

THE EFFECTS OF NILD EDUCATIONAL THERAPY ON READING ACHIEVEMENT

by

Brenda Louise Hout

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2019

THE EFFECTS OF NILD EDUCATIONAL THERAPY ON READING ACHIEVEMENT

by Brenda Louise Hout

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

2019

APPROVED BY:

Russell L. Claxton, EdD, Committee Chair

L. Thomas Crites, EdD, Committee Member

Kathleen R. Hopkins, EdD, Committee Member

ABSTRACT

The current educational system in American schools is failing to meet the literacy needs of impaired readers in grades four through eight due to inadequate or delayed intervention programs after third grade, which fail to incorporate cognitive and metacognitive skills taught simultaneously over extended periods of time. This causal-comparative research study was designed to investigate the inclusion of these skills in individual and group settings in a pre/post-test format, while controlling for the pre-test, using NILD strategies and methodology. The purpose of this study was to determine if a significant difference in reading achievement existed between the two groups when simultaneous cognitive/metacognitive instruction was administered to reading impaired students in fourth through eighth grades over one school year. The independent variable consisted of group intervention ($n = 152$), and the dependent variable was one-one-one instruction ($n = 88$). Archival data from NILD included pre- and post-test standard scores from five reading subtests of the Woodcock-Johnson III or IV for the 2014-2018 school years to determine if there was a difference in academic reading achievement between groups. Prior to intervention, all students ($N = 240$) received standardized academic and/or psychological testing for diagnoses of a reading disability. Assumption tests were conducted, and the data was analyzed using a One-Way Analysis of Covariance (ANCOVA). The results showed no significant difference between achievement for students who had received NILD treatment in group settings as opposed to one-on-one settings where $F(1, 237) = .034, p = .854$. Therefore, the researcher failed to reject the null hypothesis.

Keywords: reading disability, metacognitive reading strategy, reading comprehension, adolescent reading remediation

Copyright Page

Copyright 2019 Brenda Louise Hout

Dedication

I would like to express my gratitude to my husband and family who faithfully supported me in this long journey for my dissertation. Although at times I wavered in my belief that I would finish, they never stopped believing. It is only because of their sacrifice, encouragement, and support that I was able to reach my life-long goal. Thank you for loving me enough to believe in me and give me the determination to finish the race victoriously.

Acknowledgments

I would like to thank my chair, research consultant, and committee members for their time, expertise, and support throughout this arduous process. They provided encouragement and guidance by sharing their knowledge freely, that I might succeed in completing my degree.

Table of Contents

ABSTRACT	3
Copyright Page	4
Dedication	5
Acknowledgments	6
List of Tables	10
List of Figures	11
List of Abbreviations	12
CHAPTER ONE: INTRODUCTION	13
Overview	13
Background	13
Problem Statement	16
Purpose Statement	18
Significance of the Study	19
Research Question	20
Definitions	20
CHAPTER TWO: LITERATURE REVIEW	23
Overview	23
Conceptual Framework	23
Stages of Learning Theory	24
Zone of Proximal Development Theory	24
Brain Functioning Theory	25
Mediated Learning (MLE) Theory	26
Related Literature	26
Relevant Factors and Challenges to Reading Remediation	28

Gap Between Research and Practice	53
Summary	59
CHAPTER THREE: METHODS	62
Overview	62
Design	62
Research Question	62
Hypothesis	63
Participants and Setting	63
Instrumentation	65
Common Characteristics of W-J III and IV	65
Procedures	68
Data Analysis	72
CHAPTER FOUR: FINDINGS	74
Overview	74
Research Question	74
Null Hypothesis	74
Descriptive Statistics	74
Data Screening	76
Assumption Testing	77
Results	81
Null Hypothesis	81
CHAPTER FIVE: CONCLUSIONS	83
Overview	83
Discussion	83
Implications	88

Declining Effect Sizes	89
Reading Impaired and Non-responders	89
Complex Reading Profiles	90
A Holistic Approach to Remediation	90
Research to Practice Gap	91
Limitations	92
Recommendations for Future Research	94
REFERENCES	98
APPENDIX A: IRB Approval Letter	114
APPENDIX B: Introductory Letter to Therapists	115
APPENDIX C: Follow-Up Letter to Therapists and Instructions for Reporting	116
APPENDIX D: Data Response Form	117
APPENDIX E: Letter to Parents/Guardians	118
APPENDIX F: Progress Chart 1	120
APPENDIX G: Progress Chart III: Anecdotal Record	121

List of Tables

Table 1: Sex vs Crosstabulation	75
Table 2: Total of Subtest Scores for Control Group of 2-5 Students Per Group	76
Table 3: Total of Subtest Scores for Experimental Group of One-On-One Instruction	76
Table 4: Homogeneity of Slopes	80
Table 5: Levene's Test of Equality of Error Variances	81
Table 6: Tests of Between-Subjects Effects	82

List of Figures

Figure 1: Boxplot of pre-test for group and one-on-one composite scores	77
Figure 2: Boxplot of post-test for group and one-on-one composite scores	77
Figure 3: Scatter plot and line of best fit	78
Figure 4: Histogram of pre-test composite scores	79
Figure 5: Histogram of post-test composite scores	79

List of Abbreviations

Adequate Yearly Progress (AYP)

Analysis of Covariance (ANCOVA)

Computer Assisted Instruction (CAI)

Group Educational Therapy (GET)

Intelligence Quotient (IQ)

Mediated Learning Experience (MLE)

National Assessment of Educational Progress (NAEP)

National Institute for Learning Development (NILD)

One-in-One/Individualized Educational Therapy (IET)

Reading Disabilities (RD)

Response to Intervention (RTI)

Weschler Intelligence for Children, Fourth Edition (WISC IV)

Woodcock-Johnson Tests of Achievement, Third Edition (W-J III)

Woodcock-Johnson Tests of Achievement, Fourth Edition (W-J IV)

Zone of Proximal Development (ZPD)

CHAPTER ONE: INTRODUCTION

Overview

The current educational system in American schools is failing to meet the literacy needs of reading impaired students in grades four through eight. This is due to inadequate or delayed diagnoses and/or individualized intervention programs after third grade that fail to incorporate techniques and strategies that build both cognitive and metacognitive structures simultaneously over extended periods of time. This chapter will address a historical perspective of the contributing factors that have led to the decline of reading proficiency and adversely affected our educational system as well as foundational theories and concepts that support this study.

Background

After thirty years of legislation and intervention efforts at the federal, state, and local levels, our educational system is failing to meet the literacy needs of learning-disabled students with significant reading impairment in grades four through 12 (Wei, Blackorby, & Schiller, 2011). Among the population of learning-disabled students, approximately 69% of fourth graders, 60% of eighth graders and 67% of high school students are unable to read basic gradelevel text (McCray, Vaughn, & Neal, 2001; Solis, Miciak, Vaughn, & Fletcher, 2014). In addition, nearly 32% of high school graduates are inadequately prepared for college-level English composition courses, and 50% lack the ability to read and understand college-level texts (Brozo, 2009; Vaughn et al., 2011).

As stated by Wei et al. (2011), significant attention has been focused on research results, reports and recommendations, increased funding, and legislation mandating changes in national and state policies such as the No Child Left Behind Act (NCLB; 2001) and tiered instruction. According to Lovett, Lacerenza, De Palma, and Frijters (2012), Response to Intervention (RTI) was designed to be a three-tiered intervention providing remediation in increasingly intense

instruction to serve the whole school population of reading impaired students. However, Lovett et al. (2011) found that it has been primarily implemented and most effective for kindergarten through third grade students, but reading skills declined when specialized instruction was not continued after third grade. As a result, students in intermediate and adolescent grades fall further behind in their reading skills, especially in relation to grade level, requiring more specialized and strategic interventions over longer periods of time to provide for accelerated learning (Wanzek Wexler, Vaughn, & Ciullo, 2010). Although it may be too late to prevent reading difficulty for fourth and fifth graders, initializing or continuing remediation could provide greater opportunities for lessening the impact in other content areas, progressing into adolescence when fluency, vocabulary, and comprehension become increasingly more rigorous and text-dependent (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996). Additional studies have further shown that intervention and remediation at the junior and high school levels are significantly more difficult because of the nature of the students, history of reading failure, curriculum demands, and scheduling of remediation time in the already demanding schedule (Fuchs & Vaughn, 2012).

Research by the U. S. Department of Education (2011) indicated that school-age children with impaired reading experience more serious long-term effects than those affected by parental abuse, accidents, and childhood diseases and disorders, and they cost our nation more than the war on terrorism, crime, and drugs combined. The long-term effects show that approximately 40% of high school graduates with impaired reading ability lack the literacy skills employers seek (Brozo, 2009; McCray et al., 2001). Research also indicates that approximately 22% of American students ages 16-24 drop out annually, and their literacy skills are lower than most industrialized nations (Brozo, 2009). In a study examining the longitudinal effect of childhood reading disability on adult employment opportunity and income, McLaughlin, Speirs, and

Shenassa (2012) found that participants identified as having reading difficulties at age seven were 74% less likely to seek higher education and 56% were less likely to obtain higher income employment. These are sobering findings when considering the needs of junior and high school students and their futures as contributing members of our society. Without identification and intervention, it is more likely that this population of impaired readers is already significantly behind in their reading skills, and the gap between reading and grade level will continue to widen every year (Fuchs, Fuchs, & Compton, 2010).

The nature of restrictive scheduling, content specific vocabulary, and past failure only serve as additional barriers to effective intervention and remediation attempts (Wanzek et al., 2013). For these students, research has shown the importance of including both cognitive and metacognitive strategies in intervention methods that are necessary for text awareness, reading, and comprehension (Askell-Williams, Lawson, & Skrypiec, 2012; Schraw & Moshman, 1995; Wanzek, Vaughn, Roberts, & Fletcher, 2011). According to Askell-Williams et al. (2012), the theoretical basis of such educational research in reading acquisition and remediation is rooted in the cognitive learning theories of Piaget, Luria, Vygotsky, and Feuerstein. Cognitive and metacognitive processes involve higher order thinking, which includes recognizing, using topics, predicting from the context, using a dictionary, writing down imagery, activating background information, summarizing, and using linguistic and contextual clues such as repeated words and phrases (Ahmadi, Ismail, & Abdullah, 2013).

Research studies over the past 30 years have been based on models including these components of cognitive and metacognitive theory to determine the effectiveness of remedial interventions across grades (McLaughlin et al., 2012; Solis et al., 2012; Vaughn et al., 2012; Wanzek et al., 2013). However, most studies have been primarily focused on either cognitive or metacognitive instruction with few incorporating both components for basic reading skills and

metacognitive strategies for vocabulary and comprehension development (Dennis, 2013; Flanigan, 2007; Paris, 2005). These studies showed that if students fail to master basic cognitive skills in grades K-3 and remain unidentified, they became more likely to struggle in the intermediate and adolescent grades when metacognitive processes involve higher order thinking, planning, self-assessment, monitoring, and self-evaluation skills (Ahmadi, et. al., 2013). According to Wanzek et al. (2010), research also indicated that a lack of mastery of basic cognitive skills could account for students in intermediate and adolescent grades falling further behind in their reading skills, especially in relation to grade level, requiring strategic interventions which would allow for more accelerated learning to prepare them for increasing metacognitive challenges in sixth, seventh and eighth grades.

Historically, remediation of reading deficits in intermediate and adolescent students continues to be a critical problem in our educational system. Therefore, further research is needed that incorporates both cognitive and metacognitive reading components. Although diagnosing and implementing interventions after fourth grade may not prevent a reading difficulty, an awareness of these developing gaps in learning between fourth and eighth grades and appropriate interventions could provide the opportunity for lessening the impact in adolescence when fluency, vocabulary, and comprehension become increasingly more rigorous (Dennis, 2013; Francis et al., 1996).

Problem Statement

There is a lack of research for reading remediation of fourth through eighth grade reading impaired students, which combines simultaneous instruction of cognitive and metacognitive techniques and strategies in one-on-one and small group settings over extended periods of time (Fuchs & Vaughn, 2012; O'Connor & Klingner, 2010; Wanzek et al., 2010). This is particularly important because gradually declining reading skills in fourth and fifth grades without

remediation are more likely to produce inadequate responders (non-responders) to typically effective reading interventions (Fuchs, Fuchs, & Stecker, 2010; Vaughn & Fletcher, 2010; 2012). Fuchs and Vaughn (2012) found that few interventions were offered in junior and high school grades for several reasons. First, testing and assessment were more difficult because these students' needs were more complex, and school professionals were more focused on counseling and career choices (Compton, Fuchs, Fuchs, Elleman, & Gilbert, 2008). Second, curriculum standards of required courses needed for graduation limited the amount of time that was available for necessary remediation (Dennis, 2013). Third, content-specific vocabulary was prominent in content core classes and required mastery for reading success and comprehension (Elleman, Lindo, Murphy, & Compton, 2009). Fourth, subject content teachers had very little training and time to address the needs of the reading impaired in the classroom without extensive intervention and training by qualified support staff (Solis et al., 2012).

Solis et al. (2012) stated that these students should have been identified in grades four and five when it was obvious that they had not mastered the basic reading skills needed to become fluent readers. However, most research prior to 2011 focused on emergent readers in grades K-3 and included remediation of basic reading skills without considering the continuing complex needs of reading impaired students in grades four through eight when skills gradually decline (Ahmadi et al., 2013; Scammacca et al., 2016). Typically, fourth and fifth grade students should begin transitioning from learning to read to reading to learn by acquiring metacognitive regulatory skills of self-monitoring and evaluation of information (Ahmadi et al., 2013). However, these students are unable to bridge learning from the acquisition of basic phonological skills to text analysis and understanding necessary for comprehension (Askill-Williams et al., 2012; Suggate, 2010). To address this issue, Wanzek et. al. (2013) suggested that reading impaired students in fourth through eighth grades receive explicit and direct

instruction in vocabulary and comprehension strategies delivered in individualized or small group instruction by trained specialists over longer periods of time. Therefore, without this targeted cognitive and metacognitive instruction for fourth through eighth grade reading impaired students, gaps in learning that have already formed will continue to widen, making it difficult to develop the skills necessary for reading and understanding text efficiently (Wanzek et al., 2013).

Purpose Statement

The purpose of this causal-comparative study was to examine the effectiveness of simultaneous teaching of cognitive and metacognitive reading strategies for fourth through eighth grade reading impaired students in one-on-one and small group settings using National Institute for Learning Development (NILD) methodology, techniques, and strategies. Convenience sampling was used to select 240 participants from fourth through eighth grade reading impaired students in public, private, and homeschool environments in the Eastern United States who received NILD educational therapy instruction during the 2014-2018 school years.

Archival data for 472 students containing pre- and post-test standard scores for five reading subtests of the Woodcock-Johnson III or IV were provided by NILD for the years referenced above. However, data for 232 students was excluded due to missing scores or being outside the date and grade range of this study. The same treatment was administered bi-weekly to all students for a minimum of 60 sessions over one school year ranging from 45 minute sessions in Group Educational Therapy (GET) and 80 minute sessions for Individualized Educational Therapy (IET). Prior to treatment, all students received academic achievement and/or IQ testing for diagnoses of learning disabilities with reading impairment. The control

group (GET; $n = 152$) received instruction in groups of two to five students, and the experimental group (IET; $n = 88$) received one-on-one instruction.

Significance of the Study

This study was significant and contributed to the body of research for four reasons. First, research studies prior to 2010 focused primarily on at-risk emergent readers in kindergarten through third grades (Scammacca, Roberts, Vaughn, & Stuebing, 2015). However, this study targeted students in intermediate and adolescent grades because of the continuing decline of reading scores for this population and the small body of research that currently exists (Al Otaiba, Wagner, & Miller; 2014; McCray et al., 2001). Second, the limited number of research studies, which included fourth through eighth grade students prior to 2010, were designed to remediate either cognitive or metacognitive skills without including both simultaneously (Scammacca et al., 2015). However, the inclusion of both components taught simultaneously is grounded in prior research and in the cognitive learning theories of Piaget, Luria, Vygotsky, and Feuerstein regarding the cognition and metacognition necessary for text awareness, reading, and comprehension (Askill-Williams et al., 2012; Schraw & Moshman, 1995). This study included techniques and strategies that were designed and informed by theory and practice of NILD and conducted in both one-on-one and group settings (NILD, n.d.). Third, according to Scammacca et al. (2015), few research studies have been conducted over a period of one school year where the student population consisted exclusively of reading impaired students in grades four through eight. However, data for this study included only those students with a diagnosed reading impairment in both experimental and control groups. The students received remediation for a minimum of 60 sessions for 45 minutes (GET) to 80 minutes (IET) each over a school year, as recommended by prior researchers (Barth et al., 2014; Wanzek et al., 2013). The present study included these components of a defined population of reading impaired students, extended

treatment duration of one school year, and included one-on-one and group settings. Finally, prior to 2011 most studies for fourth through eighth grade students used informal or researcher-created tests for diagnoses and placement rather than standardized tests (Scammacca et al., 2016; Wanzek et al., 2013). This research study used standardized (rather than researcher-generated) pre- and post-test scores from five reading subtests of the Woodcock-Johnson III or IV to assess current level of functioning and develop remediation plans (Calhoon & Petscher, 2013).

Research Question

The following research question guided data collection in this study:

RQ1: Is there a difference in the achievement of fourth through eighth grade students with reading disabilities in a one-on-one setting as compared to those in group settings when receiving specialized cognitive/metacognitive instruction by setting type while controlling for pre-test reading achievement scores?

Definitions

1. *At-risk* - For the purposes of this study, at-risk refers to students who lack foundational skills in phonemic awareness, word attack, vocabulary, fluency, and comprehension (Wei et al., 2011).
2. *Cognitive skills* - Reading skills that have a ceiling for mastery, such as phonetic sounds, letter recognition, and spelling patterns (Paris, 2005).
3. *Direct Instruction* – Teacher-directed and explicit instruction using carefully planned lessons to target cognitive and metacognitive skills with deliberate sequencing of small units of information to facilitate mastery of reading and comprehension (Rupley, Blair, & Nichols, 2009).
4. *Group Educational Therapy (GET)* - Groups of two to five students who receive specialized reading instruction through mediated learning and direct and explicit

instruction for improved perceptual and cognitive/metacognitive processing using NILD materials and methodology with highly trained instructors. For the purposes of this study, only one year of data will be used although most students typically receive a minimum of three years of intervention (NILD, n.d.).

5. *Mediated Learning* - The methodology of instruction was developed by Reuven Feuerstein whereby a mediating highly trained instructor (parent, teacher) bridges the gap between input and output of information and provides a conceptual link from current to new knowledge by modifying cognitive and metacognitive structures (Ben-Hur, 1994).
6. *NILD Educational Therapy* - Brain research-based cognitive and metacognitive techniques and strategies developed by the National Institute of Learning Development (NILD) involving multimodal stimulation and mediated learning to improve information processing in learning disabled students. Instruction is administered in approximately 60+ sessions for 45 or 80 minutes per session during the school year in a one-on-one or small group environment of two to five students. An individualized instruction plan of intervention is designed according to the student's academic strengths and weaknesses, based on initial testing, and content is presented at slightly above current reading level (NILD, n.d.).
7. *Non-responders* - Reading impaired students at-risk for reading failure who received increasing levels of tiered instruction, tutoring, etc. and failed to respond to intervention methods and strategies (Fuchs & Vaughn, 2012).
8. *One-on-One Instruction* – This consists of one student per educational therapist using NILD-certified techniques, materials, and strategies given in 80-minute sessions twice

weekly for one to three years. For the purposes of this study, duration will be limited to one school year beginning in September and ending in May, unless otherwise specified (NILD, n.d.).

9. *Reading Disorder or Reading Disability* - For the purposes of this study, reading disorder and reading disability will be used interchangeably and will refer to reading impaired fourth through eighth grade intermediate or adolescent students who may present with any combination of the following characteristics: slow reading speed, poor silent and reading comprehension, word omission while reading, letter and word reversal, sound/symbol relationships of letters, sounds and spellings, and limited sight word vocabulary (Reading Disorder, n.d.).
10. *Small group instruction* - Two to five reading impaired students who are grouped by grade, age, or ability who receive reading remediation (NILD, n.d.).
11. *Metacognitive skills* - Reading skills such as spelling, vocabulary, comprehension, and fluency which continue to develop through life and have no ceiling (Paris, 2005).

CHAPTER TWO: LITERATURE REVIEW

Overview

The purpose of this literature review was to provide a discussion of the conceptual framework of cognitive/metacognitive theory and how current literature relates to the needs of struggling reading impaired students in fourth through eighth grades. This discussion will include six components: (a) relevant factors that have influenced the development of reading instruction and remediation, as well as challenges ahead as we move into the 21st Century, (b) the obstacles involved in the evaluation, assessment, and placement of at-risk students while attempting to meet their individualized needs, (c) the prevalence of non-responders to tiered instruction within the RTI model and difficulties they represent, (d) unique challenges to the implementation of RTI in the intermediate grades and early adolescence, (e) misconceptions about student remediation and the use of cognitive and metacognitive strategy instruction, (f) the need for a cognitive/metacognitive program design in light of one-on-one, small group, classroom, and technology instruction, and (g) the continuing gap between research and practice.

Conceptual Framework

This study was framed by the cognitive learning theories of Piaget, Luria, Vygotsky, and Feuerstein regarding cognition and metacognition necessary for text awareness, reading, and comprehension as grounded in the research literature (Askell-Williams et al., 2012; Schraw & Moshman, 1995). Ahmadi et al. (2013) stated that cognitive reading processes involve phonemic awareness, alphabetic knowledge, decoding, encoding, and reading fluency. Metacognitive skills include recognizing, using topics, guessing from the context, using a dictionary, writing down imagery, activating background information, summarizing, using linguistic clues, and using contextual clues such as repeated words and phrases (Ahmadi et al.,

2013). Also, per Ahmadi et al. (2013), metacognitive processes involve higher order thinking, planning, self-assessment and monitoring, as well as evaluation.

Cognitive learning theory, supporting cognitive and metacognitive instruction, is based on constructs developed by Piaget, Vygotsky, Luria, and Feuerstein and are composed of three suppositions. “Cognitive and metacognitive skills are acquired in stages of development and are influenced by exposure to ideas, events, and activities with which they come into contact” (Ültanır, 2012, p. 195). Second, learning only takes place when past and future knowledge are connected by scaffolding and restructuring of information (Vygotsky, 1978). Third, faulty cognitive structures can be modified through a process of intentional and strategically-mediated learning with an experienced adult mediator in small groups or one-on-one settings (Ben-Hur, 1994).

Stages of Learning Theory

According to Ültanır (2012), Piaget proposed that children develop cognitively through four stages: sensorimotor stage (ages 0-2), pre-operational stage (2-7 years old), concrete operational stage (7-11 years old), and formal operational stage (11 to adult). However, students ages 11-17 who fail to master basic constructs of stages one and two will experience reading difficulty in the third and fourth stages, which affects fluency, vocabulary, and comprehension (Lovett et al., 2012). These struggling readers usually become prominent during the upper elementary and middle school years when cognitive and metacognitive strategy instruction necessitates the use of explicit content and instructor mediated learning (Montague, Enders, & Dietz, 2011; O’Connor & Klingner, 2010; Tzuriel & Shamir, 2007).

Zone of Proximal Development Theory

For the cognitive/metacognitive approach, Vygotsky (1978) further proposed that the zone of proximal development (ZPD) is where learning takes place when the student bridges

past and future constructs through a more experienced person. This allows the student to make connections between knowledge learned in the past and knowledge yet to be acquired through problem solving under adult or peer guidance (Vygotsky, 1978). Vygotsky (1978) theorized that since the instructor mediates the “gap” between past and future knowledge, scaffolding and restructuring of information becomes more efficient before erroneous cognitive patterns are formed. Feuerstein’s theory of structural cognitive modifiability and Mediated Learning Experience (MLE) are similar in theory to Vygotsky’s. However, Feuerstein focused mainly on intentional and strategic cognitive restructuring through mediation from an experienced adult rather than peer collaboration, as suggested as an alternative to instruction by Vygotsky (Tzuriel & Shamir, 2007).

Brain Functioning Theory

Luria’s theory of cognitive and metacognitive brain functioning presupposed that the brain has “three functional units: (1) arousal and attention unit, (2) sensory input and integration unit, and (3) the executive planning and organization unit” (Languis & Miller, 1992, p. 494). Research has shown that Luria’s model is consistent with Piaget’s stages of learning, Vygotsky’s concept of the zone of proximal development (ZPD), and Feuerstein’s concept of mediated learning experience (MLE; Languis & Miller, 1992). Since Luria’s model is empirically testable, there is suggestive evidence that “brain processing patterns and performance in higher order, constructive cognitive tasks are related in a consistent predictable manner” (Languis & Miller, 1992, p. 493). This is also consistent with the practice of simultaneous instruction of cognitive and metacognitive strategies through mediation and direct instruction (Tzuriel & Shamir, 2007).

Mediated Learning (MLE) Theory

According to Cawthon and Maddox, (2009), Feuerstein's theory of MLE contained three key components for learning to take place: (1) intentionality and reciprocity, (2) mediation of transcendence, and (3) the mediation of learning (Mastery Level Manual for Educational Therapists, 1997; Tzuriel, 2014). Intentionality stimulates the student to focus on the object of learning, and reciprocity takes place by intentional questioning of who, what, when, where, how, what for, etc. (Cawthon & Maddox, 2009). This transformational process stimulates the student mentally, emotionally, and motivationally, so that new cognitive structures are developed, and old, faulty systems updated (Ben-Hur, 1994).

The theories of Piaget, Luria, Vygotsky, and Feuerstein have led to significant research from disciplines associated with cognitive psychology, developmental psychology, computer science, anthropology, linguistics, and neuroscience (National Research Council, 2001). According to the National Research Council (2001), this research has led to more information on brain-based cognitive and metacognitive learning in four major areas: (1) how the brain organizes knowledge, (2) how children conceptualize information, (3) how the information is acquired in different environments, and (4) how brain structures are developed during the processes of learning, storing, and retrieving information. NILD educational therapy techniques and strategies are based on the theories of Piaget, Vygotsky, Luria, and Feuerstein and are grounded in four cognitive constructs: (1) the recognition of the ZPD, (2) language and thought are interrelated, (3) the plasticity of intelligence, and (4) the role of the mediator in the learning process (Hopkins, 1996).

Related Literature

More recent research in the neurological sciences involving the unique needs of intermediate and adolescent reading impaired students has made considerable progress in

identifying the processes and foundational cognitive and metacognitive skills necessary for reading proficiency, processing, word attack, vocabulary, fluency, and comprehension (Wei et al., 2011). Deficit areas may include any combination of alphabet knowledge, letter-sound correspondence, phonological awareness, phonemic awareness, phonology, pragmatics (oral language), semantics, syntax, and vocabulary (Suggate, 2010). As a result, Wei et al. (2011) suggested that the greatest challenges to developing and applying appropriate individualized intervention is diagnosis and determination of specific processes and reading components that prevent struggling readers from comprehending meaning from text.

Recent research and brain images using magnetoencephalography of elementary and middle school students experiencing difficulties in comprehension and word level skills have produced significant results regarding left-hemispheric brain function and reading acquisition (Rezaie et al., 2011). According to Rezaie et al. (2011), dominance for language and reading typically develops in regions of the left hemisphere from birth, but activity dramatically increases during kindergarten through third grade when children should be developing the ability to rapidly process printed words. Rezaie et al. (2011) also found that when these areas are not stimulated or do not respond normally during this window of time as emergent readers, fluency, vocabulary, and comprehension skills become seriously compromised. If left undiagnosed until the adolescent years, Rezaie et al. (2011) further suggested that these students become at greater risk for academic failure in reading. In this study, magnetoencephalography was used to examine brain profiles of 27 middle school students with a history of reading failure while performing a speeded phonological decoding task. They found that the brain areas of key circuits for reading showed reduced activity because of underdevelopment during the emergent years of school, and brain plasticity was more limited making remediation more difficult. After providing remedial instruction in basic reading and comprehension in small group settings and a

one-year follow up evaluation, brain scans showed an increase in activity and results were significant: $\text{Adj. } R^2 = .50, F(2,24) = 8.34, p = .0001$. According to Rezaie et al. (2011), this could: (a) provide predictive evidence for those students who fail to respond to traditional interventions and are classified as non-responders, and (b) give insight for appropriate interventions in basic reading skills, vocabulary, and comprehension instruction for older students. However, according to Vaughn (2015), further research that addresses ways to acquire a more thorough knowledge base about effective intensive interventions for these students and treatment methods that extend beyond the classroom environment is critically needed for individuals with persistent reading disorders. NILD IET and GET would: (a) utilize standardized IQ and achievement testing, (b) identify the presence of a reading disability, (c) provide remediation through explicit and direct instruction and mediated learning, (d) provide individualized programs and targeted strategies and techniques specific to the needs of RD students, and (e) can be applied across all age and grade levels (NILD, n.d.).

Relevant Factors and Challenges to Reading Remediation

Research has shown that some of the greatest challenges to developing and applying appropriate individualized intervention is in the diagnosis and determination of specific processes and reading components that prevent struggling readers from comprehending meaning from text (Toste et al., 2014; Vaughn et al., 2011; Wei et al., 2011). These challenges include at least twelve areas of concern: (1) screening vs. discrepancy testing, (2) identification and diagnosis of the specific reading components affected, (3) the cause and severity of gaps in learning (4) how to effectively remediate students who do not respond (non-responders) to existing methods of instruction, (5) meeting the diverse needs of the reading impaired, (6) limitations imposed by annual yearly progress (7) gaps in research, (8) Response to Intervention, (9) misconceptions about remediation, (10) implementation of cognitive/metacognitive design

for research and intervention, (11) effective intervention methods, (12) and the critical gap between research and practice.

Screening versus discrepancy testing. Recent mandates of the No Child Left Behind Act (2001) have made evaluation and assessment more difficult, because broad screenings have replaced discrepancy testing prior to 2010 (Scammacca et al., 2016; Vaughn & Fletcher, 2010). Vaughn and Fletcher (2010) further suggested that universal screenings may initially determine the presence of a reading disability but fail to provide the specific reading components impeding academic achievement. In the identification process, Dennis (2013) found that struggling readers: (a) score below proficiency on measures of reading, (b) are missing specific language skills, and (c) are reading below grade level. However, specific processing needs of each individual child vary greatly and are difficult to identify without assessment of background knowledge, neurological development, general knowledge, and general intelligence (Suggate, 2010). Suggate (2010) also suggested that, by using a complete profile from IQ and ability testing, diagnostic achievement testing, and follow-up comprehension testing, a more accurate determination could be made.

Because of legislation passed during the 2000s that provided for a broader identification of students in fourth through eighth grades with reading impairment, more intense and rigorous research studies were conducted between 2010 and 2014 than in any other prior decade (Scammacca et al., 2016). In addition, Scammacca et al. (2016) found that the average sample size was three times larger than studies of the 2000s, only standardized measures were used in 50% of the studies, and 25 hours of instruction were provided in 60% of the studies.

In diagnosis and assessment, NILD IET and GET implementation is consistent with research as evidenced by the following: (a) standardized IQ and/or achievement testing is administered initially for diagnoses and assessment, (b) weaknesses in areas of cognitive and

metacognitive processing skills are evaluated by formal and informal testing to provide a clinical diagnosis of reading impairment, and (c) indications of specific areas of strengths and weaknesses and overall ability are provided (NILD, n.d.). This organization asserted that this composite of formal and informal testing information is used to plan an individualized program for each child targeting specific areas, and academic post-testing is administered yearly to assess progress and plan for future interventions, accommodations, and modifications as needed. In addition, it requires instructors to collaborate closely with classroom teachers, psychologists, school psychiatrists, parents, and administration, as necessary, in a holistic approach to meet the diverse needs of students in and out of the classroom setting.

Identification and diagnosis. Identification and diagnosis of a learning disability in reading is difficult because it frequently consists of more than one disorder and/or reading component and includes significant weaknesses in any of “seven specific areas: (1) receptive language (listening), (2) expressive language (speaking), (3) basic reading skills, (4) reading comprehension, (5) written expression, (6) mathematics calculation, and (7) mathematical reasoning” (Lyon, 1996, p. 55). Lyon (1996) also stated that learning disabilities can often cooccur with one another or with social skill deficits, attention, behavior, and/or emotional disorders, although not all children diagnosed with a learning disability will have difficulty with reading. However, Lyon (1996) further stated that most of the available research indicates that most children with LD primarily have reading deficits.

Often the diagnosis and remediation of a reading disability are fraught with obstacles. Measures that highly correlate with reading frequently fail on screening measures because of either over-identification (false positives) or under-identification (false negatives; Speece, 2005). According to Lyon (1996), another significant challenge is the overlapping influences of education, psychology, optometry, psychiatry, speech and language pathology, etc. Since each

discipline focuses on distinct aspects of the field, the reading impaired child may be viewed and diagnosed using a specific related lens, which may result in over-diagnosis or missing areas of weakness and therefore, miss opportunities to remediate a targeted weakness. Finally, Lyon (1996) also stated that the most significant factor in identifying reading impairment is the lack of a concise definition and a theoretically based classification system that would allow (a) the identification of different types of learning disabilities involving reading impairment, and (b) a method of determining the specific components and processes that are interrelated between types of LD such as lower cognitive ability. Lyon (1996) suggested that the considerable increase in identification of students with learning or reading challenges may be a result of over-diagnoses and a cause for professionals to question the validity of the current identification processes.

Gaps in learning. According to the National Center for Education Statistics (NCES, 2012), approximately 25% of eighth graders score below basic on national assessments and struggle with reading comprehension and the demands of high school. They fail on tasks when asked to summarize textbook content, to determine the meaning of words in context, and to make inferences because of their inability to decode words and fluently process text rapidly (Kim et al., 2016). The authors emphasized that when interventions target only basic subskills such as phonemic awareness and decoding without attention to developing deep comprehension involving analysis and synthesis of information, they are unable to construct a comprehensive text from prior knowledge of academic sentence structure, word origins, syntax, word meaning determined by prefixes and suffixes, as well as key words and phrases. When there are gaps in these basic reading skills, adolescents are unable to integrate multiple linguistic and cognitive processes for metacognitive processing necessary for analysis, synthesis, determining cause/effect, and inferences from text (Cirino et al., 2013). There is also significant research to indicate that, for each separate content area class, concept formation should progress gradually

from simple to complex by grade and subject through vocabulary (Fitzgerald, Elmore, Kung, & Stenner, 2017). They further stated that since words are labels for concepts, prior knowledge through vocabulary acquisition is vital to bringing meaning to text. Fitzgerald et al. (2017) emphasized that some concepts can be learned through language alone or through exposure to print, such as learning the names of the letters of the alphabet. However, they emphasized that, as concepts become more abstract, they require more scaffolding of information beyond visualization and mental pictures to make the transference to analysis and synthesis for deriving meaning from text. When concept formation is impaired in reading in the early grades, gaps in learning develop and widen as impaired readers progress through school affecting every area of learning and increasing the risk of reading failure (Fitzgerald et al., 2017; Mathes & Torgesen, 1998).

In research by Fitzgerald et al. (2017), the complexity of vocabulary concepts was investigated in two core science curriculum textbooks for elementary grades. The researchers used two measures: (1) a conceptual complexity measure, and (2) the number of associated concepts or nodes within the networks for each of the most complex networks with several significant findings. First, the authors suggested that the complexity of the concepts in the texts increased by grade, with the most complex being presented in fourth and fifth grades where the supporting concepts had not been introduced earlier. Further, the authors stated that students in these grades begin to have more difficulty because of the increased emphasis and demand for acquiring information directly from text without teacher assistance (Al Otaiba et al., 2014).

Second, the organization of the textbook content was not aligned with the foundation of cognitive theory, which is based on the gradual scaffolding and progression of concepts from simple to more complex in the development of background information as a base for future learning. (Bruner, 1977; Ültanır, 2012). According to Bruner (1977), students should learn the

structure of ideas and how they are interrelated rather than the memorization of isolated facts. Bruner (1977) also theorized that more complex concepts should be introduced earlier and in simpler form while increasing the complexity over time. He also suggested that acquisition of information should be presented in an upward spiral fashion from simple to more complex concepts. Bruner (1977) further stated that these concepts should cause the spiral to widen at the top as background knowledge and vocabulary develop, which provides the knowledge framework for the development of deep comprehension constructs necessary for analysis and synthesis. Researchers further suggested that gaps in learning occur when basic concepts are not embedded in the information scaffolding structure and connections cannot be made from prior to future knowledge (Bruner, 1977; Ültanır, 2012). According to NILD and cognitive theory, IET and GET mediation through a trained instructor can provide the information necessary by using skills and strategies to help restructure the scaffolding of the conceptual base and close the gap (Ben-Hur, 1994; NILD, n.d.; Vygotsky, 1978).

Finally, there is neither enough time nor teaching personnel to give direct instruction in the basic concepts missed to sufficiently close these gaps in learning for most reading impaired students (Fitzgerald et al., 2017). Therefore, the researchers suggested that, due to poor conceptual knowledge as well as varying background knowledge among the reading impaired, that textbooks in the core content areas should be designed with technological features that would provide options for obtaining core concepts that students have failed to learn in the past.

Non-responder remediation. Even with attempts at early identification of RD in kindergarten through third grades, few researchers have found that specialized training in either phonological awareness or beginning decoding alone has been successful for reading remediation among non-responders (Al Otaiba & Fuchs, 2002). These children are classified as non-responders, because they make little or no progress even with additional intervention measures at the tiered levels of instruction such as RTI, *Reading Recovery*, tutoring, after school

programs, or other remediation methods. However, according to NILD (n.d.), IET and GET models of mediated learning are consistent with cognitive research and incorporate simultaneous cognitive and metacognitive skill instruction, individualized instruction, and instructional materials slightly above the student's current level of functioning.

According to a review of 23 studies of emergent readers by Al Otaiba and Fuchs (2002), seven characteristics of impairment were associated with students who were unresponsive to remediation: (a) poor phonological awareness, (b) impaired phonological memory, (c) inability to rapidly name letters and sounds, (d) intelligence, (e) attention or behavior, (g) orthographic processing, and (h) demographics. The reviewers reported that 70% of the studies found a direct correlation of phonological awareness to unresponsiveness (Al Otaiba & Fuchs, 2002).

However, none of these studies investigated the dual deficit hypothesis, which proposes that students with dual or multiple reading component deficits are more likely to be non-responders than those with a single deficit (Al Otaiba & Fuchs, 2002). In addition, Wanzek et al. (2011) stated that approximately five percent of learning disabled (LD) students with language impairments and reading disorders are more likely to be non-responders, which results in an ever-widening gap between reading level and grade level as students continue through school. Therefore, a large variance in deficit components in non-responders makes it difficult for defining appropriate interventions, developing proficiency standards for progress evaluation, and planning intervention that meets needs and considers the ability of students (Dennis, 2013).

Wanzek et al. (2011) also found that most group studies used standardized intervention materials (such as *Reading Recovery*) of limited duration with at-risk readers and non-responders in grades four through eight. Therefore, it was difficult to tell whether individualized instruction and longer duration of treatment would have shown greater results (Wanzek et al., 2011).

Individualized instruction through IET and GET, for a minimum of 60 sessions per school year, twice weekly, and for 45 to 80 minutes, would be more appropriate to address these issues (NILD, n.d.).

Other research studies produced mixed results. A research study by Wanzek et al. (2013) included 19 studies of extensive reading interventions and included 9,371 students. The study included reading impaired students in grades four through twelve, who received 75 to 100 treatment sessions for five to 90 minutes, and the results showed a small effect size of .15 for those students who received specialized instruction (Wanzek et al., 2013). An additional study of interventions for comparative group sizes for sixth graders with 10-15 and two to five participants per group also showed that there was no significant difference between effect sizes when sizes of groups increased (Vaughn et al., 2010). However, several moderator variables could have affected the results: (a) the need of perhaps even smaller non-responder group sizes, (b) teachers may not have adequately differentiated instruction, and (c) the type and duration of instruction did not target the deficit reading components (Elbaum, Vaughn, Hughes, & Moody, 1999; Vaughn et al., 2003). Therefore, further research using IET and GET educational therapy would possibly address these three concerns of frequency, duration, and instruction.

In addition, Paris (2005) suggested that the ambiguity of effect sizes and results may be due to four constraints, which affect reading development: (a) unequal learning, (b) mastery, (c) transference of learned skills to new learning, and (d) codependence on other foundational skills that must be learned, which is consistent with cognitive research and theory. Basic cognitive skills have a mastery ceiling, such as letter knowledge and phonics awareness, and are accomplished early and rapidly, usually by third grade, while metacognitive skills are those that continue to progress throughout life such as comprehension and vocabulary (Dennis, 2013;

Flanigan, 2007). Paris, (2005) suggested that since cognitive and metacognitive skills have a reciprocal relationship, unequal learning takes place when there are lags or gaps in learning in either component. Therefore, Moreau (2014) cautioned that a “one-size fits all” non-standardized assessment (screening) does not take this inequity into account and can result in skewed results and missed opportunities for remediation of fourth through eighth grade students. Wanzek et al. (2013) also stated that failure to attain these foundational skills during the cognitive window of grades of K-3 contributes to persistent reading difficulties which often emerge or are compounded in fourth grade even with early remediation.

In an analysis of reading development of fourth grade students by Lipka, Lesaux, and Siegal (2006), their results showed that in 15% to 20% of non-responders, phonemic awareness does not develop or improve over time indicating a chronic deficit in phonological skills through adulthood. These students may require intervention and remediation throughout their education (Lipka et al., 2006). In these cases, IET and GET can be provided for multiple years by continuing to target deficits and support classroom or content teachers with modifications within the content curriculum (NILD, n.d.).

Diversity of needs. Another challenge is meeting the divergent and complicated needs in the reading profile of at-risk fourth through eighth grade readers (Vaughn & Fletcher, 2012). These authors stated that, although adolescence is not too late to implement interventions, complex problems such as vocabulary specific to content areas and comprehension remediation are not easily or quickly resolved. However, these researchers stressed that remediation is more easily addressed in the intermediate grades, but adolescent instruction must be more explicit at both word- and text-level involving both cognitive and metacognitive strategies specific to vocabulary in the various context areas of math, history, science, language, etc. In addition,

teaching comprehension can be beneficial, but without sufficient background knowledge, vocabulary, and/or decoding, progress can be slow (Vaughn & Fletcher, 2012). They emphasized the importance of using a holistic approach for students after third grade that incorporates interventions which address foundational components of cognition as well as metacognition. Finally, in students in sixth grade and above with significant reading problems, the process is likely to take several years and may require continued remediation through 12th grade (Ritchey, 2011). This requires intensive secondary intervention (not referring to secondary grades in middle and high school), which usually occurs as small group or individualized instruction, such as IET and GET, and involves a second stage of additional testing and evaluation (Wanzek et al., 2011).

These intensive intervention programs rely on lower teacher-student ratios (often 2:1, sometimes 1:1) as well as “complex, multicomponent instructional routines and more hours of teaching over a longer period” (Vaughn et al., 2003; Wanzek et al., 2011, p. 23). However, in doing so, struggling students may be able to maintain their status, as compared with their peers, when provided daily intervention across the school year (Vaughn & Fletcher, 2012; Vaughn et al., 2012). Research has shown that reading instruction should be intensive, providing additional instruction and learning opportunities by reducing the teacher-student ratio through one-on-one and small group instruction (Ritchey, 2011). This type of strategic, targeted instruction, as suggested by Ritchey (2011), can be provided through IET and GET instruction.

Limitations imposed by annual yearly progress. There is also skewed emphasis on cognitive interventions that use specific strategies and skills for the purpose of improving adequate yearly progress (AYP) and high-stakes testing of students (Afflerbach, Cho, Kim, Crassas, & Doyle, 2013). Afflerbach et al. (2013) indicated that these scores often not only

determine the types of reading programs implemented but are designed to reinforce and strengthen fundamental deficits in students for improving future results. Subsequently, Afflerbach et al. (2013) stated that interventions are often used because they will target skills that will improve upcoming test scores whether they meet the individual needs of at-risk students or not (hence, teaching to the test). These authors also suggested that what is best for the schools' AYP evaluations often takes precedence over what is best for the struggling readers.

Schraw (1998) asserted that cognitive strategies are important to perform a task, while metacognitive reading strategy awareness is necessary to recognize how the task has been performed. Therefore, when considering interventions to maximize progress on AYP, the emphasis should also include the simultaneous instruction of metacognitive strategies, which involve higher order thinking that initiate planning, assessing, and evaluating the success of a learning activity (Ahmadi et al., 2013). This is also consistent with NILD IET and GET methodology and instruction, because techniques and strategies are designed to stimulate cognitive/metacognitive processing in the deficit reading components that have been identified for each student (NILD, n.d.).

Gaps in research. Although there has been significant progress in the last 25 years in the field of designing and validating interventions for elementary and secondary level struggling readers, there is still a lack of research addressing two issues: (a) effective practices for intervening with students who are inadequate responders (non-responders) to typically effective interventions and (b) determining which specific interventions can effectively improve reading comprehension for older students after grade three with persistent, significant, and complex reading difficulties (Fuchs, Fuchs, & Compton, 2010; Vaughn & Fletcher, 2010; Vaughn et al., 2012). Biancarosa and Snow (2006) suggested that even with remediation, 10% of adolescents in sixth through eighth grades will continue to struggle with decoding, and 70% of older

students require some type of reading remediation, which is often due to difficulties with fluency, comprehension, and vocabulary (Biancarosa & Snow, 2006). Current research validates that there is a growing number of adolescents reading four to six years below grade level, which emphasizes the need for further research (Cirino et al., 2013).

Prior research by Edmonds et al. (2009) and Scammacca et al. (2007) have addressed the impact of supplemental reading interventions for students in grades four through twelve. The findings from these studies produced meaningful results because of the compilation of effect sizes across samples and accounting for moderating variables. Results and validity varied across studies because of factors such as: (a) the use of researcher developed non-standardized measures, (b) inadequate teacher training, (c) variations in length and duration of sessions, (d) focus and type of instruction, (e) inconsistency of results, and (f) the exclusion of non-responders (Cirino et al., 2013; Elleman et al., 2009; Hunter & Schmidt, 2004; Vaughn et al., 2012).

Response to Intervention (RTI). The research base for RTI originated in the fields of medicine and psychology and is a three-tiered instructional framework with increasingly intense levels of remediation designed for assisting struggling readers (Bineham, Shelby, Pazey, & Yates, 2014; Hughes & Dexter, 2011). Tier 1 includes universal screening and high-quality classroom instruction, Tier 2 provides more specific assessment and intervention, and Tier 3 provides more support and services to students identified as non-responders in Tiers 1 and 2, providing for smaller group or individual instruction (Toste et al., 2014). RTI also has four major components for remediation: (a) a core curriculum based on reading research, (b) universal screening, (c) progress monitoring, and (d) assessment of progress for tiers 2 and 3 (Hughes & Dexter, 2011). However, recent findings have shown that there are significant flaws in the RTI components regarding application, assessment (discrepancy testing vs. screening),

validity, identification of a reading disability, and implementation, especially for grades four through 12 (Bineham et al., 2014; Vaughn et al., 2010, 2012). The primary application of RTI research has focused on emergent readers in kindergarten through third grades for early detection and remediation of poor readers (Al Otaiba & Fuchs, 2002). However, less attention has been given to late-emerging reading impaired students in grades four through eight, with fewer interventions available, leaving these students to fall further and further behind (Compton et al., 2008; Lipka et al., 2006; Vanderheyden, 2011). Since approximately 80% of all students identified as learning disabled have reading impairment, early identification of these students after third grade is essential to providing and continuing the necessary interventions that will prevent their reading difficulty from becoming more complicated to remediate (Vaughn & Fletcher, 2012).

The second area of concern is with the kind and validity of assessments used to identify and measure achievement of students (Fuchs & Vaughn, 2012). The use of screening instead of discrepancy testing raises questions concerning the process, identification, measurement of progress, and implementation (Vanderheyden, 2011). Fuchs and Vaughn (2012) cautioned that if any of the variables of the RTI decision framework, which include sequential skill mastery of prerequisite skills and immediate or timely instructional corrective feedback and reinforcement, are incorrectly implemented, misapplied, or misinterpreted, then classification agreement analysis (the intervention does not target the deficit) can also lead to erroneous assumptions regarding appropriate interventions and student progress.

Prior to the RTI mandate, Fuchs and Vaughn (2012) stated that IQ and achievement tests were administered to determine the discrepancy between ability and performance, as well as specific individual strengths and weaknesses in reading components. They also stated that the use of discrepancy testing was a better indicator, because it provided more accurate and strategic

information of deficit areas for individualized interventions with each student. However, since 2003, RTI has relied primarily on brief universal screenings to identify impaired readers.

Research by Vaughn and Fletcher (2012) also revealed that RTI assessment protocols for grades four through twelve were based on researcher created measures, rather than gains on standardized tests which tend to reflect smaller effect sizes. Although these studies have shown strong correlations between screening measures and outcomes, classification accuracy of false positives and false negatives to determine errors in accuracy were not reported (Fuchs & Vaughn, 2012). In addition, post-testing measures must correlate closely with constructs taught, so that the integrity of the predictive validity of the score is in line with achievement (Johnson, Pool & Carter, 2016). Fuchs and Vaughn (2012) suggested that this factor could have resulted in over- or under-diagnoses of reading disabilities. Johnson et al. (2016) concluded that, if predictive validity cannot be established with reasonable accuracy, then the assessment is invalid. They further stated that some of the more current research has taken additional measures of achievement in the fall, winter, and spring for progress, but sensitivity to classification accuracy has still only been in the lower range of 79% and specificity 76%, which leaves considerable room for error (Johnson et al., 2016).

Another issue with screening accuracy is determining the exact deficit structure/s in the reading process of disabled students. Johnson et al. (2016) found that the sheer complexity of the multiple components of the reading construct, which include phonics, phonemic awareness, decoding, vocabulary, comprehension, and fluency, require more than a broad screening approach. They also stated that each student may have a range of different deficits in more than one basic reading component, and targeted approaches must be planned to address a combination of deficit areas (Johnson et al., 2016). To illustrate, Johnson et al. (2016) suggested that a student who shows a weakness in decoding often exhibits difficulties with comprehension

and fluency, and a screening task of reading non-words would only reveal decoding difficulties but not those related to comprehension and fluency. Often RTI classification of a reading deficit is based on the initial screening rather than a combination of standardized measures to more effectively serve the remediation needs of each student that discrepancy testing would provide (Wanzek et al., 2010). Johnson et al. (2016) concluded that a child may have difficulty in decoding, and with some remediation, short-term improvement is achieved. However, the authors cautioned that if co-contributing weaknesses were not initially diagnosed and targeted, the student would continue to struggle and could lose the remediated skills over time (Johnson et al, 2016). McCray et al. (2001) added that the inclusion of vocabulary development using content area words, background knowledge, the ability to recognize and comprehend relationships within verbal concepts, and the use of strategies should be included to enhance retention of material.

Because of assessment complexity, results can be misleading, especially for those students who are released from tiered instruction after third grade and are not ready for independent learning in the classroom in grades four through twelve (Vaughn & Fletcher, 2012). According to a longitudinal study by Lyon (1996), 74% of study participants identified as reading impaired in third grade remained disabled in the ninth grade. A further study by Ackerman (1996) found that reading intervention programs in the primary grades were not sufficient because many older students continue to experience learning problems throughout their adolescent years (Vaughn & Fletcher, 2012). This also raises many questions regarding the logistical and structural conditions unique to middle and secondary settings that make it difficult to screen, regularly measure progress in skills, and implement tiered instruction (Prewett et al., 2012). They also stated that middle schools have reported difficulty scheduling small group instruction as well as individualized instruction to accommodate multi-level instructional

periods and meet simultaneous competing demands of core content areas for improving students' basic skills (Prewett et al., 2012).

According to Werts, Lambert, and Carpenter (2009), other problems involving implementation concern personnel, training, and time needed for instruction. These researchers asserted that at the kindergarten through fifth grade levels, classroom teachers may be responsible for administering tier 1 instruction, which may not be sufficient to meet the needs of more impaired readers. Werts et al. (2009) emphasized that this becomes exponentially more difficult, if not impossible, in middle and high school subject area classrooms where teachers' knowledge is specialized according to content area. This need for specificity of instruction raises the questions of how students will be assessed and identified, by whom, and what will instruction look like (Werts et al., 2009)?

In a survey by Werts et al. (2009) of special education directors' perceptions and opinions of RTI in North Carolina public schools, several issues became apparent regarding data collection, response to instruction, and implementation. Although special education directors had sufficient information regarding the foundational concepts of RTI as a method of identifying students with disabilities, there was little consensus on specific consistent procedures for the implementation process (Werts et al., 2009). Werts et al. (2009) further noted that there were additional questions regarding the issues of who would administer tests, how the data would be collected, and how the intervention would be implemented.

Another finding revealed that most administrators appointed school psychologists for data collection and consultations with general and special education teachers when they had very little, if any, training in being involved in the instructional process (Werts et al., 2009). These researchers asserted that, for assessments to be effective, data must be collected in an accurate and timely manner through observation and curriculum-based measures. However, the authors

noted that these procedures are more readily implemented in self-contained classrooms but become more difficult in the upper grades where each subject domain is taught separately. Werts et al. (2009) also advised that, although the content area teacher could provide some initial informal data, he/she would not have the training, time, or expertise to prepare a remedial plan or administer additional standardized assessment for measurement of progress. The authors emphasized that the additional time spent training teachers would put greater demands on special education teachers or reading specialists to instruct, assess, and plan instruction in addition to their current case load. This study also revealed additional concerns regarding decisions on the curriculum to be used and whether it was based on scientific evidence. In this regard, IET and GET models are based on scientific research in cognitive/metacognitive theory with techniques designed for intervention by trained instructors who work collaboratively with shareholders in the child's education (NILD, n.d.).

Misconceptions about remediation. In the field of education for remediation of the reading impaired, a major misconception, that the acquisition of basic cognitive strategy and skills, which includes phonics, phonemic awareness, alphabetic knowledge, encoding/decoding words, and fluency, is enough to insure reading success (Afflerbach et al., 2013). However, these authors concluded that the cognitive emphasis is due in part to the influences of organizations and legislation such as the Common Core State Standards (CCSS) for English language arts and literacy in history/social studies, science, and technical subjects, the National Reading Panel Report of 1999, the NCLB Act of 2001, RTI, and Reading First, to name a few. However, without the ability to connect current cognitive knowledge to metacognitive structures, development of higher order concepts can be seriously delayed or impeded altogether (Ahmadi et al., 2013). Therefore, cognition is the tool that provides access to metacognitive strategies for deriving meaning from text, but metacognition is required to assemble and make

sense of text for comprehension (Rapp, van den Broek, McMaster, Kendeou, & Epsin, 2007). IET and GET therapy facilitate and integrate these components through direct instruction and mediated learning, incorporating both cognitive and metacognitive components simultaneously (NILD, n.d.).

A cognitive/metacognitive design for remediation. Research has shown that multicomponent cognitive and metacognitive instruction should be included in interventions for intermediate and adolescent struggling readers because of increasing text complexity and content area demands (Calhoun, Sandow, & Hunter, 2010). In studies by Calhoun (2005) and Lovett et al. (2012), a combination of both cognitive (decoding, phonological skills) and metacognitive (vocabulary, comprehension and strategy skills) remediation resulted in superior outcomes for students in the combined treatment group over those receiving just cognitive treatment or just metacognitive treatment. Further findings revealed that comprehension strategy training (metacognitive skills) significantly improved reading comprehension skills by closing gaps in information, remediating weak skill areas, and facilitating the ability to more readily access background information to make contextual connections (Askill-Williams et al., 2012; Calhoun et al., 2010).

Intervention delivery methods. Although there have been numerous studies involving the use of specific single and multicomponent approaches for at-risk and reading impaired students, delivery methods fall into four categories: (a) one-on-one tutoring, (b) small group tutorials, (c) classroom instructional approaches, and (d) instructional technology (Vaughn et al., 2011; Elbaum et al., 1999). In a rigorous study of effective programs for use with struggling readers in grades one through five by Slavin, Lake, Davis, and Madden (2010), 96 studies were selected with the following inclusion criteria: (a) schools or classrooms used the identified program with randomized treatment and control groups, (b) duration of treatment was over at

least a 12-week period, and (c) outcome measures had to consist of standardized tests or state assessments. The study by Slavin et al. (2010) resulted in five significant findings which are described below.

One-on-one vs. group approaches. First, it was evidenced that one-on-one tutoring was significantly more effective when trained professionals administered the remediation, and the inclusion of phonics and comprehension skills produced more significant outcomes than when presenting each component separately (Slavin et al., 2010). Slavin et al. (2010) further found that remedial programs prior to 1990 produced smaller effect sizes, and long-term follow-up studies for five years after intervention did not find continuing positive effects. In eight studies involving *Reading Recovery* and *TEACH* (both phonics based), these authors reported that the weighted mean effect size was smaller at 0.23, and in 11 studies of newer programs that included both cognitive and metacognitive skills, the weighted mean effect size was +0.60.

Secondly, Slavin et al. (2010) found that one-on-one phonetic tutoring for first graders could be highly effective, but effects diminished in the upper elementary years if remediation was not continued. Further results from these authors, which included the implementation of multicomponent programs of phonics and comprehension, were shown to be more effective with middle school students demonstrating greater effects (Barth et al., 2014). In addition, a study by Barth et al. (2014) indicated that, regardless of the duration of the intervention, long-term reading remediation for struggling middle school students may require instruction for more than one year.

Small group instruction. A third finding indicated that small group instruction can be an effective delivery method for intervention, but not as effective as one-on-one instruction (Slavin et al., 2010). In the 20 studies evaluated by Slavin et al. (2010), there were 18 different models of small group instruction, and 16 used random assignment. The authors also stated that

all group programs used extensive training, materials and other supports in addition to a strong emphasis on phonics, but the level of the instructor's training directly affected the results. Further, the authors found that the overall effects of one-on-one phonetic instruction increased from 0.38 to 0.69 when trained teachers rather than paraprofessionals were used, indicating that remediation effects were significantly greater when teachers participated rather than paraprofessionals. The research results indicated that, although more cost effective, the small group effect size was .31, with the assumption that content included phonetic components, extensive training, and follow-up. However, they cautioned that small group instruction may offer more of the same type of teaching that has already failed to work in the classroom unless it addresses both cognitive and metacognitive skills by a trained professional.

According to NILD (n.d.), instructors for one-on-one and group therapy receive intensive compulsory training in cognitive and metacognitive processing and theory application in three two-week sessions (Level I, Level II, Level III), which can be taken for college credit. Before administering IET and GET, therapists must attend the Level 1 class, and the GET workshop is recommended for small group instruction. In addition, therapists are updated via email, e-conferencing, and seminars, which include information on the latest in research and practices (NILD, n.d.).

Regular classroom and professional development. The fourth finding of Slavin et al., (2010) concerned meeting literacy needs of adolescent struggling readers in the regular classroom. According to Moreau (2014), research shows that 30% of students in any given classroom require more focused intervention to meet grade-level standards. Since this is the first line of defense, especially in RTI and *Reading Recovery*, it is imperative that classroom teachers understand and support targeted approaches that can benefit the struggling reader (Calhoun et al., 2010; McCray et al., 2001). These authors suggested that this may be more easily

accomplished in the elementary setting because reading is treated as a separate core subject during the school day. However, in middle and high school settings, content area teachers “perceive themselves as ill-equipped to properly support struggling readers in their classrooms, and are bogged down by issues of time, lack of resources, and most significantly by the lack of knowledge” (Moreau, 2014, p. 13). In Moreau’s (2014) study, data collection consisted of middle school teachers’ attitudes toward struggling readers in their classrooms. Results indicated that there was a lack of understanding of reading disability and how to address and identify the specific reading skills hindering a student’s progress. This led to false conceptions regarding the students’ responses and could result in the teacher incorrectly blaming behavior on laziness or indifference. Moreau (2014) further found that teachers also blamed “the system” because of lengthy time between identification, testing, and intervention for reading difficulties, which influenced their beliefs and practices. It was suggested by Moreau (2014) that opportunities for professional development would facilitate a better understanding of the teacher’s role in remediation in the inclusive classroom. This could significantly impact how the teacher views inclusion and the effectiveness of reading interventions (Jordan, Schwartz, & McGhie-Richmond, 2009).

IET and GET approaches bridge this gap in training and understanding through collaboration between the educational therapist and teacher, so that the needs of reading paired students in the inclusive classroom can be met (NILD, n.d.). According to NILD (n.d.), instructors also coordinate the identification of at-risk students, assessments, parent, and faculty in-services, which provide guidance in modifications and accommodations that students might require. In addition, NILD instructors also provide information and resources for the identification of other students in the regular classroom who may be having difficulty with reading or struggling to keep up.

Instructional technology. Finally, results have also shown that traditional instructional technology programs have little impact on reading. Immediate results may be evident but are not sustained over time with the discontinuance of an intervention (Slavin et al., 2010). This was further confirmed by Cheung and Slavin (2012) in a review of 84 qualifying studies of 60,000 students in grades K-12 where the results showed a positive but small effect size of +0.11. Cheung and Slavin (2012) defined educational technology as “a variety of electronic tools and applications that help deliver learning materials and support the learning process in K-12 classrooms” (p. 201). The authors further stated that computer assisted instruction (CAI) may include integrated learning systems, videos, and multimedia as components of reading. They also suggested that technology might enhance student learning based on four criteria: (a) a method of instruction which can be easily understood, well-organized, and interesting, (b) level of instruction is appropriate to student’s prior knowledge, skills, and processing ability, (c) lessons should motivate students through active participation and a desire to learn, and (d) scope and sequence would provide adequate instructional time.

In the review by Cheung and Slavin (2012), major types of computer technology included innovative technology applications, computer managed learning systems, and comprehensive models. Although the researchers stated that earlier supplemental reading programs such as *Destination Reading*, *Plato Focus*, and *Waterford* were solely based on interaction with computers by a student response without instructor input, subsequent programs were more comprehensive, such as *Fast ForWord*, *Reading Reels*, and *Lightspan*. These latter programs were designed to assess students’ reading levels, provide appropriate leveled content, facilitate the processing of information more efficiently, provide multimedia phonics class lessons for first grade, and included instructor participation (Cheung & Slavin, 2012). However, in a review of 79 studies by Strong, Torgerson, Torgerson, and Hulme (2011) including 107 children where *Fast ForWord* was used as a computer-based source of instruction, the treatment

on the language outcome was positive but with a small effect size ($d = +.08$), and the Reading Comprehension outcome was negative and non-significant ($d = -.07$). Chung and Slavin (2012) also found that the more rigorous the studies, the lower the effect sizes, possibly indicating that the students' cognitive ceiling had been reached, the intervention did not address the deficit, or that, by design, the test could not detect the subtle changes in components that were affected in the reading process.

In the analysis by Cheung and Slavin (2012), the authors pointed out that evidence from studies that were randomized, rigorous, and had large samples also produced weak effect sizes ranging from -0.01 to $+0.11$. In addition, the authors emphasized that programs such as *Fast ForWord* have dominated use in the classroom but lack evidence that they are meeting the diverse needs of the reading impaired in K-12. In contrast, the largest effect sizes have been found in studies of more comprehensive models of computer assisted instruction for *READ 180*, *Writing to Read*, and *Voyager Passport* with an overall effect size of $+0.28$ (Cheung & Slavin, 2012). According to Chung and Slavin (2012), these CAI programs include both computer and teacher instruction in the classroom, which include multiple components of the reading process. Additionally, Cheung and Slavin (2012) stated that the *READ 180* and *Voyager Passport* programs are specifically designed to address the reading deficits of secondary students, and they provide extensive professional development.

Cheung and Slavin (2012) also found that greater intensity of content did not necessarily improve outcomes, and that educational technology had a greater impact when used with secondary students with a mean effect size of $+0.31$. However, the authors pointed out that, in the 18 studies that qualified, three used the *Accelerated Reader Program* and eight used *READ 180* and suggested more studies be conducted with secondary students. Further results indicated

that students with low ability and English language learners benefited more from educational technology as a tool to close the gaps in ability and language, especially in reading (Cheung & Slavin, 2012).

Further results found by Cheung and Slavin (2012) included three key factors. First, the majority (71%) of the studies included in the review were quasi-experimental including matched control, randomized quasi-experiments, and matched post-hoc experiments, with only 29% randomized experiments. Second, the authors stated that studies with small sample sizes produced twice the effect size, because fidelity of implementation is easier to control than in large samples, but generalizability to other reading impaired populations is limited. This was confirmed in a more recent study of dyslexic students ($N = 14$) in fourth through sixth grades with impaired reading fluency by Thompson et al. (2018) where larger effect sizes were found. As indicated by Thompson et al. (2018), this was a quasi-experimental, pre-post-test design using both individual T-tests, ANOVA, and ANCOVA to account for individual differences in the scores for decoding that can affect reading comprehension.

In the study by Thompson et al. (2018), the researchers used a convenience sample of students drawn from parents who responded to a flyer that had been distributed. The respondents agreed to completing a background questionnaire, answering interview questions, and agreeing to pre-testing of their children using standardized tests, according to the researchers. The results of the sessions were recorded in the students' RTI folders, and treatment included direct instruction by the teacher for oral reading and questioning of each story as well. The post-test results from the T-tests ranged from $p = .02$ to $p = .119$ on the 14 standardized measures that were used. The ANCOVA showed significant effect sizes for the number of lessons ($F(1,12) = 26.42, p < .001, \eta^2 = .688$), and for decoding time ($F(1,12) = 23.16, p < .001, \eta^2 = .659$)

(Thompson et al., 2018). Similar results were also found in more current studies by Berninger Abbot, Cook, and Nagy (2016), Horowitz-Kraus and Holland (2015), and Jamshidfarsani, Garbaya, Lim, Bazevic, and Ritchie (2019), which also included small group sizes and similar research designs.

In a concurrent randomized control study by Messer and Nash (2018) with significant effect sizes, 78 English-speaking students were included with an average age of seven. The authors chose the computer program *Trainertext* (DM Education, 2017) involving visual mnemonics and included decoding, phonological awareness, naming speed, phonological shortterm memory, and working memory. In addition, the researchers indicated that a teaching assistant accompanied computer instruction occurring for 10-15 minutes two to three times a week over a 10-month period for the experimental group and six months for the control group. Only the experimental group received the intervention for the first 10 months, but both groups received intervention for the following six months (Messer & Nash, 2018). Therefore, the researchers administered a post-test 1 for the experimental group and a post-test 2 to the control group after intervention. Findings by Messer and Nash (2018) indicated that the experimental group at post-test 1 had mean standardized scores close to or above 100, and these were maintained over the next seven months while the intervention continued, but the control group without instruction showed no gains. However, they reported that after the control group received six months of instruction and post-test 2, most of the test scores improved but not to the level of the experimental group. Messer and Nash (2018) indicated that effect sizes on group differences using Cohen's d on gain scores for pre-test to post-test 1 (0.15 to 1.34) and gain scores on experimental group pre-test to post-test 1 compared to control group post-test 1 to post-test 2 (0.13 to 0.97) were all significant except for spelling scores which indicated small effect sizes of 0.15 and 0.13 respectively. The authors further suggested that the improvements

in visual mnemonics, phonics, decoding and memory training might not transfer to spelling, and computer interventions for spelling in general may not be as effective.

Gap Between Research and Practice

After more than 100 years of research findings regarding the classification of reading deficits, causation, and interventions that are intended to address reading disabilities, researchers and educators are no closer to closing the gap between the research findings and how they can be used effectively by teachers and other trained educational professionals in instructional settings (Doehring, 2018). Doehring (2018) suggested that perhaps the most significant implication is that we are failing to meet the needs of school-age children who struggle to read while they continue to fall farther and farther behind. Therefore, research must be designed to connect the two domains in education of acquisition of knowledge and the application of that knowledge in new situations through cognitive restructuring (Gagné & White, 1978). According to Doehring (2018), the question remains: How can research about information-processing and cognitive restructuring for the reading impaired population be translated from theoretical results to teacher instruction and practice that realistically addresses the increasing achievement gap between grade level and reading level?

Although there has been significant progress in the last 25 years in the field of designing and validating interventions for this population, low performance scores and falling research effect sizes require serious attention regarding four areas: (a) lack of relevant research and its practical application, (b) the education of preservice teachers, (c) inadequate training for experienced special education and classroom teachers, and (d) reciprocal collaboration between researchers and educators that drives and enhances research and its application to educational settings for the reading impaired (Doehring, 2018; Koedinger, Corbett, & Perfetti, 2012).

Relevant research. According to Vanderlinde and van Braak (2010), educational research must perform four functions to be effective: (a) the systematic recording of observations, (b) the analysis of results and their implications, (c) publication of findings, and most importantly, (d) the provision of practical applications that are effective for instruction and remediation of impaired readers. The authors also indicated that research should be based on the simple assumption that there should be a direct relationship from research to practice and/or research to policy. The problem is that, although there has been a plethora of research in addressing the needs of the reading impaired, the evidence is often inconclusive, ambiguous, and dependent on numerous conditions and confounding variables due to the complexity of education (Broekkamp & Van Hout-Wolters, 2007). Doehring (2018) stated that relevant research should be driven by an integrated theoretical cognitive framework of specific foundational principles for explaining where in the cognitive restructuring process the gaps in learning exist. The author further stated that this knowledge would provide greater insight into reading acquisition and how language abilities develop over time, resulting in more accurate diagnoses and deficit specific interventions (Doehring, 2018).

Doehring (2018) also emphasized that research should be specific to the reading impaired population. Most past and recent studies have used comparison groups of non-impaired and reading impaired students across grade levels when applying treatments or interventions using mostly quasi-experimental pre- and post-test designs to measure progress (Doehring, 2018). Even as early as 1977 and 1979, Doehring and Hoshko (1977) conducted studies regarding a detailed analysis of reading skills to determine if different types of reading disabilities could be identified based on skill deficit in disabled and non-disabled readers. The disabled readers were classified into subtypes, and results showed that deficit areas varied widely among participants and could be identified according to subtype such as difficulty with oral reading, associating spoken and written language, recognition of individual letters but not

word patterns, and visual recognition of letter and letter sequences (Doehring & Hoshko, 1977). Subsequent research verified the authors' findings, but deficit skills could not be readily identified in non-readers who characteristically functioned at kindergarten to second grade level. Doehring & Hoshko (1977) further stated that generalizability of an intervention becomes applicable only to reading impaired students under the same conditions and was difficult to apply with validity across ages and grades respectively, because it does not account for the kind of impairment specific to each student. This type of research fails to account for diverse individual differences, kinds, and severity of deficits that exist in any group of reading impaired students. Thus, intervention becomes a "one size fits all" scenario rather than a targeted, designed strategy of remediation for producing positive effects in closing the reading gap. Therefore, Doehring (2018) suggested that the only way to determine the most effective intervention/s which target a specific deficit is by conducting longitudinal studies over time.

Koedinger et al. (2012) and Broekkamp and Van Hout-Wolters (2007) suggested that unreported scientific norms may also compromise internal and/or external validity, and inconclusive findings could be attributed to five factors: (a) inexperienced researchers, (b) inadequate use and knowledge of prior research, (c) divergent populations with specific reading impairments, (d) theories on which they were based, and (e) effect sizes.

The education of preservice teachers. Korthagen, Loughran, and Russell (2006) suggested that the second significant area necessary for closing the research-to-practice gap concerns the inadequate preparation of preservice teachers by institutions of higher learning. The authors stated that pressure from graduates of teacher education programs, administrators, parents, and politicians has caused schools to reconsider both the structure and teacher practices of education. Although in the past 10 years, greater focus has been concentrated on improving

preservice teacher education, these positive initiatives have fallen short of closing the research to practice gap and linking theory to practice effectively as new teachers enter the classroom (Korthagen et al., 2006). The authors suggested that the traditional concept of the “theory into practice” view of higher education shifts the burden of responsibility for the application of theoretical constructs in the classroom to the novice teacher who has little practice that is intentionally aligned with theory. Further, the researchers found that educators often feel that their primary responsibility is the transference of theoretical knowledge to preservice teachers in the form of lectures without providing ample opportunities for practical classroom experience and self-evaluation (Korthagen et al., 2006).

Research by Vanderlinde and van Braak (2010) and Veenman (1984) has shown that many novice teachers experience “reality shock” and “burn out” when facing the complex challenges of the classroom environment. The “practicum,” which most educational institutions require, is often based on a specified number of hours over a semester with supervised planning, observing, and teaching, and performance is evaluated and based on successfully teaching and controlling students (Korthagen et al., 2006). The authors suggested that completion of the practicum offers limited exposure to what the preservice teacher will face in the classroom or special education setting regarding initial instruction and management. The researchers also stated that without considerable practice-based learning for a longer duration, the preservice teacher simply would not have the opportunity to develop essential teaching skills such as questioning, wait-time for answers, listening, structuring content, and time management. As a result, the authors indicated that when these teachers enter the classroom, they often become overwhelmed and begin to shift to survival mode because of little practice-based experience in applying theory to practice. Korthagen et al. (2006) also indicated that, due to a lack of time for

reflection and planning, it is easier to fall back into the traditional ways of teaching rather than becoming innovative and dynamic.

Another concern regarding teacher education is the criticism of governmental agencies such as the Title II Report, *Meeting the Highly Qualified Teachers Challenge*, the American Board for Certification of Teacher Excellence, the National Board for Professional Teaching Standards, the National Council of Teachers of Mathematics, and Interstate New Teachers Assessment and Support Consortium (Grossman, 2008). The author stated that these organizations argue that there is insufficient evidence to support the effectiveness of educational coursework or that supervised practice enhances the quality of teaching. Grossman (2008) indicated that the common consensus from critics was to place emphasis on relaxing standards for certification and give more attention to verbal skills, content knowledge, and background checks for teachers. The author also suggested that the result would essentially destroy professional education for preservice teachers and give schools and districts responsibility for training teachers. Grossman (2008) pointed out that this has little to do with learning and would be harmful to the progress of reading impaired students. Therefore, the author suggested that institutions of higher learning and their professionals should demonstrate that the methodology used to prepare preservice teachers is important for the future of our classrooms and special education teachers. In addition, Grossman (2008) stated that research should be driven by teacher education to inform educators and policy makers and improve public perception. Finally, Doehring and Hoshko, (1977) suggested that schools of education should focus on preparing a future generation of researchers who can inform practice to close the achievement gap for the reading impaired.

Continuing education for experienced educational professionals. A third significant factor for closing the gap for the reading impaired is the provision for continuing education for

classroom and special education professionals (Vanderlinde & van Braak, 2010). In a study by Vanderlinde and van Braak (2010), the views of teachers, school leaders, researchers, intermediaries, and practitioners were investigated. Results concerning classroom and special education teachers revealed the viewpoint that research offered few practical results that translated to effective implementation in educational settings with impaired readers. The researchers also indicated that teachers felt that research did not offer conclusive results, was not practical, or implementation required skills and training that the practitioners did not have. Broekkamp and van Hout-Wolters (2007) suggested that classroom and special education practitioners would make more use of research, if they were trained how to access information and interpret and understand research results that were applicable to their content areas. This would require support from legislative and educational leadership in the form of time, money, training, and, most importantly, collaboration between researchers and teachers (Broekkamp & van Hout-Wolters, 2007). According to Broekkamp and van Hout-Wolters (2007), lack of support could be the underlying cause of practitioners' negative views about research and ineffective implementation of research-based interventions for the following reasons: (a) frequent mandates requiring changes to curriculum or practice, (b) increased performance and time demands, (c) lack of materials necessary for implementation, and (d) insufficient training and staff support. The authors further suggested that these viewpoints regarding the value of research produced a negative vicious cycle that widened the gap instead of closing it.

Collaboration between researchers, teachers, and educational stakeholders. If educators are to reverse the downward spiral of decline for reading impaired intermediate and adolescent students in grades four through eight, collaboration using a bi-directional approach is necessary for closing the research to practice gap (Crooke & Olswang, 2015). Although research has made a significant impact on shaping educational policy and practice, the focus

must now shift from simply publishing facts and results to translating those results for practitioners (Vanderlinde & van Braak, 2010). Vanderlinde and van Braak, (2010) suggested that, instead of using the traditional top-down model for research development, dissemination, and implementation of results, a more circular and reciprocal model should be used to address the concerns of teachers and special education professionals to improve educational practice. These authors proposed that using the reciprocal model would give teachers the opportunity to share a primary role with researchers in addressing the development of innovative and practical interventions for addressing the needs of the reading impaired.

After conducting interviews with teachers, school leaders, researchers, and intermediaries regarding the gap between research and practice, Vanderlinde and van Braak, (2010) found five factors necessary to facilitate the use of research: (a) practical applications for diverse settings and grades, training, and necessary materials; (b) provide credible evidence of the benefits of interventions and changes to curriculum and practice; (c) additional time to read and use the research; (d) an intermediary at the school level who could provide support, guidance, and answer questions regarding current research implementation as well as translate future research results to colleagues; and (e) collaboration was important across the practice based continuum insuring that teacher-researcher concerns were addressed while maintaining research integrity.

Summary

As educators strive to continue to meet the challenges of the rising number of reading impaired students in American schools, research in intermediate and adolescent literacy must be at the forefront. Further research of a fluid multi-instructional system combining cognitive and metacognitive constructs is needed that is particularly adapted to the students in intermediate grades and adolescents such as NILD Educational Therapy (Calhoon & Petscher, 2013; Lovett

et al., 2012). These findings could be beneficial in meeting the needs of non-responders and providing guidance in restructuring the RTI model at the middle and high school levels (Bineham et al., 2014; Vaughn & Fletcher, 2010, 2012). By doing this, educators will begin to meet a wider range of needs of reading impaired and at-risk students. Attention must also be focused on recognizing that although there are common characteristics that apply to all RD and at-risk students, each individual child has unique weaknesses that must be targeted for strengthening by appropriate intervention methods and cognitive theory (Moreau, 2014).

Moreau (2014) and Calhoon et al. (2010) emphasized that administrators, and special education professionals should empower classroom teachers and parents by: (a) dispelling the influence of misconceptions about remediation, (b) re-evaluating unrealistic expectations for annual yearly progress, and (c) implementing types of remediation that will begin closing the gap between reading level and grade level for students struggling to read. One possibility that should be explored is the use of computer-assisted interventions that are of high interest and quality, media-rich in content, that provide a combination of computer and teacher instruction in classrooms, include multiple reading components, and provide extensive training opportunities for teachers. This would mean greater funding for schools through legislation, government agencies, grants, foundations, private businesses, and other sources to assess and implement state-of-the-art computer-based programs in a technologically-rich society of the 21st-century. It is, therefore, the responsibility of all educational shareholders to fund, support, and move forward in a concerted effort to provide opportunities for success of our nation's reading impaired children in all grades, especially those in the intermediate and secondary grades. This can only be accomplished by closing the research-to-practice gap and encouraging and supporting teacher-researcher collaboration in determining future research that is practical for addressing the complex needs of the reading impaired.

Since research still attests to the need for explicit and direct instruction with reading impaired students, IET and GET approaches can perform a vital role in helping to close the gaps between reading level and grade level by using techniques and strategies that involve simultaneous cognitive and metacognitive instruction through mediated learning for extended periods of time. In addition, it is applicable for all ages of students in grades K-12 as well as adults and can be uniquely tailored to the specific deficits involved in the reading process. NILD methodology would (a) incorporate simultaneous teaching of cognitive and metacognitive components, (b) use mediated learning to connect old and new knowledge, and (c) support efforts to develop better identification procedures and interventions that specifically target and strengthen reading and comprehension skills (NILD, n.d.). Research conducted using NILD theory, constructs, and strategies would contribute to the present body of knowledge concerning remediation in areas of word study, fluency, vocabulary, comprehension, and motivation, as well as provide insight for improved methods of reading remediation.

CHAPTER THREE: METHODS

Overview

The purpose of this chapter is to delineate the methods and processes that were used to complete the proposed research. These included the (a) research design, (b) research question, (c) hypothesis, (d) participants and setting, (e) instrumentation, (f) procedures, and (g) data analysis respectively.

Design

This was a causal-comparative study using one-way analysis of covariance (ANCOVA) for pre-test-intervention-post-test scores on the Woodcock-Johnson III or IV (W-J III, IV) achievement battery while controlling for scores for variance between and within groups (Gall, Gall, & Borg, 2007). According to Gall et al., (2007), this type of design is appropriate because it relies on observing the relationship between naturally-occurring differences in the independent and dependent variables, in this case, groups of two to five and one-on-one settings. This comparison was designed to reflect differences in achievement between the two groups. The independent variable consisted of the control groups of two to five students and the experimental group that received on-on-one intervention. In compliance with the NILD models, IET consisted of one student per trained instructor, and GET was conducted in small groups of two to five students per trained instructor (NILD, n.d.). The covariates were the pre-test/post-test standard achievement of reading scores, and the dependent variable was achievement of reading. Reading achievement is defined as the amount of increase in the composite standard scores of five reading subtests from the W-J III or IV for both the covariates and dependent variable.

Research Question

The following research question guided data collection in this study:

RQ1: Is there a difference in the achievement of fourth through eighth grade students with reading disabilities in a one-on-one setting as compared to those in group settings when receiving specialized cognitive/metacognitive instruction by setting type while controlling for pre-test reading achievement scores?

Hypothesis

The null hypothesis for this study was as follows:

H₀: There is no significant statistical difference in achievement of reading impaired fourth through eighth grade students in a one-on-one setting as compared to those in group settings when receiving cognitive/metacognitive instruction using NILD methodology while controlling for the pre-test of reading achievement scores.

Participants and Setting

The participants ($N = 240$) for this study were selected from a convenience sample of fourth through eighth grade reading impaired students with specific learning disabilities (SLD) in reading and comprehension provided in archival data from NILD including schools in the Eastern United States. Pre-test standard scores were provided for five reading subtests from the W-J III or IV and were administered by a trained professional prior to entrance into the NILD program or receiving treatment. However, it is not unusual that the W-J III or IV pre- and posttests were administered by an NILD educational therapist who had been specifically trained to do so. Post-test data was also provided, which was administered at the end of each school year of participation for assessment of progress. Different test forms were used for pre- and post-tests to account for the test-retest effect.

The Weschler Intelligence Scales for Children IV (WISC IV) was routinely administered by a licensed professional to all students who received one-on-one intervention as the cognitive measure but was not consistently administered to students who participated in group treatment.

However, all one-on-one and group participants selected received achievement testing which included the five reading subtests of the W-J III or IV (spelling, letter-word identification, passage comprehension, word attack, and reading vocabulary). For this reason, IQ scores were not reported for all students selected. Of those reported, the full-scale IQ scores of students ranged from 71 to 119, although NILD suggested that a minimum of 85 IQ or above was preferred for entrance into the IET and GET programs (NILD, n.d.). When available, WISC IV verbal and non-verbal subtests and index scores were evaluated by the educational therapist to determine each student's strengths and weaknesses in reading and comprehension (Flanagan & Kaufman, 2004). Otherwise, evaluation was based on the standard scores of the five reading subtests of the W-J III, IV.

Homogeneity was established because all participants received cognitive/metacognitive simultaneous instruction for a minimum of 60 individual (IET) or group (GET) sessions by an NILD trained instructor for a duration of 80 and 45 minutes respectively over the 2014-2018 school years. Students were from NILD-affiliated schools, private, public, and homeschool programs in urban and suburban settings of lower, middle, and upper socioeconomic status in the Eastern United States. Of the 240 participants in fourth through eighth grades who met the criteria, 88 received one-on-one educational therapy (IET) and included 36 females and 52 males. Of 152 participants who received group instruction (GET), there were 67 females and 85 males, and participants were grouped by grade. This number of participants exceeded the required minimum for a medium effect size with statistical power of 0.7 at the 0.05 alpha level according to Gall, Gall, and Borg (2010).

All instruction was implemented consistent with NILD methodology, strategies, and techniques. The recommendation for initial testing for students was initiated because of

concerns expressed by the school administration, teacher/s, or parent/s after a history of reading failure or unsuccessful classroom intervention. The Woodcock-Johnson Academic Tests of Achievement III and IV have been used in prior studies by Watkins and Canivez, 2001, Dimitriadis et al. (2013), and Semrud-Clikeman, Fine, and Bledsoe (2014)

One-on-one educational therapy, which included one student and one therapist, took place twice a week for 80 minutes in a quiet room, which included a chalkboard, table, chairs, and all materials necessary for instruction. Group educational therapy included two to five students who were at comparable reading levels and age and grade appropriate. Sessions for GET were held twice weekly for 45 minutes in a quiet therapy station or unused classroom that could accommodate more students. In addition, all necessary NILD materials were readily available.

Instrumentation

The instrumentation used for this study was the Woodcock-Johnson III (W-J III) or the Woodcock-Johnson IV (W-J IV). These instruments were used to measure academic achievement for reading and are described below.

Common Characteristics of W-J III and IV

The purpose of using five reading subtests of the W-J III or IV for pre- and post-tests was to determine any differences in achievement in IET and GET settings. For pre-/post-test measurement, alternate forms were used over the 2014-2018 school years to ensure test-retest reliability. These tests, W-J III (Woodcock, McGraw, & Mather, 2001) and W-J IV (Schrank, McGrew, & Woodcock, 2001), were designed and used to measure specific cognitive and oral language abilities, as well as academic achievement across a wide range of reading components using standard scores, which are consistent with the constructs of this study. According to

Schrank et al. (2001), these tests can be used with ages 2-90+ and are administered individually. Scales for standard and extended batteries include oral language, reading, mathematics, writing, and cross domain clusters for academic skills, academic fluency, academic applications, basic skill knowledge, phoneme-/grapheme knowledge, and brief or broad achievement (Schrank et al., 2001). All versions are based on the research of Raymond Cattell and other authors, along with the *Gf-Gc* theory (Cattell, 1992; Mather, Wendling, & Woodcock, 2001; Schrank, Decker, & Garruto, 2016)), which measures fluid (*Gf*) and crystallized (*Gc*) intelligence. According to these authors, *Gc* is the ability to use learned knowledge and experience, and *Gf* is used to solve unfamiliar problems, use logic in new situations, and identify patterns.

The W-J III and IV Tests of Achievement can be administered in 60- to 90-minute sessions and is available in two different formats with alternate forms for pre-and post-testing with each set containing two easel test books (standard and extended tests), an examiner's manual, technical manual, examiner training workbook, test record, and examinee response booklet (Schrank et al., 2001; Villarreal, 2015). Copies are only available to trained educational therapists and professionals and are not included in this study. According to Schrank et al. (2001) and Villarreal et al. (2015), each student is individually tested over a period of one and a half to two and a half hours with the basal or beginning question being determined by grade and a starting question by a chart on the first page of each subtest. The test record booklet is used to record student responses and raw scores, which are entered in a computerized score program for generation of a test report that produces current grade level, percentile, stanine, and standard scores.

Woodcock-Johnson III. Assessment Bulletin No. 2 of the W-J III also reported that the median reliability coefficients for the cognitive and achievement batteries were .80 or above and was normed from 8,818 participants in over 100 geographically-diverse U.S. communities,

which included 4,783 students in kindergarten through 12th grade, and from ages 24 months to 90 years old or older. Normative updates were completed in 2007, which updated the norms from prior W-J versions of the test originally developed by Woodcock et al. (2001). Standard scores from five subtests of the W-J III or IV (spelling, letter-word identification, passage comprehension, word attack, and reading vocabulary) were used for pre- and post-test assessment since they correlated closely with WISC IQ scores for age and grade-level placement (Needleman, Schnoes, & Ellis, 2006).

Passage comprehension, word attack, reading vocabulary, and letter-word identification required oral responses to target questions in the standard or extended test books and had 47, 32, 73, and 76 possible questions, respectively. The spelling subtest contained 59 words, but only those that were within the basal and ceiling range were given orally by the examiner and written by the student in the subject response booklet as discussed in the examiner's manual (Mather & Woodcock, 2001). According to Mather and Woodcock (2001), *Suggested Starting Points* are determined by a chart that appears on the first page of each subtest according to grade placement, and subtests are scored by placing a "1" if the question is correctly answered and a "0" if incorrectly answered. The authors further state that basal and ceiling are determined when six consecutive questions are answered correctly or incorrectly, except for reading vocabulary where the basal and ceiling are four questions. Raw scores are recorded in the test record booklet and entered in a scoring program, which generates grade equivalency by grade and month, and percentile, standard (68% band), and z scores. Numerous studies have been conducted using the W-J III (Floyd, Meisinger, Gregg, & Keith, 2012; Roberts et al., 2015).

Woodcock-Johnson IV. The W-J IV norming study included data that were collected between December 2009 and January 2012 from 7,416 participants across diverse geographic and socioeconomic environments, representing 36 states and the District of Columbia (Schrank

et al., 2001, p. 5). Examination of the median reliability coefficients for both editions for each cluster revealed that most were 0.90 or higher (Floyd, Evans, & McGrew, 2003; Luo, Thompson, & Detterman, 2006; Schrank et al., 2001; Tichá, Espin, & Wayman, 2009). The W-J IV content is consistent with other achievement tests in subject areas and established practices in schools (Tichá et al., 2009). Although there were some changes from the third to fourth editions regarding some subtests within cluster scores, the five selected subtests of letter-word identification, spelling, passage comprehension, word attack, and reading vocabulary that were used in this study correlate across editions (Schrank et al., 2001). Since this latest revision was published in 2014, few studies are currently available for review.

Procedures

An IRB form and proposal were submitted upon successful defense of the proposal. Approval was received from the IRB to proceed with the study on November 17, 2017 (see Appendix A). Upon receipt of the IRB approval, an introductory letter to request participation (see Appendix B) was sent via e-mail to all therapists. Respondents were sent a follow-up letter with forms and reporting instructions. Data were submitted with a therapist-assigned identification number and gender for each student to ensure anonymity (see Appendix C). A data response and therapist's permission form (see Appendix D) and parent introductory letter and consent form (see Appendix E) were sent via e-mail and was distributed by the therapist. Since each therapist documents all testing in the student's personal file along with other pertinent information, the initial WISC IV results and the pre- and post-test scores on the W-J III or IV were entered on the data response form and returned to the researcher via mail or e-mail. However, due to the low response rate and missing information, the needed data were secured directly from NILD.

After reviewing the data from NILD, a convenience sample was selected of fourth through eighth grade students, and composite scores calculated for the five reading pre-tests and post-tests for each student. The composite scores for the W-J III or IV pre- and post-test data were compared and analyzed using a one-way ANCOVA with the SPSS program (Edition 24). To ensure the protection of privacy for each student, an identification number was assigned by the researcher for each student, and student data were only identifiable by these numbers.

According to NILD, all instructors completed a bachelor's degree in a field related to education and attended a graduate Level I intensive course consisting of 80 hours of instruction conducted by NILD-approved instructors over a two-week period prior to giving treatment. Further stated by NILD, some therapists and program directors were specifically equipped to administer the W-J III or IV, identify and assess the needs of learning/reading impaired students, and create and implement individualized intervention plans using NILD techniques. All participating therapists completed at least Level I training and had one year of experience administering the treatment. Although some completed Level II and Level III training and requirements for professional certification, data received did not specify information regarding this for each instructor. However, in addition to completing Level I training, all GET instructors received an additional 20 hours of training for administering treatment in a group setting. For the 2014-2018 school years, student sessions for IET and GET settings were administered twice weekly for a minimum of 60 sessions, usually during the school day. However, the IET sessions were 80 minutes in duration, and the GET sessions were 45 minutes long.

The W-J III or IV was administered during the end of the school year before beginning treatment in the summer or the subsequent fall or at the beginning of the current school year before initial treatment began. Post-testing was administered at the end of each school year of treatment using an alternate form to minimize a test-retest effect. A total standard composite

score for the five reading subtests (spelling, letter-word identification, passage comprehension, word attack, and reading vocabulary) for each student were compared between groups to measure any differences in achievement using the SPSS program (edition 24) for analysis. All testing for the W-J III or IV was done in a one-on-one environment by a licensed professional or trained NILD therapist, and privacy procedures were implemented by assigning a number to each student by the researcher for reporting results. At no time was any personal information divulged regarding student identity or specific location. All references were made using the assigned student number.

Participating educational therapists in the one-on-one setting usually had from one to 10 students taught separately in individual 80-minute sessions, and GET settings contained two to five students per group for 45 minutes, which were age and grade appropriate. Therapy sessions were scheduled based on the daily school schedule and content area classes of each student. Instructors collaborated closely with teachers, administrators, and parents when planning and scheduling treatment sessions. Core content classes were not missed unless the class could be taken later or parents, administrator, and therapist agreed that the severity of the reading deficit required more intense remediation than could be provided in the classroom. Each therapist also collaborated with the content area teachers through daily or weekly progress monitoring of grades, modifications, and accommodations, as needed. Modifications were designed to be as short term as possible to enable the student to gradually resume adequate functioning in the classroom and become an independent learner. However, the duration, extent of modification, and kind was heavily dependent on the severity and complexity of the reading impairment and the gaps in learning that already existed (Barth et al., 2014; Ültanır, 2012). The instructors also provided instruction to individual content area and classroom teachers suggesting how modifications and accommodations might be implemented as well as providing in-service

sessions at faculty and parent meetings as needed. This holistic approach to the remediation provided a support system for the student, parents, and teachers, which is consistent with research (Vaughn, 2015; Werts et al., 2009).

During each IET and GET session, the instructor used Progress Chart I (see Appendix F) to record a detailed account of materials and techniques completed and homework that was assigned. After the session, Progress Chart III (see Appendix G) was used as an anecdotal record to note behaviors, specific areas of difficulty and concepts to reinforce or target in subsequent sessions. The anecdotal records also were used to assess yearly progress that was reported to parents and classroom teachers at the end of each school year. In addition, parents and teachers were encouraged to observe once a month to review progress and receive recommendations from the therapist.

Consistency of implementation was effective because of the prescriptive application of designated NILD therapy techniques and strategies as specified in the Level I, Level II, and Level III manuals and GET-specific training. Age and grade appropriate NILD materials were used for all students. Therefore, the content, scope and sequence, supplementary materials, and duration of instruction were consistent. In addition, NILD member therapists had direct internet access to a dedicated website for updates and information about therapy issues and questions (NILD, n.d.).

Cognitive and metacognitive reading skills were taught simultaneously in both settings through direct and mediated instruction using higher order questioning strategies. Five core techniques were used for IET and GET settings and included *Blue Book*, *Math Block*, *Rhythmic Writing*, *Dictation and Copy*, and *Buzzer*. All techniques incorporated direct instruction and mediated learning for cognitive scaffolding and conceptual understanding for differentiated reading skills and comprehension (NILD, n.d.). Components of these techniques included tasks

involving active exploration, searching, selection of main ideas, and supporting details. By analyzing and synthesizing information within the context of meaning, students were guided in making content specific choices that aided them in grasping fundamental concepts necessary for comprehension. In addition, the ability to understand the structure of a passage or problem using comparison, prediction, cause/effect, and word meaning in context enhanced their ability to see relationships and draw conclusions. (NILD, n.d.).

Data Analysis

This was a causal comparative study of two nonequivalent groups with archived data collected over the 2014-2018 school years and provided by NILD. The one-way ANCOVA was used to examine the effectiveness of simultaneous teaching of cognitive and metacognitive reading strategies for fourth through eighth grade reading impaired students in one-on-one and small group settings using NILD methodology, techniques, and strategies. Convenience sampling was used to select 240 participants from fourth through eighth grade reading impaired students in public, private, and homeschool environments in the eastern United States who received NILD educational therapy instruction in IET or GET settings for the 2014-2018 school years. The ANCOVA was appropriate for this study because participants in both the IET and GET settings were not equivalent, and this may have affected the outcome variables or post-test composite standard scores (Gall et al., 2010; Warner, 2013). Since these are not naturally-occurring groups but were selected by convenience sampling from students with learning disabilities with reading impairment who received NILD therapy, participants were at varying levels of below average reading achievement when initially tested. Therefore, the pre- and posttest scores may have shown a greater difference causing Type I or Type II errors and were adjusted to account for the difference in the pre-test scores for one-on-one and group therapy

(Jamieson, 2004). The independent variable was the control group of two to five students in group settings (GET), and the dependent variable was the group of one-on-one participants (IET); the pre-test scores were controlled for on the same measure.

Data were initially analyzed using descriptive statistics, including sample total ($N = 240$), group mean of 476.63 for two to five students ($N = 152$) and 493.40 for one-on-one instruction ($N = 88$). The standard deviations for each group were 45.403 and 51.910 respectively. The pre- and post-test composite scores were measured on the interval scale, and each group was observed separately. Data screening included box plots and scatterplots for comparison of participants between and among groups to determine extreme outliers.

With the one-way ANCOVA, several assumption tests were performed. Levene's test of equality of error variance was used to determine if the F ratio was non-significant (Warner, 2013). Linearity was demonstrated by scatter plots with line of best fit for pre-test and post-test scores indicating that there were no significant outliers. Normal distribution for each group was shown by histograms with normal curve superimposed to determine that pre- and post-test scores were normally distributed around the mean and skewness (Gall et al., 2010). The number of participants exceeded the required minimum for a medium effect size with statistical power of 0.7 at the 0.05 alpha level according to Gall et al. (2010).

CHAPTER FOUR: FINDINGS

Overview

The purpose of this causal-comparative study was to examine the effect of simultaneous instruction using cognitive and metacognitive reading strategies on reading achievement of fourth through eighth grade reading impaired students in one-on-one and small group settings using NILD methodology, techniques, and strategies. Further, this study was designed to include archived data from NILD records for the 2014 through 2018 school years. This chapter will include descriptive statistics, assumption testing, and the results of the null hypothesis.

Research Question

RQ1: Is there a difference in the achievement of fourth through eighth grade students with reading disabilities in a one-on-one setting as compared to those in group settings when receiving specialized cognitive/metacognitive instruction by setting type while controlling for pre-test reading achievement scores?

Null Hypothesis

H₀: There is no significant statistical difference in achievement of reading impaired fourth through eighth grade students in a one-on-one setting as compared to those in group settings when receiving cognitive/metacognitive instruction using NILD methodology while controlling for the pre-test of reading achievement scores.

Descriptive Statistics

Edition 24 of the SPSS statistical software program were used to analyze the data for descriptive statistics. Univariate one-way ANCOVA was used for this study to compare the effects of pre- and post-test composite scores for each reading impaired participant for five reading subtests (spelling, letter-word identification, passage comprehension, word attack, and reading vocabulary) of the Woodcock-Johnson Tests of Achievement III or IV.

Archival data for 472 students was provided by NILD for the 2014 through 2018 school years, which included scores for students in kindergarten through twelfth grade. Due to the scope of the study, the convenience sample included only 240 students in grades four through eight who received either one-on-one or group instruction in reading and had pre- and post-test scores reported for all five subtests using standard scores for 2014-2018. However, 232 of the 472 students provided by NILD were excluded from the convenience sample due to missing scores or being outside of the date and grade range. The control group ($n = 152$), or independent variable, consisted of students in group settings of two to five students, and the treatment group ($n = 88$), or dependent variable, participated in one-on-one instruction. Since this number of participants exceeded the required minimum for a medium effect size, statistical power of 0.7 at the 0.05 alpha level was applied per Gall et al. (2010). All students received an average of 60 sessions during each year of participation. See Table 1 for cross tabulation of the number of males and females who participated in each group.

Table 1
Sex vs. Group Crosstabulation

		Cross Tabulation		
		Group		Total
		.00 ^a	1.00 ^b	
Sex	Male	85	52	137
	female	67	36	103
Total		152	88	240

^a Control group of 2-5 students. ^b Experimental group.

After determining the participants, the researcher entered the five sets of pre- and posttest scores using the SPSS software (version 24) and totaled the respective scores by adding the five subtest scores together to determine a composite standard score for each student. These total

composite standard scores for the five subtests combined were then used to analyze the data and determine descriptive statistics. The sample size, means, and standard deviations for the control and experimental groups are presented in Tables 2 and 3.

Table 2

Total of Subtest Scores for Control Group of 2-5 Students Per Group

Descriptive Statistics				
	<i>N</i>	Mean	Std. Deviation	Std. Error
Composite	152	476.63	45.403	1.987

Table 3

*Total of Subtest Scores for
Experimental Group of One-on-One Instruction*

Descriptive Statistics				
	<i>N</i>	Mean	Std. Deviation	Std. Error
Composite	88	493.40	51.910	2.264

Data Screening

Box and whisker plots were used to detect any outliers. No significant outliers were found (see Figures 1 and 2).

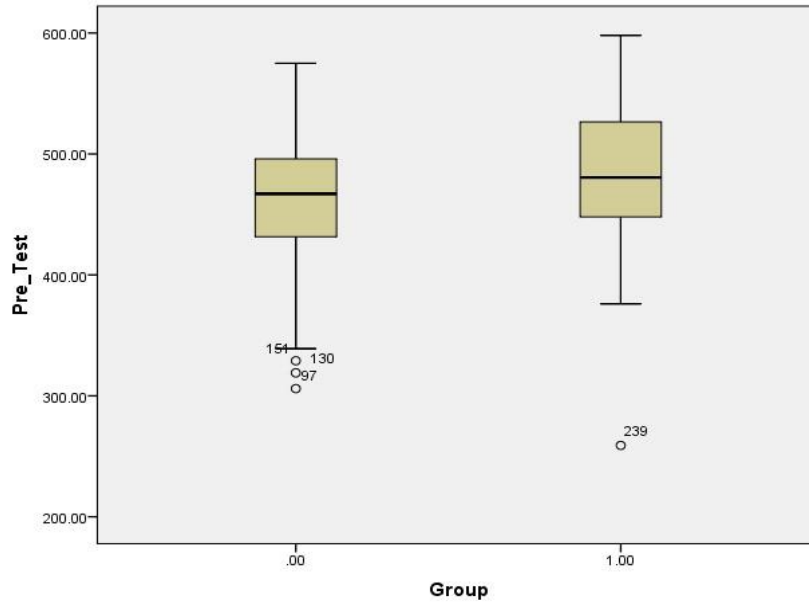


Figure 1. Boxplot of pre-test for group and one-on-one composite scores.

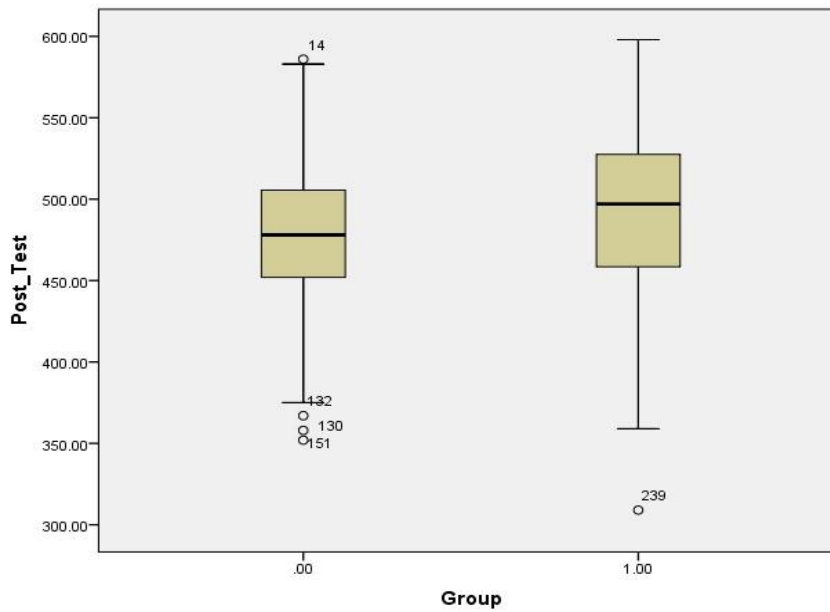


Figure 2. Boxplot of post-test for group and one-on-one composite scores.

Assumptions Testing

After determining the control and experimental groups and analyzing the data to determine the descriptive statistics, assumption tests were performed.

Test for linearity. Scatterplots were created from the composite pre and post-test scores for participants in group and one-on-one instruction with line of best fit. Figure 3 shows that the assumption of linearity was met because movement of the data points progressed along the line of best fit.

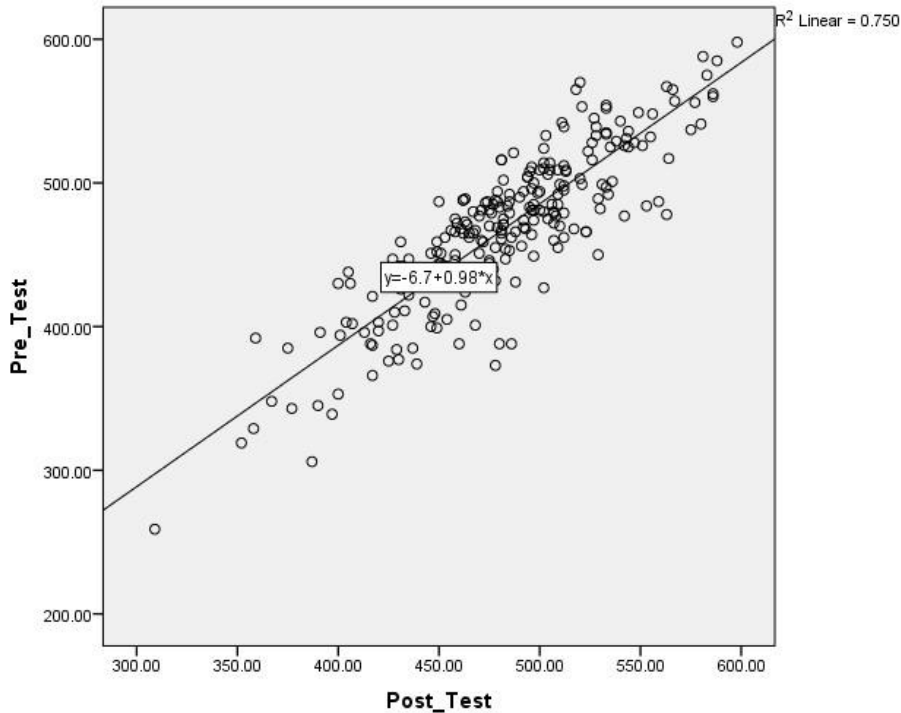


Figure 3. Scatter plot and line of best fit.

Test of normality. Histograms with the normal curve superimposed were created for analysis of pre and post-test composite standard scores to show the relationship between those who participated in groups of two to five students and those who received one-on-one instruction. Figures 4 and 5 reflected a normal distribution because the frequency of scores was distributed along the line of the normal curve. Although scores were positively skewed to the right, skewness was not determined to be extreme or likely to affect the results of the one-way ANCOVA (Gall et al., 2007).

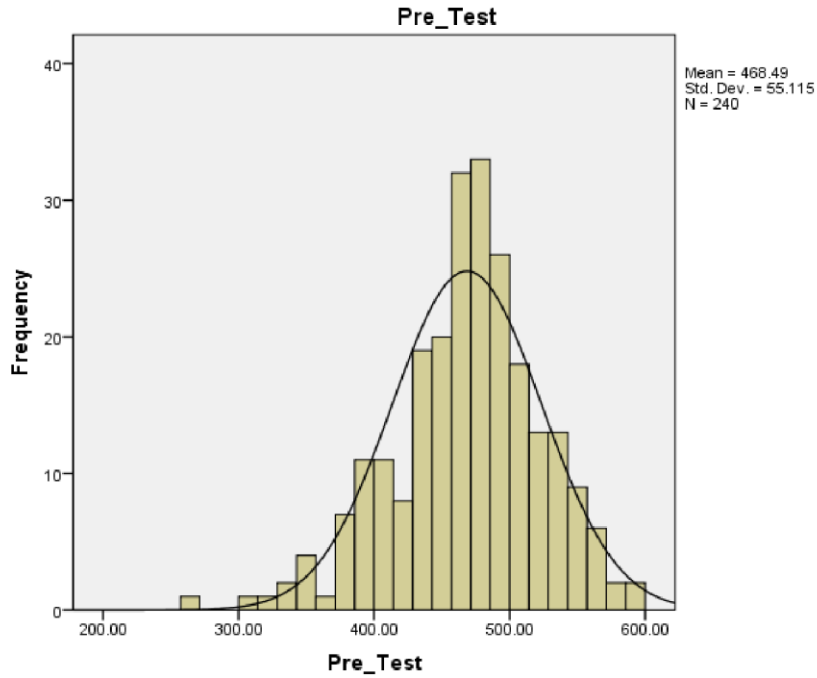


Figure 4. Histogram pre-test composite scores.

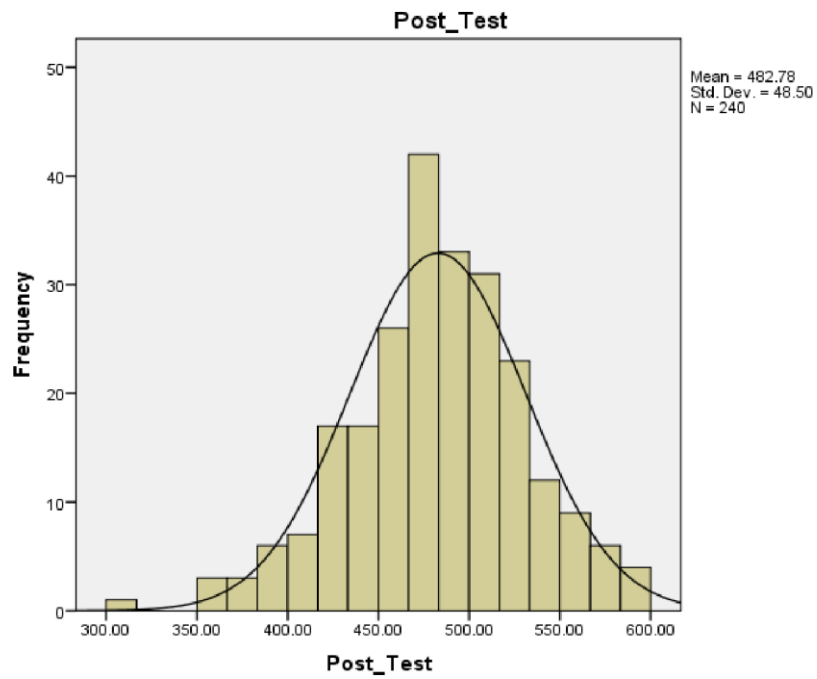


Figure 5. Histogram of post-test composite scores.

Test of homogeneity of slopes. As shown in Table 4, there was no significant difference in the effect of NILD instruction between pre- and post-test total scores for group and one-on-one therapy where $F(1, 236) = 2.134, p = .952; \eta^2$ was .000, which indicated a small effect size.

Table 4

Homogeneity of Slopes

Tests of Between-Subject Effects for Homogeneity of Slope						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial η^2
Corrected Model	421796.763 ^a	3	140598.921	236.344	.000	.750
Intercept	47662.302	1	47662.302	80.119	.000	.253
Group	.848	1	.848	.001	.970	.000
Pre-test	394722.075	1	394722.075	663.519	.000	.738
Group Pre-test	2.134	1	2.134	.004	.952	.000
Error	140394.533	236	594.892			
Total	56500365.000	240				
Corrected Total	562191.296	239				

^a. R Squared = .750 (Adjusted R Squared = .747)

Test of equality variance. The assumption of equality of error variance was tested using Levene's, and Table 5 indicated that the Levene's test of equality of error variance ($p = .025$) was significant. However, the test of assumption of equality of error variance ($p = .025$) was not met, but the ANOVA is robust enough to handle this violation.

Table 5

Levene's Test of Equality of Error Variances

Levene's Test of Equality of Error Variances ^a			
Dependent Variable: Post-Test			
F	df1	df2	Sig.
5.057	1	238	.025

Note. Tests the null hypothesis that error variance of the dependent variable is equal across groups.

^a Design: Intercept + Pre-test + Group

Results

Null Hypothesis

H₀: There is no significant statistical difference in achievement of reading impaired fourth through eighth grade students in a one-on-one setting as compared to those in group settings when receiving cognitive/metacognitive instruction using NILD methodology while controlling for the pre-test of reading achievement scores.

This hypothesis compared composite pre- and post-test scores of five reading subtests of the Woodcock-Johnson III or IV for reading impaired students to determine if there was a statistical difference in achievement between those who received instruction in a one-on-one setting as opposed to a group setting of two to five students. After assumption tests were completed, an ANCOVA was conducted and the following results were found. The researcher failed to reject the null where $F(1, 237) = .034$, $p = .854$; η^2 was .000, which indicated a weak effect size. Therefore, there was no significant difference between the adjusted post-test reading achievement scores of fourth through eighth grade students in a one-on-one setting as compared

to those in group settings when receiving cognitive/metacognitive instruction using NILD methodology (see table 6).

Table 6

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	<i>F</i>	Sig.	Partial Eta Squared
Corrected Model	421794.629 ^a	2	210897.315	356.010	.000	.750
Intercept	49579.189	1	49579.189	8	.000	.261
Pre-test	406127.781	1	406127.781	685.574	.000	.743
Group	20.168	1	20.168	.034	.854	.000
Error	140396.667	237	592.391			
Total	56500365.000	240				
Corrected total	562191.296	239				

^a R squared = .750 (Adjusted R squared = .747).

CHAPTER FIVE: CONCLUSIONS

Overview

The purpose of this causal-comparative study was to determine the effects of simultaneous cognitive/metacognitive instruction on reading achievement for fourth through eighth grade students when administered in one-on-one and group settings and using NILD techniques and strategies over a period of one school year. The study also relied on established methodology and neurological, scientific, and educational research in determining the direction of the study. The following sections will include the findings of the data appropriate to the study, information regarding cognitive/metacognitive learning theory, prior research, implications, limitations, and recommendations for further research.

Discussion

The research question and hypothesis that formed the basis of this study are as follow:

RQ1: Is there a difference in the achievement of fourth through eighth grade students with reading disabilities in a one-on-one setting as compared to those in group settings when receiving specialized cognitive/metacognitive instruction by setting type while controlling for pre-test reading achievement scores?

H₀: There is no significant statistical difference in achievement of reading impaired fourth through eighth grade students in a one-on-one setting as compared to those in group settings when receiving cognitive/metacognitive instruction using NILD methodology while controlling for the pre-test of reading achievement scores.

When comparisons were made between the pre- and post-test composite standard scores of five reading subtests (spelling, letter-word identification, passage comprehension, word attack, and reading vocabulary) from the Woodcock-Johnson Tests of Achievement III and IV in one-on-one (IET) and group settings of two to five students (GET) in fourth through eighth

grades using NILD methodology, the researcher failed to reject the null hypothesis where $F(1, 237) = .034, p = .854$.

Based on a thorough review of literature, the significance of this study was supported by research and theory in five areas: (a) inclusion of both cognitive and metacognitive instruction, using strategies and techniques that could address multiple deficits of the reading process for impaired readers; (b) the extension of the duration and frequency of the intervention to include multiple sessions over a longer period of one school year; (c) a focused inclusion of reading impaired fourth through eighth grade students; (d) controlled administration of treatment in one-on-one and group settings of two to five students by highly qualified, experienced instructors; and (e) the use of norm-referenced standardized tests and subtests for diagnoses and individual remediation plans.

The theoretical framework of the cognitive and metacognitive constructs of Piaget, Luria, Vygotsky, and Feuerstein were grounded in NILD educational therapy, methodology, and techniques, and provided direction for this study (NILD, n.d.). NILD archival data was used and consisted of pre- and post-test standardized test scores for five reading subtests on the Woodcock-Johnson Tests of Achievement for the 2014-2018 school years for group and one-on-one participants. After initial psychological and/or academic testing, participants were diagnosed with language and reading impairments prior to receiving instruction by an NILD-trained instructor in either a one-on-one setting or in small groups of two to five students who were grouped by grade. All students received a minimum of 60 sessions, administered twice weekly for either 80 minutes per session (IET) in individual settings or 45 minutes per session in groups of two to five students by grade (GET) over the course of one school year. Instructors received at least one level of training with one year of experience and/or GET-specific training prior to administering treatment. Therefore, all research criteria were met.

Results, although consistent with prior research, the study presented several challenges. First, of the reading subtest scores provided for 473 students who had received treatment between 2014 and 2018, student scores for 232 were excluded due to missing data for one or more of the five reading subtests or for being outside of the date and grade range of the study. Analysis using a one-way ANCOVA resulted in a weak effect size where $F(1, 237) = .034, p = .854$. Confirmation of small effect sizes was also found in group studies conducted by Barth et al. (2014), Scammacca et al. (2016), and Vaughn et al., (2003), where participants included students in grades four through eight, in large and small groups, and schools provided intervention over a period of one school year with small effect sizes ranging from 0.06 to 0.23. Results varied only when cognitive skills instruction was provided in kindergarten through third grade in one-on-one settings. Although initial effects were significant at 0.60, gains dissipated dramatically over the following five-year period with no further intervention (Slavin et al., 2010).

In addition, findings in this study were consistent with prior research of Wanzek, et al. (2013). These researchers also found a small effect size of 0.15 which included 19 studies and 9,371 fourth through twelfth grades students who received one-on-one and small group specialized instruction within similar limitations of length and number of sessions. The results of an additional study by Vaughn et al. (2010) likewise found that there was no significant difference between effect sizes when the number of students in a group increased from two to five students (0.06) to 10-15 students (0.17).

Other researchers have shown that small effect sizes could be the result of: (a) gaps or uneven learning in the formative stages of language development, (b) failure to connect past and future knowledge by scaffolding and structuring information, (c) a limited exposure to a rich literacy environment, and (d) a lack of early assessment and intervention, (e) low IQ,

(f) insensitivity of tests in detecting impaired components of the reading process, (g) the inclusion of non-responders, and (h) gradual slow progress evidenced over several years of continuing intervention (Barth et al., 2014; Otaiba & Fuchs, 2002; Ültanır, 2012). These indicators can dramatically affect achievement outcomes even with intensive intervention such as one-on-one and small group instruction and may explain the small effect sizes found in this study as well as prior research (Lovett et al., 2012; Wanzek et al., 2013). Outcomes are also consistent with research because reading impairment requires a multifaceted approach and is not easily or quickly resolved even with remediation (Floyd et al., 2012). In that light, NILD treatment is most effective when continued for a minimum of three years, and some students require remediation for longer periods of time, including into adolescence (NILD, n.d.). This study only included those students who received treatment for one year, which may not have been enough time to see significant effect sizes because of the complex process of rebuilding and creating new cognitive structures that are necessary for connecting prior knowledge to future learning (Bruner, 1977; Cirino et al., 2013; Fitzgerald et al., 2017). Further confounding is the fact that, since 2010, research models have begun to consistently include both cognitive and metacognitive reading components in designs and specifically focus on text awareness, vocabulary, and comprehension, but effect sizes continue to be small (Scammacca et al., 2016). Also, according to Scammacca et al. (2016), the use of standardized assessments since 2011 has become the norm, and both the frequency and duration of targeted interventions for fourth through eighth grade students has increased.

In a recent review by Scammacca et al. (2016) of a century of reading research, findings indicated that effect sizes have continued to decline since the 1980s, which, although counterintuitive, could be due to several factors. First, the authors stated that neurological and scientific evidence have influenced the refinement and development of testing designs and

measures, which more accurately detect specific deficits within the cognitive/metacognitive reading process, facilitating earlier intervention and remediation (Scammacca et al., 2016). Therefore, test measures for identification and intervention programs are more precise and readily available for diagnosis and appropriate interventions for reading impaired students (Scammacca et al., 2015). The authors further suggested that because of legislation and funding, at-risk students are more likely to receive remedial assistance in kindergarten through third grades through programs, such as Reading First, RTI, etc., that may somewhat mitigate and lower effect results.

Although this research study included only data for fourth through eighth grades, many students within the school setting may have been identified before fourth grade and received some form of informal intervention, such as tutoring, before entry into educational therapy or other intervention programs (Vaughn et al., 2011). Although the effects of the remediation tend to diminish rapidly with discontinuance, some residual effects may have influenced the initial reading battery of the W-J III or IV original test scores (Johnson et al., 2016).

Another factor that may impact effect sizes is the incidence of children in kindergarten through third grade who fail to improve in reading even after identification and specialized intervention in either phonological awareness or beginning decoding alone (Al Otaiba & Fuchs, 2002). These children are classified as non-responders and make little or no progress when given tiered levels of instruction such as RTI, *Reading Recovery*, tutoring, etc. This difficulty is due to a large variance in deficit components that are complex, hard to identify, assess, and address with appropriate interventions (Dennis, 2013). In a review of 23 studies, Al Otaiba and Fuchs (2002) found that these students tend to have poor phonological awareness, poor phonological memory, cannot rapidly name letters and sounds, may have lower intelligence, attention or behavior issues, and orthographic processing difficulty. The reviewers also found

that 70% of the studies found a direct correlation of phonological awareness to unresponsiveness. As these non-responders continue through grades 4-12, it becomes increasingly more difficult to meet their needs and may require long-term assistance and the use of direct and explicit instruction throughout their education.

Implications

The foundational ability to read and understand text either connects or serves as a barrier for each of us in all areas of life and is fundamental to our success as a nation. As such, the implications of this study and prior research further support and draw critical attention to the complexity of the reading process, the diversity of needs, and the challenges facing our nation in the education of our children in the 21st century. This is evidenced by Solis et al. (2014) who found that approximately 60-69% of fourth through 12th graders are unable to read basic grade level text. In addition, nearly 32% of high school graduates are inadequately prepared for college-level English composition courses, and 50% lack the ability to read and understand college-level texts (Brozo, 2009; Vaughn et al., 2011).

This raises serious questions about the education of our children with reading impairment and how the current educational system will address this issue in the future. The implications of this study contribute to five areas of concern: (a) the confirmation and significance of declining effect sizes of existing research even with an emphasis on standardized testing and comprehension; (b) the distinct challenges of addressing the needs of fourth through eighth grade reading impaired students and non-responders; (c) defining and delineating the complex structures involved in the reading process in line with intervention design and implementation; (d) the need for a holistic approach in addressing the needs of impaired readers by providing education, flexibility of scheduling, and staff support for classroom and special

education teachers in meeting their needs in the inclusive classroom, and (e) closing the research to practice gap.

Declining Effect Sizes

First, it has been suggested that declining effect sizes are the result of multiple influences such as changing designs and measures, increasing focus on vocabulary and comprehension, dilution of effects by prior standard interventions, a changing population, co-morbid conditions co-occurring with reading impairment, etc. (Scammacca et al., 2016). All of these may indeed be factors, but until researchers begin to discover the degree to which intervention content and designs account for the transfer of existing knowledge to new learning as part of the reading process, results will continue to stagnate.

Reading Impaired and Non-responders

Second, educators, administrators, and researchers must refocus attempts to identify and provide intervention for the reading impaired in fourth through eighth grades and non-responders to typical forms of remediation. For many of these students, “business as usual” remedial attempts are not working, and the gap between reading level and grade level is widening (Scammacca et al., 2015). Recognizing this and prioritizing the importance of early identification and the continuation of interventions past third grade makes it more likely that the process of remediation and intervention for these students will take several years and may require continued remediation through 12th grade (Ritchey, 2011). It is critical that educators’ attention must be drawn to the realization that the only thing “typical” about these students is that they all will be affected throughout their lives by the inability to read proficiently and acquire meaning from text. Unless we meet the long-term challenges of creative scheduling and developing interventions that function within the framework of subject specific content, reading

skills will continue to decline for fourth through eighth graders in relation to grade level (Wanzek et al., 2010).

Complex Reading Profiles

A third implication is the changing and divergent needs of reading impaired students in intermediate grades and junior high because of complicated reading profiles (Vaughn et al., 2012). Often, researchers have found that defining and delineating the complex functions of the reading process to align with intervention design and implementation for this population is like trying to hit a moving target (Biancarosa & Snow, 2006). Researchers of educational practice and neurological functioning must continue to expand the boundaries of knowledge in delineating the individual processes that form the basis of cognitive and metacognitive functioning when learning to read. Researchers also bear the responsibility of interpreting results for teachers in such a way that results can be readily understood and implemented in the classroom. Therefore, the better educators understand the interconnectedness of research and practice, the more effectively they can recognize how background information, vocabulary, and decoding transfer to new learning. The more explicitly these components can be applied at the word and text level for comprehension in core content areas of math, history, science, etc., the more proficient students can become (Vaughn & Fletcher, 2012).

A Holistic Approach to Remediation

The fourth significant implication is that a holistic approach to remediation must include preparation and reasonable expectations for teachers by other educational professionals and administrators as policy demands and standards are set for meeting the needs of impaired readers in the inclusive classroom. Because of past legislation and the mandate for intervention programs such as RTI, increased demands have added additional responsibilities on classroom and content area teachers for evaluation and assessment of student progress producing a greater

concern for the lack of time needed for instruction (Werts et al., 2009). This is especially true in grades six through 12 where content area teachers specialize in subject-specific areas with little training or assistance regarding meeting the unique needs of the students who struggle to master basic content (Vaughn & Fletcher, 2012). In these adolescent grades, teachers are left with few options and limited assistance, while at-risk students fall farther and farther behind in reading when compared to their peers.

Research to Practice Gap

The fifth, and perhaps the most critical implication of this study, is the widening research-to-practice gap that still exists after a century of research (Doehring, 2018). With national scores in reading continuing to fall, attention must be focused on preparing preservice teachers for classroom and special education through more practice-based learning experiences over a longer period of time. Educators in higher learning cannot assume that, because novice teachers have been taught theoretical methodology, it will automatically transfer to classroom instruction. Preservice programs much include opportunities and training in understanding preservice teachers' own cognition and engage in self-reflection to evaluate their own teaching experiences and how they connect to cognitive theory. How can novice teachers understand student cognition and the complexities of reading impairment when they do not understand how what they have learned connects to instruction in the classroom?

Another critical issue is the need for continuing training for educational professionals in the use of research and cognitive processing, especially those in inclusive classrooms and special education settings. In studies by Broekkamp and Van Hout-Wolters (2007) and Vanderlinde and van Braak (2010), teachers of the reading impaired viewed research as impractical, not easily implemented, difficult to understand, time consuming, necessitating additional staff and requiring skills and training that practitioners did not have. This self-

perpetuating negative cycle must be broken by providing the tools and training teachers need if our reading impaired students are to make any progress towards closing the reading gap.

Without the proper support and funding from federal and state agencies and support from local school districts for continuing education, teachers cannot meet the demands of closing the reading gap for our intermediate and adolescent students.

Finally, there must be closer collaboration between researchers and teachers so that a reciprocal relationship exists. Researchers must shift their focus from simply passing down results of their studies and expecting automatic implementation to actually hearing and addressing the concerns of teachers of the reading impaired to improve practice and drive future research. Teachers would be more open to applying research to practice if the following needs could be met: (a) results could be applied across diverse settings and grades, (b) additional time provided for training and planning, (c) school-level support available for answering questions and translating new research into practice, and (d) teacher-researcher collaboration to address concerns and maintain the integrity of implementation (Vanderlinde & van Braak, 2010).

Limitations

Several possible threats to external validity were found. First, since participants and standardized subtest scores from the W-J III and IV were provided from archival data collected by the NILD, the population validity was only representative of fourth through eighth grade students who had received cognitive/metacognitive instruction in similar settings of one-on-one and small groups and had been diagnosed with language and/or reading impairment after receiving psychological and/or academic testing. Therefore, generalization of results would be limited to students in the same grade range with similar deficits, treatment, settings, and diagnoses.

Additional threats to external validity were the individual teaching style of the instructors, environment, and rapport with the students. Although all therapists had the same training and experience with learning disabled students with reading impairment, the positive or negative connection with the student could have influenced the administration of instruction and the receptive learning of the student. In addition, although the environment of therapy sessions is usually designed to be held in quiet, less noisy locations, this is not always possible due to scheduling, utilization of available space, adjacent regular classrooms, halls, etc. Therefore, this may have impeded learning for some students.

There could have been a threat to internal validity as well because of confounding or extraneous variables that could not be accounted for by the psychological and achievement testing assessments. Often the complexities of the reading process, which accompany language and reading impairment, can co-occur with other deficits or co-morbid conditions such as attention, behavior, emotional disorders, slow processing, low IQ, etc. (Lyon, 1996). According to Lyon (1996), although research indicates that most children with learning disabilities, have primarily reading deficits, other associative conditions can affect results.

In addition, another threat to internal validity was that WISC scores were not reported for all students, and those that were reported IQs that ranged from 71 to 119. This IQ range from borderline intelligence to above average intelligence could have increased the possibility of inducing a type II error and artificially depressing the overall significance of effects. Another threat that could have affected results was with the limitations of the archival data and the number of students that qualified for the convenience sample. Of scores provided for 472 students reported, 252 were eliminated due to missing data or being outside of the scope of the study.

An additional confounding variable is that, in most impaired readers, progress tends to be slow and gradual so that improvement is measured in small gains and may be necessary over a period of years (Ritchey, 2011; Vaughn et al., 2012). This means that at the intervention level, remediation must be methodical and strategic, with consistent reinforcement of learning because of the multiple components of text vocabulary and comprehension that must be addressed. Most students require continuing intervention for a longer duration than just one year, as in this study, and even throughout adolescence. Although NILD intervention is intended to be a minimum of three years because of the slow and gradual progress, the convenience sample effects may have been diminished. Therefore, effect results may have been larger with additional years of intervention.

Recommendations for Future Research

Considering prior and future research and the results of this study, the educational system in America continues to face significant challenges for meeting the needs of reading impaired students in grades four through twelve. Recommendations for further research are as follow.

There is a significant need for further studies designed to investigate the possible factors that are reducing effect sizes due to changes in the population of reading impaired students in fourth through eighth grades. These non-responders have more difficulty and seem to be more resistant to traditional methods of remediation that have proven effective in the past (Calhoun & Petscher, 2013). Scammacca et al. (2016) suggested that the “business as usual approach” of the prescriptive application of remediation may no longer be adequately addressing the more sophisticated and complex components of the reading process. If this is true, then this must be addressed by neurological and scientific researchers by providing new insight for educators into

areas of cognitive brain functioning that can be incorporated in novel and meaningful ways to address individual deficits and cognitive reading impairment (Askill-Williams et al., 2012).

Another factor that should be investigated is how the effect of late identification of intermediate and adolescent students impacts reading development and interventions with alternative designs that can work more effectively within the unique school environment of intermediate and adolescent remediation. According to Ahmadi et al. (2013), intermediate students (grades 4-5) should be transitioning from learning to read to reading to learn and acquiring self-monitoring and self-regulatory metacognitive skills for evaluating, analyzing, and synthesizing information. This results in serious reading impairment when they are unable to bridge from phonological skills to text analysis necessary for comprehension.

Another area of concern for policymakers is the need for funding of more longitudinal research to detect the difference in effects of early identification and remediation of emergent impaired readers as opposed to those who are identified after third grade (McLaughlin et al., 2012). This is particularly important for junior and senior high students because remediation is significantly more complicated and difficult because of their history of past failure, curriculum demands, scheduling, and teacher training (Fuchs & Vaughn, 2012; Wanzek et al., 2010). If further research could be extended beyond the time of intervention and remediation through 12th grade, with subsequent periodic standardized evaluations of competency, it could provide significant insight in determining if treatment effects are sustained or gradually lost over time. Thus, differentiation of reading components could provide insight for four areas: (a) diagnosing and more accurately identifying specific faulty components of the reading process, (b) influencing the design of innovative interventions that target deficit reading components with skills appropriate content, (c) addressing the appropriate frequency and duration of instruction for maximum progress, and (d) providing methods that more accurately assess progress. As a

result, perhaps educators and researchers could begin to more accurately address the literacy needs of reading impaired children instead of leaning on the failings of the past.

Researchers also should begin to carefully examine the concept development of textbooks in the core content areas of intermediate and adolescent classes that will be used with the reading impaired. Since cognitive theory is based on concept structuring from the simple to the complex, for effective scaffolding of information and transference of prior knowledge to future learning, textbooks should be evaluated and selected carefully. Selection should be based on consistent concept progression from simple to complex and include sources that provide alternative methods and integrated learning supported through media, high interest materials, and technology (Fitzgerald et al., 2017). These resources should also provide opportunities for teacher training for administering textbook content through direct and explicit instruction, which has proven to be more effective for all students (Cheung & Slavin, 2012).

Although costly and time-intensive, research should be considered that involves interventions that are continued for a period of years instead of weeks or months and supported by pre- and post-testing using standardized tests at periodic intervals, especially with non-responders. The results could more appropriately identify the pattern of achievement for specific reading disabilities through the intermediate and adolescent years. The results could contribute significant insights into understanding best practices and the kinds of interventions needed for this unique population of reading impaired students and non-responders.

Finally, to close the research to practice gap, it is imperative that teaching professionals be included in determining future research, and studies should be designed specific to reading impaired students as a result of bi-directional collaboration between teachers and researchers in practice-based settings. In addition, interventions should provide practical solutions for the

diverse needs of the reading impaired that can be implemented across grades for intermediate and adolescent impaired readers.

REFERENCES

- Ackerman, P. T. (1996). A study of adolescent poor readers. *Learning Disabilities Research and Practice, 11*(2), 68-77.
- Afflerbach, P., Cho, B., Kim, J., Crassas, M. E., & Doyle, B. (2013). Reading: What else matters besides strategies and skills? *The Reading Teacher, 66*(6), 440-448.
doi:10.1002/TRTR.1146
- Ahmadi, M. R., Ismail, H. N., & Abdullah, M. K. K. (2013). The importance of metacognitive reading strategy awareness in reading comprehension. *English Language Teaching, 6*(10), 235-244. doi:10.5539/elt.v6n10p235
- Al Otaiba, S., & Fuchs, D. (2002). Characteristics of children who are unresponsive to early literacy intervention: A review of the literature. *Remedial and Special Education, 23*(5), 300-316. doi:10.1177/07419325020230050501
- Al Otaiba, S., Wagner, R. K., & Miller, B. (2014). “Waiting to fail” redux: Understanding inadequate response to intervention. *Learning Disability Quarterly, 37*(3), 129-133.
doi:10.1177/0731948714525622
- Askill-Williams, H., Lawson, M. J., & Skrypiec, G. (2012). Scaffolding cognitive and metacognitive strategy instruction in regular class lessons. *Instructional Science, 40*(2), 413-443. doi:10.1007/s11251-011-9182-5
- Barth, A. E., Stuebing, K. K., Fletcher, J. M., Denton, C. A., Vaughn, S., & Francis, D. (2014). The effect of reading duration on the reliability and validity of middle school students’ ORF performance. *Assessment for Effective Intervention, 40*(1), 53-64.
- Ben-Hur, M. (1994). *On Feuerstein’s instrumental enrichment: A collection*. Arlington Heights, IL: Skylight Training.

- Berninger, V., Abbot, R., Cook, C. R., & Nagy, W. (2016). Relationships of attention and executive functions to oral language, reading, and writing skills and systems in middle childhood and early adolescence. *Journal of Learning Disabilities, 50*(4), 434-449. doi:10.1177/0022219415617167
- Biancarosa, G., & Snow, C. E. (2006). Reading next—A vision for action and research in middle and high school: A report to the Carnegie Corporation of New York (2nd ed.). Washington, DC: Alliance for Excellent Education.
- Bineham, S. C., Shelby, L., Pazey, B. L., & Yates, J. R. (2014). Response to intervention: Perspectives of general and special education professionals. *Journal of School Leadership, 24*(2), 230-252.
- Broekkamp, H., & van Hout-Wolters, B. (2007). The gap between educational research and practice: A literature review, symposium, and questionnaire. *Educational Research and Evaluation, 13*(3), 203-220. doi:10.1080/13803610701626127
- Brozo, W. G. (2009). Response to intervention or responsive instruction? Challenges and possibilities of response to intervention for adolescent literacy. *Journal of Adolescent & Adult Literacy, 53*(4), 277-281. doi10.1598/JAAL.53.4.1
- Bruner, J. S. (1977). *The process of education: A landmark in educational theory*. Cambridge, MA: Harvard University Press.
- Calhoon, M. B. (2005). Effects of a peer-mediated phonological skill and reading comprehension program on reading skill acquisition of middle school students with reading disabilities. *Journal of Learning Disabilities, 38*(5), 424-433. doi:10.177/00222194050380050501
- Calhoon, M. B., & Petscher, Y. (2013). Individual and group sensitivity to remedial reading program design: Examining reading gains across three middle school reading projects.

- Reading and Writing*, 26(4), 565-592. doi:10.1007/s11145-013-9426-7
- Calhoun, M. B., Sandow, A., & Hunter, C. V. (2010). Reorganizing the instructional reading components: Could there be a better way to design remedial reading programs to maximize middle school students with reading disabilities' response to treatment? *Annals of Dyslexia*, 60(1), 57-84. doi:10.1007/s11881-009-0033-x
- Cattell, R. B. (1992). The relevance of fluid and crystallized intelligence concepts of nature: Nature investigation. *Mankind Quarterly*, 32(2), 359-375.
- Cawthon, C. H., & Maddox, J. S., Jr. (2009). *Small-group versus one-on-one educational therapy for struggling readers and writers* (Unpublished doctoral dissertation). Barry University, Miami Shores, FL.
- Cheung, A., & Slavin, R. E. (2012). How features of educational technology applications affect student reading outcomes: A meta-analysis. *Educational Research Review*, 7(3), 198-215. doi:10.1016/j.edurev.2012.05.002
- Cirino, P. T., Romain, M. A., Barth, A. E., Tolar, T. D., Fletcher, J. M., & Vaughn, S. (2013). Reading skill components and impairments in middle school struggling readers. *Reading and Writing*, 26(7), 1059-1086. doi:10.1007/s11145-012-9406-3
- Compton, D. L., Fuchs, L. S., Fuchs, D., Elleman, A. M., & Gilbert, J. K. (2008). Tracking children who fly below the radar: Latent transition modeling of students with late-emerging reading disability. *Learning and Individual Differences*, 18(3), 329-337. doi:10.1016/j.lindif.2008.04.003
- Crooke, P. J., & Olswang, L. B. (2015). Practice-based research: Another pathway for closing the research-practice gap. *Journal of Speech, Language, and Hearing Research*, 58(6), 1871-1882. doi:10.1044/2015_JSLHR-L-15-0243

- Dennis, D. V. (2013). Heterogeneity or homogeneity: What assessment data reveal about struggling adolescent readers. *Journal of Literacy Research, 45*(1), 3-21.
doi:10.1177/1086296X12468431
- Dimitriadis, S. I., Laskaris, N. A., Simos, P. J., Micheloyannis, S., Fletcher, J. M., Rezaie, R., & Papanicolaou, A. C. (2013). Altered temporal correlations in resting-state connectivity fluctuations in children with reading difficulties detected via MEG. *NeuroImage, 83*(1), 307-317. doi:10.1016/j.neuroimage.2013.06.036
- DM Education. (2017). How Trainertext works. *David Morgan Education*.
- Doehring, D. G. (2018). What do we know about reading disabilities? Closing the gap between research and practice. *Annals of Dyslexia, 33*(1), 175-183. doi:10.1007/BF02648004
- Doehring, D. G., & Hoshko, I. M. (1977). Classification of reading problems by the Q-technique of factor analysis. *Cortex, 13*(3), 281-294. doi:10.1016/S0010-9452(77)80037-3
- Edmonds, M. S., Vaughn, S., Wexler, J., Reutebuch, C., Cable, A., Tackett, K. K., & Schnakenberg, J. W. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. *Review of Educational Research, 79*(1), 262-300. doi:10.3012/0034654308325998
- Elbaum, B., Vaughn, S., Hughes, M., & Moody, S. W. (1999). Grouping practices and reading outcomes for students with disabilities. *Exceptional Children 65*(3), 399-415.
doi:10.1177/001440299906500309
- Elleman, A. M., Lindo, E. J., Murphy, P., & Compton, D. L. (2009). The impact of vocabulary instruction on passage-level comprehension of school-age children: A meta-analysis. *Journal of Research on Educational Effectiveness, 2*(1), 1-44.
doi:10.1080/19345740802539200

- Fitzgerald, W. J., Elmore, J., Kung, M., & Stenner, A. J. (2017). The conceptual complexity of vocabulary in elementary-grades core science program textbooks. *Reading Research Quarterly, 52*(4), 417-442. doi:10.1002/rrq.184
- Flanagan, D. P., & Kaufman, A. S. (2004). *Essentials of WISC IV assessment*. Hoboken, NJ: John Wiley & Sons, Inc.
- Flanigan, K. (2007). A concept of word in text: A pivotal event in early reading acquisition. *Journal of Literacy Research, 39*(1), 37-70. doi:10.1080/10862960709336757
- Floyd, R. G., Evans, J. J., & McGrew, K. S. (2003). Relations between measures of Cattell-Horn-Carroll (CHC) cognitive abilities and mathematics achievement across the school-age years. *Psychology in the Schools, 40*(2), 155-171. doi:10.1002/pits.10083
- Floyd, R., Meisinger, E., Gregg, N., & Keith, T. (2012). An explanation of reading comprehension across development using models from Cattell-Horn-Carroll theory: Support for integrative models of reading. *Psychology in the Schools, 49*(8), 725-742. doi:10.1002/pits.21633
- Francis, D. J., Shaywitz, S. E., Stuebing, K. K., Shaywitz, B. A., & Fletcher, J. M. (1996). Developmental lag versus deficit models of reading disability: A longitudinal, individual growth curves analysis. *Journal of Educational Psychology, 88*(1), 3-17. doi:10.1037/0022-0663.88.1.3
- Fuchs, D., Fuchs, L. S., & Stecker, P. M. (2010). The “blurring” of special education in a new continuum of general education placements and services. *Exceptional Children, 76*(3), 301-323. doi:10.1177/001440291007600304
- Fuchs, L. S., Fuchs, D., & Compton, D. L. (2010). Commentary: Rethinking Response to Intervention at middle and high school. *School Psychology Review, 39*(1), 22-28.
- Fuchs, L. S., & Vaughn, S. (2012). Responsiveness-to-Intervention: A decade later. *Journal of*

- Learning Disabilities*, 45(3), 195-203. doi:10.1177/0022219412442150
- Gagné, R. M., & White, R. T. (1978). Memory structures and learning outcomes. *Review of Educational Research*, 48(2), 187-222. doi:10.3102/00346543048002187
- Gall, J. P., Gall, M. D., & Borg, W. R. (2010). *Applying educational research: A practical guide* (6th ed.). New York, NY: Pearson.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction* (8th ed.). Boston, MA: Pearson Education, Inc.
- Grossman, P. (2008). Responding to our critics: From crisis to opportunity in research on teacher education. *Journal of Teacher Education*, 59(1), 10-23.
doi:10.1177/0022487107310748
- Hopkins, K. R. (1996). *A study of the effect of interactive language in the simulation of cognitive functioning for students with learning disabilities* (Unpublished doctoral dissertation). College of William & Mary, Virginia.
- Horowitz-Kraus, T., & Holland, S. K. (2015). Greater functional connectivity between reading and error-detection regions following training with the reading acceleration program in children with reading difficulties. *Annals of Dyslexia*, 65(1), 1-23.
doi:10.1007/s11881015-0096-9
- Hughes, C. A., & Dexter, D. D. (2011). Response to Intervention: A research-based summary. *Theory Into Practice*, 50(1), 4-11. doi:10.1080/00405841.2011.534909
- Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings* (2nd ed.). Thousand Oaks, CA: Sage.
- Jamieson, J. (2004). Analysis of covariance (ANCOVA) with difference scores. *International Journal of Psychophysiology*, 52(3), 277-283. doi:10.1016/j.ijpsycho.2003.12.009
- Jamshidifarsani, H., Garbaya, S., Lim, T., Blazevic, P., & Ritchie, J. M. (2019).

Technology-based reading intervention programs for elementary grades: An analytical review. *Computers and Education*, 128(1), 427-451.

doi:10.1016/j.compedu.2018.10.003

Johnson, E. S., Pool, J., & Carter, D. R. (2016). Screening for reading problems in an RTI framework. *RTI Action Network*.

Jordan, A., Schwartz, E., & McGhie-Richmond, D. (2009). Preparing teachers for inclusive classrooms. *Teaching and Teacher Education*, 25(4), 535-542.

doi:10.1016/j.tate.2009.02.010

Kim, J. S., Hemphill, L., Troyer, M., Thompson, J. M., Jones, S. M., LaRusso, M. D., & Donovan, S. (2016). Engaging struggling adolescent readers to improve reading skills. *Reading Research Quarterly*, 52(3), 357-382. doi:10.1002/rrq.171

Koedinger, K. R., Corbett, A. T., & Perfetti, C. (2012). The knowledge-learning-instruction (KLI) framework: Bridging the science-practice chasm to enhance robust student learning. *Cognitive Science*, 36(5), 757-798. doi:10.1111/j.1551-6709.2021.01245.x

Korthagen, F., Loughran, J., & Russell, T. (2006). Developing fundamental principles for teacher education programs and practices. *Teaching and Teacher Education*, 22(8), 1020-1041. doi:10.1016/j.tate.2006.04.022

Languis, M. L., & Miller, D. C. (1992). Luria's theory of brain functioning: A model for research in cognitive psychophysiology. *Educational Psychologist*, 27(4), 493-511. doi:10.1207/s15326985ep2704_6

Lipka, O., Lesaux, N. K., & Siegel, L. S. (2006). Retrospective analyses of the reading development of grade 4 students with reading disabilities: Risk status and profiles over 5 years. *Journal of Learning Disabilities*, 39(4), 369-379.

doi:10.1177/00222194060390040901

- Lovett, M. W., Lacerenza, L., De Palma, M., & Frijters, J. C. (2012). Evaluating the efficacy of remediation for struggling readers in high school. *Journal of Learning Disabilities, 45*(2), 151-160. doi:10.1177/0022219410371678
- Luo, D., Thompson, L. A., & Detterman, D. (2006). The criterion validity of tasks of basic cognitive processes. *Intelligence, 34*(1), 79-120. doi:10.1016/i.intell.2004.12.003
- Lyon, G. R. (1996). Special education for students with disabilities. *The Future of Children, 6*(1), 54-76.
- Mastery Level Manual for Educational Therapists. (1997). In K. Hopkins (Ed.), *NILD Level III Manual* (2nd ed., pp. 1-25). Norfolk, VA: National Institute of Learning Development.
- Mather, N., Wendling, R. W., & Woodcock, R. W. (2001). *Essentials of WJ III tests of achievement assessment*. New York, NY: Wiley.
- Mather, N., & Woodcock, R. W. (2001). *Woodcock-Johnson III tests of achievement: Examiner's manual*. Rolling Meadows, IL: Riverside.
- Mathes, P. G., & Torgesen, J. K. (1998). All children can learn to read: Critical care for the prevention of reading failure. *Peabody Journal of Education, 73*(3-4), 317-340. doi:10.1080/0161956x.1998.9681897
- McCray, A. D., Vaughn, S., & Neal, L. I. (2001). Not all students learn to read by third grade: Middle school students speak out about their reading disabilities. *The Journal of Special Education, 35*(1), 17-30. doi:10.1177/002246690103500103
- McLaughlin, M. J., Speirs, K. E., & Shenassa, E. D. (2012). Reading disability and adult attained education and income: Evidence from a 30-year longitudinal study of a population-based sample. *Journal of Learning Disabilities, 47*(4), 374-386. doi:10.1177/0022219412458323

- Messer, D., & Nash, G. (2018). An evaluation of the effectiveness of a computer-assisted reading intervention. *Journal of Research in Reading, 41*(1), 140-158. doi:10.1111/1467-9817.12107
- Montague, M., Enders, C., & Dietz, S. (2011). Effects of cognitive strategy instruction on math problem solving middle school students with learning disabilities. *Learning Disability Quarterly, 34*(4), 262-272. doi:10.1177/0731948711421762
- Moreau, L. K. (2014). Who's really struggling? Middle school teachers' perceptions of struggling readers. *RMLE Online, 37*(10), 1-17.
- National Center for Educational Statistics (2012). Digest of Education statistics: 2012 - Elementary and secondary education. *NCES*.
- National Institute for Learning Development. (n.d.). What is NILD educational therapy?
- National Research Council. (2001). *Knowing what students know: The science and design of educational assessment*. doi:10.17226/10019
- Needleman, H., Schnoes, C. J., & Ellis, C. R. (2006). The New WISC IV. *Journal of Developmental and Behavioral Pediatrics, 27*(2), 127-128. doi:10.1097/00004703-200604000-00007
- No Child Left Behind Act of 2001, Pub. L. No. 107-110, § 115 Stat. 1425 (2002).
- O'Connor, R. E., & Klingner, J. (2010). Poor responders in RTI. *Theory Into Practice, 49*(4), 297-304. doi:10.1080/00405841.2010.510758
- Paris, S. G. (2005). Reinterpreting the development of reading skills. *Reading Research Quarterly, 40*(2), 184-202. doi:10.1598/RRQ.40.2.3
- Prewett, S., Mellard, D. F., Deschler, D. D., Allen, J., Alexander, R., & Stern, A. (2012). Response to intervention in middle schools: Practices and outcomes. *Learning Disabilities Research & Practice, 27*(3), 136-147. doi:10.1111/j.1540-

5826.2012.00359.x

Rapp, D. N., van den Broek, P., McMaster, K. L., Kendeou, P., & Epsin, C. A. (2007). Higher-order comprehension processes in struggling readers: A perspective for research and intervention. *Scientific Studies in Reading, 11*(4), 289-312.

doi:10.1080/10888430701530417

Reading Disorder. (n.d.). In *Encyclopedia of Mental Disorders*.

Rezaie, R., Simos, P. G., Fletcher, J. M., Cirino, P. T., Vaughn, S., & Papanicolaou, A. C. (2011). Temporo-parietal brain activity as a longitudinal predictor of response to educational interventions among middle school struggling readers. *Journal of the International Neuropsychological Society, 17*(5), 875-885.

doi:10.1017/S1355617711000890

Ritchey, K. D. (2011). The first "R": Evidence-based reading instruction for students with learning disabilities. *Theory Into Practice, 5*(1)0, 28-34.

Roberts, G., Rane, S., Fall, A. M., Denton, C. A., Fletcher, J. M., & Vaughn, S. (2015). The impact of intensive reading intervention on level of attention in middle school students. *Journal of Clinical Child & Adolescent Psychology, 44*(6), 942-953.

doi:10.1080/15374416.2014.913251

Rupley, W. H., Blair, T. R., & Nichols, W. D. (2009). Effective reading instruction for struggling readers: The role of direct/explicit teaching. *Reading and Writing Quarterly, 25*(2-3), 125-138. doi:10.1080/10573560802683523

Scammacca, N. K., Roberts, G. J., Cho, E., Williams, K. J., Roberts, G., Vaughn, S. R., & Carroll, M. (2016). A century of progress: Reading interventions for students in grades 4-12, 1914-2014. *Review of Educational Research, 86*(3), 756-800.

doi:10.3102/0034654316652942

- Scammacca, N. K., Roberts, G., Vaughn, S., Edmonds, M., Wexler, J., Reutebuch, C. K., & Torgensen, J. K. (2007). Interventions for adolescent struggling readers: A meta-analysis with implications for practice.
- Scammacca, N. K., Roberts, G., Vaughn, S., & Stuebing, K. K. (2015). A meta-analysis of interventions for struggling readers in grades 4-12: 1980-2011. *Journal of Learning Disabilities, 48*(4), 369-390. doi:10.1177/0022219413504995
- Schrank, F. A., Decker, S. L., & Garruto, J. M. (2016). *Essentials of WJ IV cognitive abilities assessment*. Hoboken, NJ: John Wiley & Sons, Inc.
- Schrank, F. A., McGrew, K. S., & Woodcock, R. W. (2001). *Technical abstract* (Woodcock-Johnson III assessment service bulletin no. 2). Itasca, IL: Riverside Publishing.
- Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science, 26*(1-2), 113-125. doi:10.1023/A:1003044231033
- Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review, 7*(4), 351-371. doi:10.1007/BF02212307
- Semrud-Clikeman, M., Fine, J. G., & Bledsoe, J. (2014). Comparison among children with children with autism spectrum disorder, nonverbal learning disorder and typically developing children on measures of executive function. *Journal of Autism and Developmental Disorders, 44*(2), 331-342. doi:10.1007/s10803-013-1871-2
- Slavin, R. E., Lake, C., Davis, S., & Madden, N. A. (2010). Educator's guide: Identifying what works for struggling readers. In *Best Evidence Encyclopedia*.
- Solis, M., Ciullo, S., Vaughn, S., Pyle, N., Hassaram, B., & Leroux, A. (2012). Reading comprehension interventions for middle school students with learning disabilities: A synthesis of 30 years of research. *Journal of Learning Disabilities, 45*(4), 327-340. doi:10.1177/0022219411402691

- Solis, M., Miciak, J., Vaughn, S., & Fletcher, J. M. (2014). Why intensive interventions matter: Longitudinal studies of adolescents with reading disabilities and poor reading comprehension. *Learning Disability Quarterly*, *37*(4), 218-229.
doi:10.1177/0731948714528806
- Speece, D. L. (2005). Hitting the moving target known as reading development: Some thoughts on screening children for secondary interventions. *Journal of Learning Disabilities*, *38*(6), 487-493. doi:10.1177/00222194050380060301
- Strong, G. K., Torgerson, C. J., Torgerson, D., & Hulme, C. (2011). A systematic meta-analytic review of evidence for the effectiveness of the “Fast ForWord” language intervention program. *Journal of Child Psychology and Psychiatry*, *52*(3), 224-235.
doi:10.1111/j.1469-7610.2010.02329.x
- Suggate, S. P. (2010). Why what we teach depends on when: Grade and reading intervention modality moderate effect size. *Developmental Psychology*, *46*(6), 1556-1579.
doi:10.1037/a0020612
- Thompson, R., Tanimoto, S., Lyman, R. D., Geselowitz, K., Begay, K. K., Nielsen, K., . . . Berninger, V. (2018). Effective instruction for persisting dyslexia in the upper grades: Adding hope stories and computer coding to explicit literacy instruction. *Education and Information Technologies*, *23*(3), 1043-1068. doi:10.1007/s10639-017-9647-5
- Tichá, R., Espin, C. A., & Wayman, M. M. (2009). Reading progress monitoring for secondary-school students: Reliability, validity, and sensitivity to growth of reading-aloud and maze-selection measures. *Learning Disabilities Research & Practice*, *24*(3), 132-142.
doi:10.1111/j.1540-5826.2009.00287.x
- Toste, J. R., Compton, D. L., Fuchs, D., Fuchs, L. S., Gilbert, J. K., Cho, E., . . . Bouton, B. D. (2014). Understanding unresponsiveness to tier 2 reading intervention: Exploring the

- classification and profiles of adequate and inadequate responders in first grade. *Learning Disability Quarterly*, 37(4), 192-203. doi:10.1177/0731948713518336
- Tzuriel, D. (2014). Rueven Feuerstein: A giant in cognitive psychology. *Journal of Cognitive Education and Psychology*, 13(3), 289-291. doi:10.1891/1945-8959.13.3.289
- Tzuriel, D., & Shamir, A. (2007). The effects of peer mediation with young children (PMYC) on children's cognitive modifiability. *British Journal of Educational Psychology*, 77(Pt. 1), 143-165. doi:10.1348/000709905x84279
- Ültanır, E. (2012). An epistemological glance at the constructivist approach: Constructivist learning in Dewey, Piaget, and Montessori. *International Journal of Instruction*, 5(2), 195-212.
- U.S. Department of Education. (2011). The nation's report card: Reading 2011 national assessment of education progress at grades 4 and 8. *National Center for Educational Statistics/U.S. Department of Education*.
- Vanderheyden, A. M. (2011). Technical adequacy of response to intervention decisions. *Exceptional Children*, 77(3), 335-350. doi:10.1177/001440291107700305
- Vanderlinde, R., & van Braak, J. (2010). The gap between educational research and practice: Views of teachers, school leaders, intermediaries and researchers. *British Educational Research Journal*, 36(2), 299-316. doi:10.1080/01411920902919257
- Vaughn, S. (2015). Building on past successes: Designing, evaluating, and providing effective treatments for persons whom typical instruction is not effective. *Remedial and Special Education*, 36(1), 5-8. doi:10.1177/0741932514543928
- Vaughn, S., Cirino, P. T., Wanzek, J., Wexler, J., Fletcher, J. M., Denton, C. D., . . . Francis, D. J. (2010). Response to intervention for middle school students with reading difficulties: Effects of a primary and secondary intervention. *School Psychology Review*, 39(1), 3-21.

- Vaughn, S., & Fletcher, J. M. (2010). Thoughts on rethinking response to intervention with secondary students. *School Psychology Review, 39*(2), 296-299.
- Vaughn, S., & Fletcher, J. M. (2012). Response to intervention with secondary school students with reading difficulties. *Journal of Learning Disabilities, 45*(3), 244-256.
doi:10.1177/0022219412442157
- Vaughn, S., Klingner, J. K., Swanson, E. A., Boardman, A. G., Roberts, G., Mohammed, S. S., & Stillman-Spisak, S. J. (2011). Efficacy of collaborative strategic reading with middle school students. *American Educational Research Journal, 48*(2), 938-964.
doi:10.3102/0002831211410305
- Vaughn, S., Linan-Thompson, S., Kouzekanani, D., Pedrotty Bryant, D., Dickson, S., & Blozis, S. A. (2003). Reading instruction grouping for students with reading difficulties. *Remedial and Special Education, 24*(5), 301-315. doi:10.1177/0741932503024005051
- Vaughn, S., Wexler, J., Leroux, A., Roberts, G., Denton, C., Barth, A., & Fletcher, J. (2012). Effects of intensive reading intervention for eighth-grade students with persistently inadequate response to intervention. *Journal of Learning Disabilities, 45*(2), 515-525.
doi:10.1177/0022219411402692
- Vaughn, S., Wexler, J., Roberts, G., Barth, A. A., Cirino, P. T., Romain, M. A., . . . Denton, C. A. (2011). Effects of individualized and standardized interventions on middle school students with reading disabilities. *Exceptional Children, 77*(4), 391-407.
doi:10.1177/001440291107700401
- Veenman, S. (1984). Perceived problems of beginning teachers. *Review of Educational Research, 54*(2), 143-178. doi:10.3102/00346543054002143
- Villarreal, V. (2015). Test review: Schrank, F. A., Mather, N., & McGrew, K. S. (2014) Woodcock-Johnson IV Tests of Achievement. *Journal of Psychoeducational*

Assessment, 33(4), 391-398. doi:10.1177/0734282915569447

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological process*.

Cambridge, MA: Harvard University Press.

Wanzek, J., Vaughn, S., Roberts, G., & Fletcher, J. M. (2011). Efficacy of a reading intervention for middle school students with learning disabilities. *Exceptional Children*, 78(1), 73-87.

doi:10.1177/001440291107800105

Wanzek, J., Vaughn, S., Scammacca, N. K., Metz, K., Murray, C. S., Roberts, G., & Danielson, L. (2013). Extensive reading intervention for students with reading difficulties after grade 3. *Review of Educational Research*, 83(2), 163-195.

doi:10.3102/0034654313477212

Wanzek, J., Wexler, J., Vaughn, S., & Ciullo, S. (2010). Reading interventions for students with learning disabilities in the upper elementary grades: A synthesis of 20 years of research.

Reading and Writing, 23(8), 889-912. doi:10.1007/s11145-009-9179-5

Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd ed.). Thousand Oaks, CA: Sage.

Watkins, M. W., & Canivez, G. L. (2001). Longitudinal factor structure of the WISC-III among students with disabilities. *Psychology in the Schools*, 38(4), 291-298.

doi:10.1002/pits.1019

Wei, X., Blackorby, J., & Schiller, E. (2011). Growth in reading achievement of students with disabilities, ages 7 to 17. *Exceptional Children*, 78(1), 89-106.

doi:10.1177/001440291107800106

Werts, M. G., Lambert, M., & Carpenter, E. (2009). What special education directors say about RTI. *Learning Disability Quarterly*, 32(4), 245-254. doi:10.2307/27740376

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson III - Tests of achievement* (3rd ed.). Itasca, IL: Riverside Publishing.

APPENDIX A
IRB Approval Letter

LIBERTY UNIVERSITY
INSTITUTIONAL REVIEW BOARD

November 17, 2017

Brenda Hout
IRB Exemption 2951.111717: The Effects of NILD Educational Therapy on Reading
Achievement

Dear Brenda Hout,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(4), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,



Administrative Chair of Institutional Research
The Graduate School

LIBERTY
UNIVERSITY.

Liberty University | Training Champions for Christ since 1971

APPENDIX B
Introductory Letter to Therapists

Dear Educational Therapist:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree in curriculum and instruction. This study will include participants from fourth through eighth grades with a diagnosed reading disability, who received at least one year of educational therapy using the methodology of National Institute of Learning Development (NILD). Selection will be limited to students who participated between 2014, 2015 or 2016 in either one-on-one or group settings. The title of my research project is THE EFFECTS OF NILD EDUCATIONAL THERAPY ON READING ACHIEVEMENT, and the purpose of my research is to better understand reading achievement when students receive a combination of cognitive and metacognitive instruction in a one-on-one or small group setting by an NILD educational therapist. As the researcher for this study, I have twenty years of experience giving educational therapy to students in Kindergarten through adult age and ten years teaching in the classroom.

Since most of the information will come from your annual testing records, it will require minimal time away from your busy schedule. If you would be willing to participate, please fill in the form below and e-mail to [REDACTED] or call [REDACTED] at your earliest convenience. Upon receiving your response form, further instructions will be sent by e-mail for the collection and reporting of the data. By participating, you will help further the research base for NILD.

Thanks for your time, and may God richly bless you as you continue to make a difference one child at a time. Blessings,

Brenda Hout, M.Ed., Ed.S., ET
Doctoral Candidate at Liberty University

Yes, I would like to participate in this study and will provide the required data stripped of any identifiable information that would violate the participant's privacy rights.

Therapist _____

E-mail _____

Phone _____

School or Private Therapist _____

IET or GET (Circle One for student)

Address _____

City, State _____

Level of Training completed:

Level I _____ *Level II* _____ *Level III* _____ *PCET* _____ *W-J Workshop* _____ *GET*

APPENDIX C

Follow-Up Letter to Therapists and Instructions for Reporting

Dear Participating Therapist.

Thank you for your time and willingness to participate in this study of reading achievement in NILD one-on-one and group educational therapy students in fourth through eighth grades for 2014, 2015, and/or 2016. Attached are the Parental Consent and Data Response Forms.

Instructions:

1. select student participants who completed at least one year of one-on-one or group therapy in fourth through eighth grades during 2014, 2015, and/or 2016.
2. contact the parent/s or guardian and have them sign the Parental Consent Form and return it to you. Then either mail, or scan and send a copy via e-mail to me as soon as possible.
3. complete the Data Response Form, which is similar to the NILD Annual Summary form used each year for Annual Testing.
4. complete the background information followed by:
 1. initial verbal, non-verbal, Factor Scores (if available) and full-scale IQ scores from the WISC III or IV
 2. initial and post-test percentile and grade equivalent scores of five subtests from the Woodcock-Johnson III or IV (Spelling, Letter-Word Identification, Passage Comprehension, Word Attack, and Reading Vocabulary).

For data collection and privacy, please use the NILD number that was assigned to student/s from your program. This would be the same student number used on your Annual Report to NILD. Do not include any personal information that might violate the student/s privacy, then complete the attached Data Collection Form. All information will remain confidential, and results of this study will be released upon request.

I am looking forward to hearing from you soon.
May God richly bless you and your family.



Blessings,

Brenda L. Hout, M.Ed., Ed.S., ET
Doctoral Candidate at Liberty University

APPENDIX D
Data Response Form

DATA RESPONSE FORM FOR 2014-2017 SCHOOL YEARS

Therapist _____ E-mail _____
 Phone _____
 School or Private Therapist _____ IET GET (Circle One for student)
 Address _____
 City, State _____
 Level of Training Level I _____ Level II _____ Level III _____ PCET _____ W-J _____ GET _____
 Years of Experience _____
 Student ID# _____ Gender _____ Began Therapy _____
 # of Sessions for _____ Year – 2014 _____ 2015 _____ 2016

Complete the form below:

WISC IV Initial Testing						
Test Date						
Age Equivalency						
Grade Equivalency						
Verbal Score						
Performance Score						
Full Scale IQ						
Verbal Comprehension Score						
Perceptual Organization Score						
Freedom from Distractibility Score						
Processing Speed Score						
Woodcock Johnson Initial Test Score	W-J III (Third Ed.)			W-J IV (Fourth Edition)		
Letter-Word Identification	SS	PR	GE	SS	PR	GE
2014-2015						
2015-2016						
2016-2017						
Spelling	SS	PR	GE	SS	PR	GE
2014-2015						
2015-2016						
2016-2017						
Passage Comprehension	SS	PR	GE	SS	PR	GE
2014-2015						
2015-2016						
2016-2017						
Word Attack	SS	PR	GE	SS	PR	GE
2014-2015						

2015-2016						
2016-2017						
Reading Vocabulary	SS	PR	GE	SS	PR	GE
2014-2015						
2015-2016						
2016-2017						

Key: Standard Score (SS)/ Percentile Rank (PR / Grade Equivalent (GE)

APPENDIX E Letter to
Parents/Guardians

November 1, 2017

Dear Parent or Guardian:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree in curriculum and instruction. This study will include participants from fourth through eighth grades with a diagnosed reading disability, who received at least one year of educational therapy using the methodology of National Institute of Learning Development (NILD). Selection will be limited to students who participated between 2014 through 2016 in either a one-on-one or group settings. The title of my research project is THE EFFECTS OF NILD EDUCATIONAL THERAPY ON READING ACHIEVEMENT, and the purpose of my research is to better understand reading achievement when students receive remediation in a one-on-one or small group setting by an NILD educational therapist. As the researcher for this study, I have twenty years of experience giving educational therapy to students in Kindergarten through adult age students, and ten years teaching in the classroom.

I am writing to advise you that your child has met the participation criteria for this study and request your permission to access and utilize NILD test data/records.

Since data will be from archived records, no student participation is required. The data will be used to determine if remedial reading instruction is more effective in a one-on-one or group setting when using NILD techniques and strategies. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you choose to grant permission, please place your signature below or grant permission by emailing your therapist or returning this signature page to your NILD educational therapist as soon as possible. You may also respond to me by email at blhout@liberty.edu.

Signature _____

Brenda L. Hout, Ed.S
Doctoral Candidate
Reading Specialist
Educational Therapist

