring system helps ensure that an intervention is being executed with integrity and accurately follows the implementation intentions of the publisher or author. The Response to Instruction and Intervention Manual states that all LEAs must establish a process for monitoring the fidelity of intervention implementation, specifically describing the choice of personnel responsible for monitoring as well as the frequency of monitoring for both tiers of intervention. The manual also ties the process of fidelity monitoring to data-based decision making as an avenue to deepen the investigation of student progress: effective instruction and no progress may indicate the need to move a student into a more intensive tier of intervention, and likewise, the determination of ineffective instruction evidenced by no student progress indicates a need for program restructuring. Implementations found to be effective require less intensive fidelity monitoring and could be a short observation or a walk through. Fidelity monitoring for implementations deemed ineffective may increase in number and involve a more thorough
process of investigation. The Tennessee RTI\textsuperscript{2} framework requires documentation to be collected for both direct and indirect fidelity monitoring (i.e., lesson plans, schedules, walk-through documents) and reviewed in conjunction with student artifacts during regular data team meetings. This suite of collected data, student work, and documentation of program fidelity all assist educators in making the most appropriate decisions concerning the placement of each student (Tennessee Department of Education, 2015a).

*The Role of Technology in RTI*

Although current federal legislation mandates that technology be integrated into school curricula, the real challenge facing educators is to better understand how to effectively utilize technology as an integral component of the teaching and learning process. Under this mandate, educational leaders at both the state and local levels must craft plans to effectively integrate educational technologies (Davies, 2011; U.S. Department of Education, 2001). Davies, Sprague, and New (2008b) defined *educational technology* as: any tool, piece of equipment or device – electronic or mechanical – that can be used to help students accomplish specified learning goals. As educators position themselves to uphold the mandate, many are finding that the use of education technology solved issues that have otherwise been a struggle. Termed *technology-based solutions*, schools are seeking educational technology to help them better manage instructional time, provide quality instruction, and engage and motivate students.

Since the 1990’s, there has been an explosion of technology-based academic solutions, accompanied by concerns as to the potential of these solutions to meet the specific educational needs for all students (Smith & Okolo, 2010). Often seen as “equalizers” for struggling learners, technology-based solutions are likely to become even more pervasive and profound in the future,
particularly as schools find themselves in need of options when it comes to the delivery of intervention instruction. Federal regulations state that a “child’s response to scientific, research-based intervention” is central to RTI (34 C.F.R. 300 & 301, 2006; P. 46786), and more than ever educators are looking for quality, scientific and research-based interventions that move beyond traditional options. Smith and Okolo (2010) agreed, stating that educators are seeking ways to further the integration of technology tools within the framework of RTI, thereby strengthening the RTI model with use of technology, seen as a tool to both support and enhance learning for struggling students. Kennedy and Deshler (2010) also found that developments in technology-based supports, especially for students with a SLD, have had favorable implications for teaching and learning. The impact was particularly positive when technology-based solutions were combined in a logical manner with effective instructional practices and materials. Although reasons for using educational technologies vary, the decision to implement a specific technology must ultimately be based on its ability to facilitate explicit instruction and accomplish desired learning objectives. A substantial amount of research indicates that students with a SLD that receive systematic and explicit instruction are more likely to have higher rates of academic success, and in order to consider technology as a means for providing evidence-based RTI practice, educators must first link it to features of effective and explicit instruction. In response, Smith and Okolo (2010) defined four key features of explicit instruction that are best supported by educational technology. These include (a) an increase in basic skills practice, (b) an increase in academic learning time, (c) feedback and review, and (d) systematic progress monitoring. Because many students with a SLD develop basic skills at a slower rate, technology-based solutions help by providing systematic practice in those basic skills that students often struggle. Research shows that students tend to show an increase in motivation when technology is
integrated into instruction, therefore, educational technology has the potential to increase student learning time; this is especially important for those students that need extra learning time. Additionally, most technology-based applications, including those that deliver basic skill practice, can be independently used, providing opportunities for students to acquire additional learning time. Feedback plays a critical role in the learning process, particularly for novice learners as they acquire new skills. Many technology-based applications are customizable to each individual learner, track the learner’s performance between responses, conduct error analyses, and look for patterns of responses, and yield highly individualized feedback. Equally important is the review of the process of consolidating and maintaining skills for struggling students. This is accomplished by tracking a student’s exposure to specific skills, then applying this knowledge to develop schedules for both short-term and cumulative review. Lastly, effective technology-based solutions include an extensive collection of student performance data that is used to make instructional decisions and provide further diagnostic information. Considered an especially desirable feature, technology-based progress monitoring provides instant access to student data, enabling educators to make more immediate and responsive decisions and target those students that are in need of additional assistance. The process of technology-based progress monitoring is considered a more time-efficient option versus traditional one-on-one paper and pencil methods, freeing up teachers to spend quality time working with small groups or individual students. (Kennedy & Deshler, 2010; Smith & Okolo, 2010).

According to Davies (2011), the human activity of constructing knowledge can surely be facilitated by technology, however, the technology should become invisible to the learning process and familiar enough to be used as a learning tool. Hutchison and Reinking (2011) concurred, and added that the integration of technology as a learning tool is less likely to be
authentic and effective when teachers conceptualize the integration as a separate entity from the curriculum. In fact, the authors posited that instruction should never be driven by the technology, rather, the technology should be chosen based on the specific learning standards and pedagogical approach to the unit or lesson to be taught. Whether it is with tier one instruction or RTI, the integration of technology-based solutions draw upon Harris and Hofer’s (2009) suggestions concerning the instructional decisions teachers should make when planning learning that involves technology. They suggested that teachers should (a) choose specific learning goals, (b) make pedagogical-based decisions concerning the nature of the learning experience, (c) consider types of activities that easily combine, (d) pre-select assessment strategies, and (e) pre-select the technology that is best suited to help students benefit from the learning experience and will assist students in reaching the defined learning goals. Hutchison and Woodward (2014) built upon Harris and Hofer’s (2009) suggestions by including the process of reflection. The researchers stated that this is perhaps the most critical step of effective technology integration, particularly when making sensitive decisions concerning struggling learners. Upon reflection, teachers should discover if the use of the chosen technology made a strong contribution to their instruction and the learning experience. This information will then be used to drive future decision making. Hutchison and Woodward (2014) also pointed out that teachers look at both the contributions and constraints of the technology as part of the reflection process, noting that this will allow teachers to fully investigate the potential of the technology while also uncovering the impact that potential obstacles could have on instruction. In agreement, Davies (2011) stated that reflective practices demand that teachers critically analyze their methods, including the role of technology in specific educational situations. Furthermore, he argued that teachers must learn to temper their enthusiasm for technology and instead evaluate appropriate technology
integration in terms of why the technology was chosen, then how well the technology accomplished the learning task.

According to researchers Moran, Ferdig, Pearson, Wardrop, and Blomeyer (2008), the role of new technologies on learning has received a great deal of attention in the past several years, particularly around literacy acquisition, and because we can do very little to alter the swiftly shifting landscape of how technology impacts literacy instruction, we are merely forced to try to keep up. In response to these trends, two prominent professional organizations grounded in the development of literacy made a stance. For example, the International Reading Association (IRA) crafted a position statement in 2009 to address literacy and technology:

To become fully literate in today’s world, students must become proficient in the new literacies of 21st-century technologies. As a result, literacy educators have a responsibility to effectively integrate these new technologies into the curricula, preparing students for the literacy future they deserve. (IRA, 2009, n.p.)

Likewise, the National Council of Teachers of English (NCTE) drafted four position statements, four sets of guidelines, and 11 resolutions related to technologies as a part of mainstream literacy (21st Century Literacies, n.d.). NCTE also developed standards for effectively integrating technology into educational instruction. According to Hutchison and Reinking (2011), several premises underlie the cause for such a focus on integrating technology into literacy instruction. First, the teaching of foundational skills, reading and writing strategies, and reading and writing dispositions fall primarily in the realm of the literacy teacher. And although many opportunities to authentically practice and apply these skills, strategies, and dispositions exist in other academic subjects, literacy teachers are specifically charged with the task, which increasingly include those aspects of literacy involving the use of technology. Second, the literacy curriculum offers a wide range of opportunities to integrate the use of technology to content inherent to language arts. These include, but are not limited to: the Internet for research, automated
programs to practice basic literacy skills for automaticity and fluency, and the exposure to multiple formats of text for reading. Third, Hutchison and Reinking (2011) argued that despite the calls from prominent organizations for integrating technology into instruction, the actual occurrence has been minimal, and even superficial in some cases. Furthermore, they stated that technology integration in schools has not kept pace with developments beyond the classroom and the integration is especially sparse among literacy teachers in the United States. It was this perceived lack of adequate technology integration that formed the rationale for both IRA and NCTE to emphasize the need to integrate technology into literacy instruction. The fourth premise centers around the unique affordances that technology provides for reading and writing, not just in the acquisition and practice of skills, strategies, and dispositions, but that technology also provides opportunities to build upon and exceed a student’s experiences associated with conventional forms of printed text. As the collection of research substantiating the differences between printed and digital texts continues to grow, Hutchison and Reinking (2011) contended that the failure to integrated technology into literacy instruction leaves today’s generation of students at risk for being unprepared when it comes to mainstream reading and writing activities, especially because these technology-infused activities are becoming noticeably prominent in and out of academic contexts. Lastly, the fifth premise is that the burden of technology integration into literacy instruction should not fall solely on the shoulders of literacy teachers. One of IRA’s position statements involves policymakers and pre and inservice educators as key supporters in the efforts to facilitate technology integration. However, according to Hutchison and Reinking (2011), the research that could provide guidance for these literacy stakeholders is relatively limited. In addition, they argue that there has been no systematic, widespread effort to determine how teachers view the issues related to literacy and technology integration, specifically what
they perceive the obstacles to be. Hutchison and Reinking claimed that the non-existence of data characterizing teacher’s beliefs about the need and importance of integrating technology into literacy instruction is unfortunate. This is because teachers’ beliefs about the role and benefit of using technology have consistently been identified to relate to the extent to which technology is, in fact, integrated into instruction. Teachers were more likely to have a positive view of technology integration, both its role in the classroom and its benefit to students, when they perceived it as important to student success. However, the researchers stated that overall, teachers see the process of integration more in the technological sense, rather than in the realm of curriculum or as a supplemental component to literacy instruction. Hutchison and Reinking suggested that more research is needed to investigate what teacher characteristics or beliefs are related to more or less integration of technology in literacy instruction.

Educators must consider technology as a way to augment literacy instruction, all the while considering their capability to rapidly integrate technology-based solutions into their existing educational environments (Moran et al., 2008). Kennedy and Deshler (2010) argued that although technology plays an important role in assisting teachers as they organize individualized literacy instruction, it must be considered augmentative and sound in terms of its effect on the complete instructional plan. Kennedy and Deshler stated that practitioners who provide RTI services must question how technology-based solutions can inform instructional decisions across the increasingly intensive tiers, particularly ensuring that evidence-based practices that attend to the acquisition and practice of literacy skills are solidly in place in all tiers. Moreover, Kennedy and Deshler pointed out the importance of arming teachers with a menu of appropriate technology options to augment existing practices, circumventing a commonly cited problem: many practitioners working with students with a SLD do not use
evidenced-based strategies found to help raise literacy achievement, not to mention that evidence-based technology practices for students identified as having a SLD are severely underutilized (Klingner, Urbach, Golos, Brownell, & Menon, 2010; Smith & Okolo, 2010). As much as two decades ago, Edyburn (2000) suggested that technology-based solutions were commonly overlooked for students with mild to moderate disabilities, and as researchers and educators alike consider the benefits of technology-based solutions, they find themselves faced with limited school and district resources that only further the disuse. Fortunately, significant progress has been made in developing and substantiating cost-effective, easily-implemented interventions and instructional protocols that have proven to advance academic outcomes for struggling students. These include technology-based tools and supports (Kennedy & Deshler, 2010).

According to IDEA 2004, assistive technology is defined as “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a child with a disability” (20 U.S.C. 1401(1)). Studies have shown that students identified as having a SLD need instruction that enhances, facilitates, and accelerates cognitive processes and overall student motivation, and for many, assistive technology has become a viable option. Struggling students should also be encouraged to actively participate in their own learning, instead of simply passively receiving information (Boone & Higgins, 2007; Mayer, 2009). Smith and Okolo (2010) stated that the necessary connections students must make among concepts and key terms can be solidified through multimedia components embedded within software and Internet-based technology-based solutions. However, it is critical for educators at every level to remember that a struggling student’s working memory and capacity for cognitive load can easily
be overwhelmed (Mayer, 2009). Defined as the digital integration of text, graphics, video, audio, animation, or any other media and the representation, storing, and transmitting of digital information, multimedia technology can greatly augment existing approaches for the remediation of skills. According to Kennedy and Deshler (2010), teaching struggling students in any content area or at any learning level is a complex task, but it is especially challenging in literacy, however, educators that design their instruction with the inclusion of multimedia materials may find that students are more engaged and successful in both their literacy and general learning. The authors also suggested that teachers be intentional when they develop instruction using multimedia technology, and they must take time to investigate all the aspects. For example, a teacher should consider: graphics, sound, text, types of delivery, methods of feedback, motivational appeal, and learner control. In an attempt to promote intentional inquiry of multimedia technology to teach literacy skills to students in a tiered instructional framework, Kennedy and Deshler (2010), proposed three recommendations:

- The selection or design of multimedia technology for use in literacy instruction should logically supplement existing pedagogy and explicitly assist students as they build skills essential for literacy-related success. This should also include meeting a student’s individual learning needs while remaining focused on the demands of local and state academic standards.

- The selection or design of multimedia technology for use in literacy instruction should manage a student’s essential processing while limiting his or her extraneous processing. It should encourage active learning through the micromanagement of every multimedia aspect presented to students (Mayer, 2009).
• The selection or design of multimedia technology for use in literacy instruction should incorporate validated learning theories, more specifically, those theories that ensure the chosen multimedia instruction sufficiently reflects the specific literacy demands being learned. It should also be relevant to students, regardless of the skills being taught.

Kennedy and Deshler (2010) stated that because instruction at tiers two and three can be dull and repetitive, the practice of infusing technology to complement existing instruction, not supplant it, can assist in motivating and engaging struggling students, especially for students with a SLD. Moreover, the authors argued that educators need to better understand that the greatest technology available cannot compensate for a weak or poorly designed lesson, emphasizing the critical role of a strong instructional framework to support the addition of technology-based tools. Basham, Israel, Graden, Poth, and Winston (2010) claimed that teachers must consider exactly how technology is to support student learning at each of the tiers of instruction and intervention. For instance, the technologies that are purposefully used for tier one core instruction should be used in a more individualized and determined manner for students requiring additional support in tiers two and three. Whether students are low or high performers, this practical view of how technology tools can purposefully be used to support performance is pedagogically central to educating all students, particularly those with diverse learning needs. In a 2010 study by Torgesen, Wagner, Rashotte, Herron, and Lindamood, the use of computer-based instruction was offered as an instructional supplement, rather than a replacement for instruction led by a teacher. More specifically, the instructional design was closely integrated with student experiences on the computer and targeted the practice of skills and concepts that would academically benefit the students. The results indicated that the computer-supported
instructional intervention model provided effective supplemental reading instruction to the combined-intervention students through their significantly better performance compared to the control students who had only been exposed to the school’s standard reading program. Mayer (2009) further emphasized that student learning can be enhanced via the use of computer-supported instructional intervention, particularly in a multi-tiered system consisting of a solid core of effective practices with supplemental interventions that build upon and extend the core. Smith and Okolo (2010) contended that technology-based instructional practices, when integrated into an RTI framework, generate positive outcomes for struggling students and thus, enhance a student’s access to the general education curriculum.

According to Davies (2011) the intended goal of instructional technology integration should be the “wise and competent use of technology to facilitate learning” (p. 50). However, the process of becoming knowledgeable and proficient takes time and includes continuous, quality professional development. In addition, Davies (2011) argued that teachers gain practical competency and wisdom in problem-based learning situations that are authentic, of which are not always feasible in formal training situations, but are more likely to be found in school settings. Due to the change rate of technology innovations paired with the continual evolution of instructional practices are ever increasing, teachers must sustain proficiency in order to make informed decisions concerning the specific technologies that best support students in accomplishing their learning goals. Hutchison and Reinking (2011) stated that studies suggest that a lack of technology-integration professional development is one of the most prominent reasons as to why teachers do not integrate technology into their instruction. In agreement with Davies (2011), Hutchison and Reinking (2011) posited that the evolution of instructional technology has been rapid, making it reasonable to assume that professional development
designed to help teachers understand and integrate technology into instruction is worthwhile and necessary, yielding more confident, capable, and willing teachers. Based on current trends, the discipline of instructional technology will continue to push the envelope in the development of new, effective ways to utilize technology in educational situations, and the research indicated that training teachers and users of this technology will always include the process of becoming conscious of as well as providing practice with any new technology (Davies, 2011).

According to Davies (2011), instruction and intervention can certainly be enriched by the use of technology, however, effective use requires an understanding of the function and utility of the technology and how it connects to and assists in the accomplishment of the defined learning goals. And as practitioners attempt to implement and integrate technology-based solutions, a number of concerns and constraints have surfaced in the research. The most common concern noted was an evident disconnect between technology and instruction (Davies, 2011; Hutchison & Reinking, 2011; Lawless & Pellegrino, 2007; Stolle, 2008; Torgesen, 2010). Torgesen et al. (2010) stated that the most prominent problem in the integration of computer-based instruction is a lack of a tight connection to classroom instruction or intervention. Stolle (2008) concluded that the limited extent to which technology is integrated into instruction and intervention stems from the tensions, uncertainties, and fears that teachers face about the understanding of technology use, an access to appropriate technology, and the knowledge of who benefits from using it. Instead, teachers were found to simply use technology to complete tasks rather than infusing it into their curriculum. Moreover, Davies (2011) posited that teachers must move beyond viewing technology as just a way to motivate or entertain students, but view it as a tool to supplement core practices and facilitate student learning of specific learning objectives. This is especially important considering many students simply view technology as a novelty. Lawless and
Pellegrino (2007) stated, “We need to move to a more systematic study of how technology integration occurs within our schools, what increases its adoption by teachers, and the long-term impacts that these investments have on both teachers and students” (p.575). Moreover, recognizing the merits of utilizing purposeful technology as a component of instructional design, whether as proactive in the practice and acquisition of skills and concepts or reactive based on performance data of a group of students or a single student, is essential to an effective RTI model (Basham et al., 2010). In a 2011 study done by Hutchison and Reinking, a majority of responding teachers clearly understood and acknowledged that literacy instruction needs to address technological forms of reading and writing, and although their opinion regarding frequency of use did not always coincide with the level of importance, they recognized the importance of technology integration. The same study indicated that teachers also reported minimal access to equipment and a lack of technical support as prominent obstacles. Furthermore, teachers did not find their school’s available technology useful for their specific instruction and intervention learning goals. Davis (2011) argued that both teachers and students experience a learning curve with the integration of a new technology. To gain effectiveness and efficiency, he stated that frequent use reduces frustration and is particularly successful when done as guided practice rather than as self-discovery. Hutchison and Woodward (2014) claimed that a further potential constraint tied to a technology-based learning curve is that students may lack familiarity with the technology tools being used. In this case, the researchers suggested that teachers should consider how to scaffold the student’s experience so that their inexperience does not overshadow the instructional goal. In a 2010 study by Torgesen et al., researchers found that the technology was used to replace teacher instruction rather than to augment it, and in some cases, the study’s observational data found that teachers provided less direct reading instruction
when technology was in the classroom than when it was not present. Hutchison and Woodward (2014) suggested that this might be due to the teacher’s lack of knowledge concerning the literacy-based integration of technology for which professional development could counteract. Hutchison and Reinking (2011) reported that 82% of surveyed literacy teachers believed that a major barrier to the integration of technology was a shortage of quality, meaningful professional development, specifically targeting successful models for infusing digital technologies into instruction. In addition, the researchers reported the following constraints to integrating technology into instruction and intervention: lack of time to prepare integrated lessons involving technology tools and the lack of time to teach students basic computer skills in order to more efficiently and effectively use the integrated technology.

Because technology is a dynamic, adaptable, and persistently evolving tool, and the instructional applications it supports also continually evolve and change, the range of research studies involving the use of technology as a critical component of literacy instruction is increasing. Burnett (2010) organized studies into three categories that reflect the various ways in which researchers tend to be characterizing the role of technology in literacy instruction:

- Technology as the deliverer of literacy
- Technology as the site for student interaction around texts
- Technology as the medium for meaning-making

Those research studies that involve the use of computer programs to support the development of print-based literacy skills were placed into Burnett’s first category. Burnett’s second category focused on research studies that involve student interactions around digital texts. Burnett’s final category included research studies that place an emphasis on the technology itself as a way to encourage and make meaning.
The Role of Paraprofessionals in RTI

According to Averill, Baker, and Rinaldi (2014), one of the biggest challenges of successfully supporting struggling students is finding the time to consistently deliver interventions, therefore, school systems must consider using personnel in the most effective way possible. To increase the likelihood of students benefitting from the intervention provided, the researchers state that success may lie in reaching beyond the classroom teacher to pool and expand personnel resources. Averill, Baker, and Rinaldi found that many schools are adopting an all-hands-on-deck approach in which nearly all educators in the school become involved in the student support system. By pooling teaching resources, schools are then able to deliver support services to a greater number of students (Lembke et al., 2010). However, Averill, Baker, and Rinaldi (2014) suggested that as schools begin thinking creatively about assigning staff, they should focus on who will be the best fit and where. School leaders should also consider the availability of quality technology resources that could serve to provide supervised student support. In addition, the authors argued that those personnel that are highly specialized, such as literacy specialists and English as a Second Language (ESL) teachers, be placed in areas with the most leverage, whereas support staff, such as hired paraprofessionals, be placed in areas of support.

As inclusive education has become more prevalent in schools, the paraprofessional’s primary job responsibilities has changed from clerical to providing support in instructional contexts (Wasburn-Moses, Chun, & Kaldenberg, 2013). In 2002, NCLB outlined their version of appropriate responsibilities for paraprofessionals that included providing one-on-one tutoring, monitoring or providing support in environments such as computer labs or school libraries, assisting with classroom management, as well as working with parents (U.S. Department of
Soon to follow, the International Reading Association established their own paraprofessional standards (Standards for Reading Professionals, n.d.). In 1999, French defined the term *paraprofessional* as “an individual who works in a school in an instructional capacity alongside school professionals and is supervised by the certified or licensed professionals who hold ultimate responsibility for the student and programmatic outcomes” (French, 1999, p. 65).

Since then, the lines have blurred between professionals and paraprofessionals. According to Wasburn-Moses et al. (2013), the roles of paraprofessionals have traditionally been vague and often have not matched their formal job descriptions, and this has been particularly evident in academic areas such as reading. Wasburn-Moses et al. argued that in an era of persistent change, these roles are likely to become more, rather than less, complex. Perhaps more than in years past, school systems must take the roles of paraprofessionals into account as they develop plans for the delivery of student support. Moreover, schools leaders must attend to staff perceptions regarding paraprofessionals’ increased involvement in instruction. Giangreco, Suter, and Doyle (2010) stated that a lack of agreement concerning appropriate roles and responsibilities for paraprofessionals has compounded the challenge of making assignments and providing suitable supervision. In their 2001 study investigating perceptions about paraprofessionals, Giancreco, Edelman, and Broer (2001) reported that the surveyed faculty conveyed more instructional confidence with those paraprofessionals that were either college educated or certified teachers. Furthermore, the faculty perceived those paraprofessionals who had received extensive on-the-job training as being qualified to carry out instructional tasks. Giancreco, Edelman, and Broer concluded that the healthiest school cultures sharing both professional and paraprofessionals to support struggling students intentionally matched the agreed upon paraprofessionals’ skills and training to the specific type of support they would provide.
As early as the 1990s, researchers such as Doyle (1997) and Freschi (1999) argued that the critical role of paraprofessionals in general education classes was apparent, particularly in classrooms where students with a SLD were included with classmates who do not have a SLD. Years later, Wasburn-Moses et al. (2013) stated that education is a field that is moving toward an increased integration between general and special education, and because more special needs students are receiving instruction in the general education classroom, paraprofessionals are often hired to support them. According to the U.S. Department of Education, Institute of Education Sciences (2012), the number of paraprofessionals specific to special education is on the rise, and in 2010 more than 731,705 paraprofessionals were employed in public schools across the United States. Although, IDEA (2004) stated that paraprofessionals only provide instruction under the direct supervision of a licensed teacher, Averill et al. (2014) argued that students with and without disabilities benefit from ongoing collaboration among general and special educators at all tiers of support. This collaboration allows for the sharing of skills and strategies related to differentiation, progress monitoring, and assessment.

Wasburn-Moses et al. (2013) claimed that the reading classroom is one of the most common places in schools that paraprofessionals support struggling students. Several reasons for this phenomenon exist, including the needs of students with an identified disability in the area of reading, a targeted focus on reading under NCLB, and the increased use of RTI models, all of which boosts the amount of reading instruction provided to a wider array of students. Causton-Theoharis, Giangreco, Doyle, and Vadasy (2007) reviewed seven studies in which paraprofessionals were used to provide reading intervention and found that “paraprofessionals are most effectively utilized during instructional time if they are provided with research-based reading approaches that have explicit and systematic instructional guidelines” (p. 58). The
authors established five key strategies for effectively using paraprofessionals for literacy instruction: (1) paraprofessionals should be used in supplementary roles, (2) paraprofessionals should always follow research-based reading approaches, (3) provide paraprofessionals with quality training in the reading approaches, (4) invest in additional training to teach paraprofessionals how to manage behavior, and (5) provide paraprofessionals with consistent, clear, ongoing monitoring and feedback. Albeit paraprofessionals are likely to play a larger role in reading instruction with an RTI framework in place, Averill et al. (2014) argue that beyond the many different considerations specific to individual schools, it is important to always place the most highly qualified educators with those students that have the greatest intervention needs, continuously assessing and reassigning based on the evolving changes in student needs. In Leko, Roberts, and Pek’s (2015) study, the researchers found that paraprofessionals, like licensed educators, made program adaptations resulting from attempts to meet students’ needs. The most skilled paraprofessionals capitalized on their own strengths, as well as the reading program’s strengths, as a way to provide more engaging and responsive instruction to their students. Even when the reading programs in use were perceived as effective, these teachers expressed the need to adapt the program. The researchers suggested that this may result from contending with the motivational and behavioral needs of students that have experienced years of reading problems and who are now vulnerable to feeling stigmatized. Although numerous studies exist regarding the role of paraprofessionals, much more research is needed concerning their optimal roles specific to the area of reading intervention and support (Averill et al., 2014; Causton-Theoharis et al., 2007; Leko et al., 2015).

In 2007, Lane, Fletcher, Carter, Dejud, and Delorenzo (2007) claimed that the research around the training needs for paraprofessionals as literacy support was in its nascent stages. By
2010, Giangreco et al. reported their review of the literature and concluded that paraprofessionals often lack sufficient, quality training, even though they are becoming increasingly responsible for providing academic support to struggling students. Wasburn-Moses’ et al. (2013) study highlighted the significance of both individual and group training for paraprofessionals, especially if they are assigned to a situation in which they focus on one academic area, such as reading. The surveyed paraprofessionals in their study expressed a desire for further training and feedback in academics as well as in behavior, noting that several reported being uninformed about a student’s specific disability, how his or her disability affected learning, or the existence of his or her individualized education program (IEP) goals. Furthermore, some believed they were unprepared to teach the most basic of reading skills, but were uncomfortable asking for training. Wasburn-Moses et al. also reported that the majority of surveyed paraprofessionals appeared to rely heavily on personal experiences, therefore, they suggested schools offer additional professional development in the form of in-context learning based on self-assessed needs as an effective way to assist in improving practice. This cyclical approach to professional development considers each paraprofessional’s strengths, needs, past experiences, and level of training as a guide for planning future training. Averill et al. (2014) also suggested schools track which paraprofessionals will need additional training if they are assigned to independently support students. Reed, Sorrells, Cole, and Takakawa (2012) stated that providing students with small classes taught by highly trained, experienced personnel is one of the chief challenges facing schools, particularly if they support a high number of students who struggle with reading.

Over a decade ago, Giancreco, Edelman, and Broer (2001) argued that an important part of building a school’s sustainability to support struggling students, both inside and outside of general education classrooms, is in recruiting and retaining paraprofessionals who experience
high levels of job satisfaction. Wasburn-Moses et al. (2013) agreed, and based on their study posited that in a current educational culture of data-driven practices, including performance-based assessments of teacher effectiveness, a very little attention is paid to the performance of paraprofessionals and support staff. And in many cases, licensed teachers are responsible for supervising paraprofessionals, even though they typically have no training in supervision. The authors suggested that as schools move toward more complex service delivery models, they must consider developing a process for the appropriate collection and usage of both quantitative and qualitative data surrounding the effectiveness of their paraprofessionals and the support they provide. Paired with research findings, this type data can serve to guide these new roles for paraprofessionals as they continue to evolve. Wasburn-Moses et al. (2013) contended that much more research regarding literacy-based paraprofessional roles is warranted, and because the delivery of support services is changing in both general and special education, our understanding of the role paraprofessionals’ play remains to be seen.

*Making Connections® Intervention*

*Making Connections® Intervention (MCI)* is a comprehensive blended program developed by Educational Publishing Services Literacy and Intervention. The program targets intervention for students who struggle with literacy in middle school and beyond. Addressing a wide range of students’ literacy needs, the complete MCI blended model combines direct, explicit teacher-led instruction, engaging and individualized interactive practice, and both formal and informal assessments via print and computer-based delivery modes. Supporting the three groups of struggling readers identified in Reading Next (Biancarosa & Snow, 2004), a widely used report on adolescent literacy, MCI’s instructional approach targets: students who lack
enough fluency to assist comprehension, students who read fluently, but lack the necessary
comprehension skills and strategies, as well as students who have acquired the necessary skills
and strategies, but struggle to transfer them to other texts. Reading Next’s (Biancarosa & Snow, 2004) recommendations for successful adolescent reading intervention also served as guiding
principles for the development of MCI. These include:

- The implementation of a blended model
- Lessons that motivate students to engage with the text
- Scaffolding and substantial support for each new skill through explicit instruction, which
  is gradually removed as a student’s proficiency increases.
- Strategic tutoring for those students that are still struggling with lower level, foundational
  skills.
- Text-based collaborative learning that supports students as they build comprehension
together through repeated readings, group discussions, and presentations.
- Age-appropriate considerate texts and optional audio support that allows students the
  ability to focus on acquiring new skills and applying learned strategies.

Based on the philosophy that comprehension is the end goal of reading, and
comprehension proficiency becomes more critical as students move beyond the grades of
learning to read to reading to learn, MCI is structured in three levels to assist struggling students
in the acquisition and application of key comprehension skills and strategies: (1) Aqua – third
grade readability, (2) Gold – fourth grade readability, and (3) Crimson – fifth grade readability.
Each level is comprised of five connected components that further support the critical skill of
comprehension and are organized into high-interest thematic units to maintain student
engagement and motivation. MCI Comprehension provides students with three engaging texts
per unit that focus on key comprehension skills while supporting students’ construction of content-area knowledge and reading fluency. *MCI Online* uses adaptive technology to provide students with tailored, interactive comprehension instruction and practice tied to and supporting the skills presented in the *MCI Comprehension* texts. *MCI Writing* connects the writing process to the same text structure or genre presented in each unit of *MCI Comprehension*. *MCI Word Study* underpins the goal of comprehension by providing students with practice in decoding and vocabulary acquisition. Lastly, *MCI Student Library* offers students an opportunity to engage with high-interest, thematically-connected paperback books that target the key comprehension skills and strategies found in *MCI Comprehension*.

*MCI*’s instructional model is built upon the introduction of skills through direct teacher-modeled instruction, which is carefully scaffolded to transition from modeling, to guiding, to coaching in order for students to learn how to independently apply newly learned skills and strategies. Three varied learning scenarios make up the foundation for *MCI*’s instructional model:

- whole group – scaffolded direct instruction
- small group – strategic tutoring and cooperative learning
- independent – adaptive technology and student library

*MCI* provides a wide range of assessments, such as pre- and post-tests, for student placement and progress monitoring. *MCI*’s progress monitoring assessments are maze tests, considered to be a superior assessment for comprehension, and provide short, frequent snapshots of student progress and specific skill attainment. *MCI* assessments use the Lexile® framework for Reading, a curriculum-based measure (CBM) that monitors students’ long term progress.
Additional diagnostic assessments are available if needed for further investigation into a student’s learning profile. Reports are available at the student, class, school, and district levels.

The MCI management system is a browser-based delivery model and provides teachers, administrators, and interventionists with powerful tools to monitor student progress, differentiate their instruction, and manage RTI implementations (MCI Making Connections® Intervention n.d.).

Chapter Summary

Although proficient reading is a prerequisite for post-secondary educational and job-related success, many students still struggle to develop the skills needed to read fluently and comprehend (U.S. Departments of Education, Institute of Education Science, National Center for Education Statistics, 2015). In addition, an overwhelming amount of research suggests that once a student falls behind in reading skill development, he or she is unlikely to catch up (Shinn, 2010). Together, these findings confirm the need for early prevention and intervention in the critical area of reading. Within a multi-tiered response to intervention system, students are likely to receive support during the earlier stages of learning. The development of some disabilities may even be prevented, or at the least, their impact lessened. The search for preventative measures has prompted many schools to implement an RTI framework as a means for improving their educational practices (Stecker, Fuchs, & Fuchs, 2008; Solis, Miciak, & Vaughn, 2014). As it continues to evolve, the very structure of RTI as a mult-tiered system of support is proving to be complex, therefore, schools are facing many challenges as they strive for an effective and sustainable RTI implementation that supports student progress (Thorius & Maxey, 2015).
CHAPTER 3
RESEARCH METHOD

The purpose of this non-experimental quantitative study was to provide research in examining the difference in students’ reading language arts achievement before and after receiving targeted reading intervention, specifically, the reading intervention program Making Connections Intervention. This was accomplished through the quantitative data collection of TCAP reading scaled scores for students in sixth through ninth grade from one East Tennessee school district for the academic school years 2014 and 2015. This chapter details the methodology in which data was collected and analyzed to test the following five research questions.

Research Questions and Null Hypotheses

The following questions and corresponding null hypotheses relating to TCAP achievement scores and the implementation of Making Connections Intervention were addressed:

1. Is there a significant difference between students’ TCAP reading scaled scores before and after implementation of Making Connections?

H₀1. There is not a significant difference between students’ TCAP reading scaled scores before and after implementation of Making Connections.

2. Is there a significant difference between TCAP reading scaled scores of male and females students who participated in Making Connections Intervention?

H₀2. There is not a significant difference between TCAP reading scaled scores of male and females students who participated in Making Connections Intervention.
3. Is there a significant difference between TCAP reading scaled scores of Title I and non-Title I students who participated in *Making Connections Intervention*?

H_0^3. There is not a significant difference between TCAP reading scaled scores of Title I and non-Title I students who participated in *Making Connections Intervention*.

4. Is there a significant difference between TCAP reading scaled scores of special education and nonspecial education students who participated in *Making Connections Intervention*?

H_0^4. There is not a significant difference between TCAP reading scaled scores of special education and nonspecial education students who participated in *Making Connections Intervention*.

5. Is there a significant difference between TCAP reading scaled scores of students taught by a certified teacher and students taught by a paraprofessional who participated in *Making Connections Intervention*?

H_0^5. There is not a significant difference between TCAP reading scaled scores of students taught by a certified teacher and students taught by a paraprofessional who participated in *Making Connections Intervention*.

*Population*

The population for this study was confined to a cohort of 99 students who received reading intervention via *Making Connections Intervention* during the 2014-2015 school year in an East Tennessee school district. Forty-six of the cohort’s students were male and 53 were female. Students were initially identified for support through RTI\(^2\) based on a review of longitudinal information such as, but not limited to: scores on a nationally-normed screening assessment, TCAP performance data, academic grades, and teacher observational data. Each
student identified as at-risk was then enrolled in one of the nine classes providing reading intervention through the *Making Connections Intervention* program. The population of 99 students were randomly divided to form all nine intervention classes. Classes were taught five days a week for a minimum of 30 minutes a day. Subgroups for this study included: gender, Title I classification, special education classification, and instructor classification.

*Instrumentation*

The data used in this study came from 2014 and 2015 TCAP Achievement scores; more specifically reading language arts scaled scores. A scaled score is the total number of correct questions (raw score) that has been converted into a consistent and standardized scale and balances out the differences due to multiple test forms and item difficulty commonly found on standardized assessments (APICS, 2015). The TCAP Achievement test is a standardized assessment administered to all Tennessee students in grades three through eleven and assesses student mastery of grade-level standards in reading language arts, math, science and social studies. This study closely investigated students’ scaled scores in reading language arts.

According to a report provided by the Tennessee Task Force of Student Testing and Assessment (Tennessee Department of Education, 2015b), Tennessee has long used summative tests, such as the TCAP, to provide important information regarding the collective progress of students across the state. Tennessee began statewide testing with the Tennessee Proficiency Test in 1983, and in 1988, the State Board of Education enacted the Tennessee Comprehensive Assessment Act (TCAP) to become the new statewide summative test. In 1992, TCAP became a state mandated assessment per the Education Improvement Act (EIA) and remained so until the 2015-2016 school year when it was replaced by the TNReady statewide summative assessment. In 2014 and
2015, the Tennessee Department of Education reported that the average seventh grade student spent 11.7 hours per year taking the state-required TNReady summative assessment. Until the advent of TNReady, 4.3 hours, was spent on the English language arts and writing sections of the TCAP administered to grades six through twelve.

Data Collection

Prior to beginning the research process of this study, the researcher obtained permission from the Institutional Review Board (IRB) at East Tennessee State University. Upon approval, the researcher met with the Sullivan County Director of Schools to discuss the purpose of the study and clarify any questions concerning the research process. The researcher then met with her dissertation committee to gain permission to proceed with the collection and analysis of data, whereupon, the data were provided for the selected population by the Sullivan County Department of Education. Prior to the researcher’s retrieval, the district testing coordinator omitted all student names from the data and created a unique identifier for each student. The data was presented in a single file comprised of the entire cohort’s TCAP reading scaled scores.

Data Analysis

Data analyses were conducted using Microsoft Excel for Mac Version 2015 and Statistical Package for Social Sciences (SPSS). A series of paired samples $t$ tests were conducted to analyze the data for research question 1. An independent samples $t$ test was conducted to analyze the data for research questions 2, 3, 4, and 5. According to Green and Salkind (2003), a paired samples $t$ test evaluates whether the mean of the difference between two variables is significantly different from zero. Similarly, an independent samples $t$ test evaluates the
difference between the means of two independent groups. The output provided for each data set in this study was analyzed at the .05 significance level. The results of each analysis are included in Chapter 4.

Chapter Summary

A non-experimental quantitative method was chosen for this study due to the researcher’s interest in the differential nature of the collected data. The researcher was interested in assessing the degree of difference between the variables in each subgroup: gender, Title I classification, special education classification, and instructor classification.
CHAPTER 4

FINDINGS

The purpose of this quantitative study was to determine whether there was a significant impact on students’ reading language arts TCAP scores due to intervention instruction delivered via the program *Making Connections Intervention* in one East Tennessee school district. Participants in this study included 99 students in grades six through nine that received reading intervention five days a week for a minimum of 30 minutes a day. Data were analyzed for the subgroups gender, Title I classification, special education classification, and instructor classification.

*Research Question 1*

Research Question 1: Is there a significant difference between students’ TCAP reading scaled scores before and after implementation of *Making Connections Intervention*?

H₀₁: There is not a significant difference between students’ TCAP reading scaled scores before and after implementation of *Making Connections Intervention*.

A paired-samples *t* test was conducted to evaluate whether students’ TCAP reading scaled scores differed between before and after implementation of *Making Connections Intervention*. The intervention program *Making Connections Intervention* was the test variable and the grouping variable was 2014 TCAP reading scaled scores and 2015 TCAP reading scaled scores. The test was significant, *t*(99) = -5.946, *p* < .001. Therefore, the null hypothesis was rejected. Students’ 2014 TCAP reading scaled scores (*M* = 717.18, *SD* = 23.96) were significantly lower than students’ 2015 TCAP reading scaled scores (*M* = 735.77, *SD* = 27.48). The 95% confidence interval for the difference in means was 12.41 to 24.76. The Cohen’s d
index was 0.72, which indicated a medium effect size. Students’ reading scaled scores were significantly higher after the implementation of the intervention program *Making Connections Intervention*. Figure 1 shows the distributions for the two groups.

![Box plot showing performance on the TCAP assessment](image)

*Figure 1.* Reading scaled scores on the TCAP assessment before and after implementation of the intervention program *Making Connections Intervention*

**Research Question 2**

Research Question 2: Is there a significant difference between TCAP reading scaled scores of male and female students who participated in *Making Connections Intervention*?

H₀₂: There is not a significant difference between TCAP reading scaled scores of male and female students who participated in *Making Connections Intervention*. 
An independent-samples $t$ test was conducted to evaluate whether the mean reading scaled score on the 2015 TCAP differed between male and female students who participated in the intervention program *Making Connections Intervention*. The 2015 TCAP reading scaled score was the test variable and the grouping variable was gender. The test was not significant, $t(71) = 1.218$, $p = .227$. Therefore, the null hypothesis was retained. Male students ($M = 732.02$, $SD = 33.71$) did not significantly score higher or lower than female students ($M = 739.02$, $SD = 20.05$). The 95% confidence interval for the difference in means was -5.70 to 17.09. The Cohen’s $d$ index was 0.26, which indicated a small effect size. Male students’ 2015 TCAP reading scaled scores were not significantly higher or lower than female students’ 2015 TCAP reading scaled scores who participated in the reading intervention *Making Connections Intervention*. Figure 2 shows the distributions for the two groups.

*Figure 2.* Reading scaled scores for male and female students on the 2015 TCAP assessment
Research Question 3

Research Question 3: Is there a significant difference between TCAP reading scaled scores of Title I and non-Title I students who participated in Making Connections Intervention?

H₀₃: There is not a significant difference between TCAP reading scaled scores of Title I and non-Title I students who participated in Making Connections Intervention.

An independent-samples t test was conducted to evaluate whether the mean reading scaled score on the 2015 TCAP differed between Title I and non-Title I students who participated in the intervention program Making Connections Intervention. The 2015 TCAP reading scaled score was the test variable and the grouping variable was Title I classification. The test was not significant, t(52) = 0.751, p = .456. Therefore, the null hypothesis was retained. Title I students (M = 732.63, SD = 33.58) did not significantly score higher or lower than non-Title I students (M = 737.48, SD = 23.31). The 95% confidence interval for the difference in means was -12.75 to 14.35. The Cohen’s d index was 0.17, which indicated a small effect size. Title I students’ 2015 TCAP reading scaled scores were not significantly higher or lower than non-Title I students’ 2015 TCAP reading scaled scores who participated in the reading intervention Making Connections Intervention. Figure 3 shows the distributions for the two groups.
Figure 3. Reading scaled scores for Title I and non-Title I students on the 2015 TCAP assessment

Research Question 4

Research Question 4: Is there a significant difference between TCAP reading scaled scores of special education and nonspecial education students who participated in Making Connections Intervention?

H₀₄: There is not a significant difference between TCAP reading scaled scores of special education and nonspecial education students who participated in Making Connections Intervention.

An independent-samples t test was conducted to evaluate whether the mean reading scaled score on the 2015 TCAP differed between special education student and nonspecial
education students who participated in the intervention program *Making Connections Intervention*. The 2015 TCAP reading scaled score was the test variable and the grouping variable was special education classification. The test was not significant, \( t(26) = 0.786, p = .438 \). Therefore, the null hypothesis was retained. Special education students \((M = 731.00, SD = 40.77)\) did not significantly score higher or lower than nonspecial education students \((M = 737.56, SD = 20.09)\). The 95% confidence interval for the difference in means was -14.25 to 18.10. The Cohen’s d index was 0.22, which indicated a small effect size. Special education students’ 2015 TCAP reading scaled scores were not significantly higher or lower than nonspecial education students’ 2015 TCAP reading scaled scores who participated in the reading intervention *Making Connections Intervention*. Figure 4 shows the distributions for the two groups.
Research Question 5

Research Question 5: Is there a significant difference between TCAP reading scaled scores of students taught by a licensed teacher and students taught by a paraprofessional who participated in Making Connections Intervention?

H₀₅: There is not a significant difference between TCAP reading scaled scores of students taught by a licensed teacher and students taught by a paraprofessional who participated in Making Connections Intervention.

An independent-samples t test was conducted to evaluate whether the mean reading scaled score on the 2015 TCAP differed between students who were instructed in the
intervention program *Making Connections Intervention* by a licensed teacher and students who were instructed by a paraprofessional in the intervention program *Making Connections Intervention*. The 2015 TCAP reading scaled score was the test variable and the grouping variable was instructor classification. The test was not significant, \( t(32) = 1.137, p = .261 \). Therefore, the null hypothesis was retained. Students instructed by a licensed teacher (\( M = 733.32, SD = 24.24 \)) did not significantly score higher or lower than students instructed by a paraprofessional (\( M = 740.67, SD = 32.32 \)). The 95% confidence interval for the difference in means was -2.09 to 27.06. The Cohen’s d index was 0.26, which indicated a small effect size. The 2015 TCAP reading scaled scores of students who were instructed by a licensed teacher were not significantly higher or lower than the 2015 TCAP reading scaled scores of students who were instructed by a paraprofessional in the reading intervention program *Making Connections Intervention*. Figure 5 shows the distributions for the two groups.
Figure 5. 2015 TCAP reading scaled scores for students instructed by a licensed teacher and students instructed by a paraprofessional in the intervention program Making Connections Intervention.

Chapter Summary

In this chapter 2014 and 2015 TCAP data were presented and analyzed for a cohort of 99 students participating in a tiered intervention program implemented in two East Tennessee schools. There were five research questions and five null hypotheses. All data were obtained from the Sullivan County Department of Education. Results indicated a significant difference in students’ TCAP reading scaled scores before and after implementation of the intervention program Making Connections Intervention and no significant differences between TCAP reading scaled scores of male and female students who participated in Making Connections Intervention.
TCAP reading scaled scores of Title I and non-Title I students who participated in *Making Connections Intervention*, TCAP reading scaled scores of special education and nonspecial education students who participated in *Making Connections Intervention* or TCAP reading scaled scores of students taught by a licensed teacher and students taught by a paraprofessional who participated in *Making Connections Intervention.*
CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter contains findings, conclusions, and recommendations which may be used as a resource for the investigation or implementation of a tiered response to intervention framework. The purpose of this study was to examine the relationship between the reading intervention program *Making Connections Intervention* and pre-intervention and post-intervention TCAP scores in grade levels six through nine in an East Tennessee school district. The study was conducted using students’ TCAP reading scaled scores for the academic school years 2014 and 2015.

*Summary of Findings*

The statistical analysis reported in this study was based on the five research questions presented in Chapters 1 and 3. In Chapter 3 each research question had one null hypothesis. Null hypothesis 1 was analyzed using a paired samples *t*-test while null hypotheses 2, 3, 4, and 5 were analyzed using independent samples *t*-tests to determine if there was a difference in students’ pre- and post-intervention TCAP reading scaled scores based on the grouping variables of gender, Title I classification, special education classification, and instructor classification. The level of significance for each test was .05. The number of students involved in this study was 99. Although findings did not reveal a significant difference in TCAP reading scaled scores for any of the subgroups: gender, Title I classification, special education classification, and instructor classification, the study found that overall, students’ TCAP reading scaled scores increased after the implementation of the program *Making Connections Intervention*. 

82
The results showed that there was a significant difference between students’ TCAP reading scaled scores before and after implementation of the program *Making Connections Intervention*. Students’ TCAP reading scaled scores were significantly higher after the implementation of the intervention program *Making Connections Intervention*.

However, results did not indicate significant differences between TCAP reading scaled scores of males and female students who participated in *Making Connections Intervention*, TCAP reading scaled scores of Title I and non-Title I students who participated in *Making Connections Intervention*, TCAP reading scaled scores of special education and nonspecial education students who participated in *Making Connections Intervention*, or TCAP reading scaled scores of students taught by a licensed teacher and students taught by a paraprofessional who participated in *Making Connections Intervention*.

**Conclusions**

The purpose of this study was to examine the relationship between the reading intervention program *Making Connections Intervention* and pre-intervention and post-intervention TCAP reading scaled scores in grade levels six through nine in one East Tennessee school district. The study was conducted using participating students’ TCAP reading scaled scores for the academic school years 2014 and 2015. The following conclusions were based upon the findings from the data of this study:

**Implementation of the Intervention Program**

A significant difference was found between students’ TCAP reading scaled scores before and after the implementation of *Making Connections Intervention*. According to Wright (2006),
“the quality of a school as a learning community can be measured by how effectively it addresses the needs of struggling students.” (p. 1). Therefore, the implementation of an effective RTI model can serve as a way to expand a school’s capacity to both reach and support its many diverse learners. Schools vary greatly when it comes to choosing which model to establish: a stand-alone program following the standard protocol approach, the development of individualized interventions for every student using the problem-solving approach, or a combination of both program and individualized approaches (Fuchs & Vaughn, 2012). This study involved the use of both the program and individualized approaches.

**Gender**

No significant difference was found between TCAP reading scaled scores of male and female students that participated in Making Connections Intervention. Fifty-two of the 99 students in this study were male and 47 were female. According to researchers King and Gurain (2006), gender differences do exist among readers. For example, boys tend to be more active than girls, find interest in visually novel stimuli, and compartmentalize brain activity. In contrast, girls are typically better at multitasking due to the structural differences in their brains that make it possible for the hemispheres to cross information. Thus, girls can typically process information from more subjects at any given time while boys process best when given specific steps to follow focusing on a single task. In addition, King and Gurain (2006) posited that the area of the brain associated with reading and word production is generally more active and develops more quickly in girls than in boys, suggesting that normally developing boys may be misidentified as at-risk if teachers are unaware of these differences. Sadowski (2010) noted that the concerns about boy’s reading struggles go back to as early as the 1900s, but current evidence
indicates that boys’ reading deficits may require solutions that capitalize on context rather than on crisis, devoting attention to what brain research is telling us that boys need to become proficient readers instead of focusing merely on the fact that girls are surpassing boys in overall academic performance.

**Title I Classification**

No significant difference was found between TCAP reading scaled scores of Title I and non-Title I students that participated in *Making Connections Intervention*. Even fifty years after its inclusion as part of President Lyndon Johnson’s War on Poverty, the role of Title I of the Elementary and Secondary Education Act (ESEA) remains a debatable subject for elementary and secondary educators in the United States (Wright, 2010). Designed to increase opportunities for disadvantaged children via an influx of federal funds to both public and private schools, Title I awards funds to school districts with the intentions of supporting the highest poverty schools. And within those high poverty schools, Congress further intends for local districts to direct Title I funds to support the most educationally deprived children. Since its inception, it has proven to be challenging for the federal government to ensure that districts use their Title I funds to support the program’s intended beneficiaries. A key federal goal emerged from the 1994 reauthorization of ESEA which was based on the theory that money alone does not constitute student progress and success. This goal aimed at ensuring the effective use of Title I funds to improve student outcomes (Gordon & Reber, 2015). For many districts, this meant appropriating funds in the form of personnel to shore up current work around supporting struggling learners, particularly in the area of literacy. Hence, specific Title I teachers were hired and injected into existing frameworks for supporting at risk students which research indicates have yielded varying levels
of effectiveness. In response, researchers such as Mahdavi and Beebe-Frankenber (2009) argue that districts should no longer provide student support services based solely on categories such as special education and Title I, rather an attempt to increase overall student success should be based on a tiered model of intervention that is available to all students.

Special Education Classification

No significant difference was found between TCAP reading scaled scores of special education and nonspecial education students that participated in Making Connections Intervention. According to Fuchs, Fuchs, and Compton (2004) and IDEA (2004), local education agencies can now elect to use a student’s response to intervention as a chief component for identifying SLDs alongside the determination of his or her eligibility for special education services. And although the findings of this study between special education and nonspecial education students were not significant, Shinn (2007) stated that models of RTI have the ability to enhance the validity with which specific learning disabilities are identified and have proven to reduce the eventual student failure that would otherwise occur without targeted intervention. Fuchs et al. (2003) argue that this intensive approach transforms the process of identification into a process of prevention, indicating that struggling students benefit from RTI regardless of their classification as special education or nonspecial education.

Instructor Classification

No significant difference was found between TCAP reading scaled scores of students taught by a certified teacher and students taught by a paraprofessional that participated in Making Connections Intervention. According to Wasburn-Moses et al. (2013), the reading classroom is
one of the most common places in which schools use paraprofessionals to support struggling students. This study did not yield a significant difference in TCAP scores of students taught by either a licensed teacher or a paraprofessional, however Leko, Roberts, and Pek’s (2015) study found that paraprofessionals were more likely to positively impact student achievement at a quicker rate when an RTI framework was in place, suggesting that the use of paraprofessionals for intervention can be done effectively with the proper amount of research and support. Because the delivery of student support services is continually evolving in both general and special education, Wasburn-Moses et al. (2013) contend that additional research regarding the use of paraprofessional roles for literacy-based instruction is warranted.

Recommendations for Practice

The findings and conclusions of this research established a foundation for making the following recommendations for assisting school systems in the implementation of an RTI framework:

1. Prior to the implementation of an RTI framework, school administrators should consider the development of a team consisting of key stakeholders. This team should fully investigate the process of implementing and sustaining an effective model of intervention and communicate their findings to other involved stakeholders.

2. District and school administrators should develop a strategic plan to address the short- and long-term goals concerning the implementation of an RTI framework.
3. All stakeholders should come to understand that RTI is a targeted plan to address struggling students’ academic deficits, not merely a placement on the continuum for the referral for special education services.

4. District and school administrators should endeavor to seek out and provide continuous, needs-based, high-quality, professional development opportunities concerning the implementation and sustainability of an effective RTI framework.

5. District and school administrators should develop a process for identifying those teachers or paraprofessionals that will most effectively provide interventions to the most at-risk students.

6. All stakeholders involved in any part of an RTI framework should participate in the process of frequent and continuous reflection in order to make necessary adjustments, modification, additions, or omissions. This reflection should be based on administrator, student, teacher, school- and district-wide qualitative and quantitative data.

According to Wright (2007), the best plan to support an individualized intervention process is to develop a multi-disciplinary problem-solving team. This team serves as the vehicle to support teachers in developing and monitoring individual student intervention plans. Wright argues that a primary objective for any school in the beginning stages of implementing RTI is the recruiting and training of such a team. This team essentially becomes the nucleus, responsible for developing both short- and long-term plans to drive the implementation process. Brown-Chidsey and Steege (2010) suggested that district- and school-level RTI teams draft a detailed plan for what they anticipate might happen within a given extended time frame. Although flexible enough
to be modified and adjusted, this plan ensures that responsive instruction becomes a reality, built on the solid footing of monitoring of the overall progress of the implementation and sustainment of RTI. This monitoring allows RTI teams the ability to pinpoint specific areas of strength as well as specific areas of need, and according to Kratochwill, Volpiansky, Clements, and Ball (2007) one of the most common forgotten aspects of any RTI implementation is the need for quality professional development. This is especially true when paraprofessionals are delivering interventions as they have traditionally not been held to the same level of instructional responsibility. As an integral part of a problem-solving model of RTI, Brown-Chidsey and Steege (2010) proposed that professional development be followed by supported, monitored implementation paired with scheduled times set aside for reflection and adjustments. It is this cycle of professional training, implementation support, reflection and adjustment that provides a school’s RTI stakeholders “the chance to identify what has been successful and build upon it when developing new goals and plans” (p. 11).

Recommendations for Future Research

The results of this study indicate that the district implementation of the intervention program Making Connections Intervention had a significant impact on student achievement as measured by the TCAP assessments of 2014 and 2015. The following are recommendations for future research and study to be conducted:

1. A replication of this study in similar schools or school districts.
2. An expansion of this study to include a qualitative research method to examine key stakeholders’ perceptions concerning the implementation of an RTI framework to support the academic needs of struggling learners.

3. A comparable study concerning the use of Making Connections Intervention for RTI instruction to that of a similar intervention program.

4. A continuation of this study to include longitudinal data on the same group of participating students. This data could be used to investigate: whether receiving intervention made any long-term impact on participating students’ academic success, how many students were able to close academic gaps and return to solely Tier I instruction by their senior year, how many students continued to need intervention in addition to regular education instruction, how many students were referred for special education services based on the inability to close academic gaps during intervention, as well as the overall graduation rate of the cohort of 99 students.

Chapter Summary

This study examined the relationship between the reading intervention program *Making Connections Intervention* and pre-intervention and post-intervention TCAP scores in grade levels six through nine in an East Tennessee school district. The study was conducted using students’ TCAP reading scaled scores for the academic school years 2014 and 2015. The findings presented in this chapter provided the researcher data to make conclusions and recommendations for future investigation and implementation of a tiered framework of response to intervention. Although an overall significant impact on student achievement was found based on this specific
implementation of the intervention program *Making Connections Intervention*, the researcher concludes that additional, longitudinal investigation is needed as the implementation continues, and should include a wider scope of locations as well as an increase in the number of participants.
REFERENCES


Individuals with Disabilities Education Improvement Act (IDEA) of 2004, P.L. 108-446, Vol. 300.309[b][2].


May 26, 2016

Dear Jamie Corwin

Thank you for recently submitting information regarding your proposed project "A Study to Determine the Relationship of the Reading Intervention Program Making Connections Intervention on Tennessee Comprehensive Assessment Program Scores in One East Tennessee Middle School".

I have reviewed the information, which includes a completed Form 129.

The determination is that this proposed activity as described meets neither the FDA nor the DHHS definition of research involving human subjects. Therefore, it does not fall under the purview of the ETSU IRB.

IRB review and approval by East Tennessee State University is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are human subject research in which the organization is engaged, please submit a new request to the IRB for a determination.

Thank you for your commitment to excellence.

Sincerely,
Stacey L. Williams, Ph.D.
Chair, ETSU IRB
APPENDIX B: TENNESSEE RTI² MODEL

Response to Instruction and Intervention

RTI²

GUIDING PRINCIPLES: □ Leadership □ Culture of Collaboration □ Prevention & Early Intervention

TIER I  All

ALL students receive research-based, high quality, general education instruction. In general, 80-85 percent of students will receive only Tier I instruction.

TIER II  Some

In ADDITION to Tier I, extra help is provided to students who fall below the 25th percentile in basic math and reading skills. In general, 10-15 percent of students will receive Tier II interventions.

TIER III  Few

In ADDITION to Tier I, extra help is provided to students who have not made significant progress in Tier II, are 1½ – 2 grade levels behind, or are below the 10th percentile in basic math and reading skills. Tier III interventions are more explicit and more intensive than Tier II interventions. In general, only 3-5 percent of students will receive Tier III interventions.
VITA
JAMI H. CORWIN

Education:  
East Tennessee State University, Johnson City, TN  
Doctor of Education, Educational Leadership, Administrative Endorsement, Ed.D.  
2016

East Tennessee State University, Johnson City, TN  
Master’s of Arts in Teaching, M.A.T.  
1997

Virginia Commonwealth University, Richmond, VA  
Bachelor of Fine Arts, B.F.A.  
1995

Professional Experience:  
Academic Consultant – First TN CORE  
Tennessee Department of Education, Nashville, TN  
2015-present

English Language Arts Curriculum Coordinator  
Sullivan County Schools, TN  
2010-2015

Teacher  
Emmett Elementary School, Bristol, TN  
2004-2010

Teacher  
Hawkins County Schools, TN  
1997-2001