DIRECT INSTRUCTION AND ORTON-GILLINGHAM READING METHODOLOGIES: EFFECTIVENESS OF INCREASING READING ACHIEVEMENT OF ELEMENTARY SCHOOL STUDENTS WITH LEARNING DISABILITIES

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Abstract

Despite the efforts to improve the reading achievement of students with dyslexia and other language based learning disabilities in recent years, little progress has been made towards increasing the reading proficiency of this population of students and closing the achievement gap between students identified as having a disability, as compared to typically developing peers. Given the importance of reading proficiency, it is imperative that educators use the most effective curriculum and interventions possible. Yet, most special educators continue to rely upon teacher made and selected materials along with trade books for teaching reading. The Orton-Gillingham-based reading pedagogy has been used in the United States since the 1930’s to teach students with learning disabilities. However, due to a lack of published research the pedagogy has been relegated to the status of unscientifically proven, and few public schools are able to implement the methodology with their struggling students due to NCLB and the Individuals with Disabilities Education Act (IDEA) mandates to use only curriculum and methodologies that are scientifically proven. In addition, while there are over forty years of research to support the use of scripted Direct Instruction programs as one of the most effective instructional methods for at-risk students, few studies have specifically looked at the effectiveness with students identified as having dyslexia or other language based learning disabilities. There is a need to address the significant gap in the literature regarding the effectiveness of these methodologies with students identified as having learning disabilities in reading. By employing a quasi-experimental design, and implementing the two intervention curricula for a ten-week period, and assessing reading achievement pre and post-test using Measures of Academic Progress – Reading (MAP-R), one-way ANCOVA was used to compare the adjusted means of the reading performance variables. While the quantitative data in this
study failed to provide clear and statistically significant results showing one curriculum to be more effective than the other, the qualitative data from open-ended interviews of the teachers and paraeducators in the study provided insight into the educators’ experiences implementing the intervention curricula with students. The themes that surfaced from these interviews offer insight for future development of reading intervention curriculum, as they provide awareness of the importance that educators place upon scaffolding and multi-sensory learning opportunities in educational materials, as well as the student-teacher relationship, for students with learning disabilities. Further, the interview findings suggest the need for on-going support of teachers and paraeducators as they implement new curricula, so that they may overcome any implementation challenges and successfully implement the materials with full fidelity.

Keywords: Orton-Gillingham-based instruction, Corrective Reading, direct instruction, literacy instruction, learning disabilities, dyslexia
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The end result of wisdom is . . . good deeds. – The Talmud, Berakhot

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Direct Instruction and Orton-Gillingham Reading Methodologies:
Effectiveness of Increasing Reading Achievement of Elementary School Students
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Chapter 1: Introduction

Statement of the Research Problem

Sixty-six percent of American fourth graders are not proficient in reading, a statistic that hasn’t changed much since the early 1990s (U.S. Department of Education, 2014; U.S. Department of Education, 2014b). Even more alarming is the fact that thirty-two percent of American fourth graders lack even basic reading skills as measured by the National Assessment of Educational Progress (NAEP) (U.S. Department of Education, 2014). Despite No Child Left Behind (NCLB) and the shift towards Common Core Curriculum Standards (CCCS) in the United States within the past two decades, reading proficiency has remained largely flat and unchanged since the early 1990’s (Reardon et al, 2012; U.S. Department of Education, 2014; U.S. Department of Education, 2012; U.S. Department of Education, 2012b).

Student reading achievement data is even more dismal for students identified with disabilities. Of the more than 6.4 million children between the ages of three and twenty-one identified as having a disability under the Individuals with Disabilities Education Act (IDEA) less than ten percent are found to have proficient reading skills by the time they reached eighth grade (Disability Statistics & Demographics Rehabilitation & Training Center, 2014; U.S. Department of Education 2015), a statistic that is startling enough by itself, but when taken in comparison to the scores of non-disabled students is outright alarming. In 1998 NAEP scores illustrated a gap of 41 points between the average scores of fourth grade American students with
disabilities in comparison to their same age peers without disabilities (U. S. Department of Education, 2014). Despite the national attention to this problem over the past decade, reauthorization of the IDEA law, implementation of NCLB, and the CCCS, the gap has not only failed to close, but it has actually slowly widened by two additional points (Wei, Blackorby, & Schiller, 2011). While two points may seem small, it is actually quite significant given that students with disabilities are now allowed accommodations on the NAEP reading assessment, something that was not allowed prior to 1998. Additionally, the overall gap is now nearly 25% of the total average reading score for students with disabilities (U.S. Department of Education, 2014).

While it is true that the reading achievement of students with disabilities has continued to lag far behind that of non-disabled students, it can’t be said that the United States hasn’t tried to close this gap through legislation, educational initiatives, and allocation of financial resources. Every national educational legislation and initiative in the last two decades has included some provision for the requirement to close the gap that exists between students with and without disabilities in the area of academic achievement (Apple, 2008; Haager & Vaughn, 2013, Roberts, 2012, Wei, Blackorby, & Schiller, 2011). The most recent re-authorization of IDEA requires students to be educated in the least restrictive environment with full access to the general education curriculum, and requires each state’s Department of Education as well as local education association or public school district to analyze their achievement data and submit an improvement plan annually or face loss of federal IDEA funding (Individuals with Disabilities Education Improvement Act, 2004). The No Child Left Behind Act mandates that states and school districts demonstrate adequate yearly progress in student achievement, including for students with disabilities, or risk the loss of federal Title funds. Even more recently, with the
shift to Common Core Curriculum Standards, districts are required to show how students with
disabilities are afforded access to the general curriculum (Haager & Vaughn, 2013). Perhaps
even more telling is the fact that the United States now spends on average thirty-nine percent
more per elementary and secondary student each year, than the average spent by all other
member countries of the Organization for Economic Co-Operation and Development (OECD
countries) (OECD, 2013; U. S. Department of Education, 2014), all without meeting the intended
benefit of increasing reading proficiency and closing the long standing achievement gap.

One scientifically research-based educational pedagogy that a growing number of schools
have adopted as a result of these mandates is scripted Direct Instruction (DI) (Shelton, 2010).
While there is over forty years of data that shows direct instruction to be a successful means of
teaching students basic reading skills (Becker & Engelmann, 1973; Engelmann, 1999), many
teachers are resistant to using direct instruction with their students (Grossen, 2004; Shippen,
Houchins, Steventon, & Sartor, 2005).

Perhaps one of the key problems surrounding the use of scripted direct instruction
programs with students is simply that direct instruction is such a hotly debated topic. Which
methodology works best, particularly in the area of reading, has long been a political one. The
question of scripted direct instruction has proven to be no different, with debates raging over the
appropriateness of the use with students in Kindergarten through high school being debated for
nearly forty years (Becker & Engelmann, 1973; Kim & Axelrod, 2005; Shelton, 2010). Another
issue may be that research on the subject has focused solely upon the effectiveness of the
methodology, rather than how teachers’ perceptions may play a role in the effectiveness of the
methodology on student achievement.
Another educational pedagogy being implemented in schools with struggling readers on an increasing frequency is Orton-Gillingham-based instruction (O-G) (Ritchey & Goeke, 2006, Rose & Zirkel, 2007, Rowley, McCarthy, & Rines, 2014). Like scripted direct instruction (DI), the Orton-Gillingham methodology is not new. Dating back to the 1930’s, it is an instructional methodology that has long been used with students who have reading disabilities and is widely upheld as being highly effective by both teachers and parents, and is a frequently requested methodology in IDEA due process complaints (Rose & Zirkel, 2007). Unlike direct instruction, there is remarkably little empirical research proving O-G to be an effective approach to teaching reading, despite the wide held beliefs of many parents and educators that O-G is an effective intervention for struggling readers (Giess, Rivers, Kennedy, & Lombardino, 2012; Ritchey & Goeke, 2006; Turner, 2008; U. S. Department of Education, 2010).

Several problems of practice arise out of this. First, in order to help all students to achieve reading proficiency it is imperative that educators use the most effective curriculum and interventions possible. Secondly, the No Child Left Behind (NCLB) and Reading First initiatives mandate the use of scientifically research based educational practices and curriculum with students (U. S. Department of Education, Office of Elementary and Secondary Education, 2002). In fact, the focus upon scientifically researched practices is so focal in the NCLB mandate that the term is used well over 100 times within the bill (U. S. Department of Education, 2002). Because of this call for the use of scientifically research-based practices, many schools have mandated specific curriculum and programs that teachers must use with students, for fear of losing state and federal funding sources should their students fail to make adequate yearly progress (AYP). Yet rarely have these curricula been scientifically proven as being effective with students who exhibit dyslexia or other learning disabilities. Thirdly, given the immense
financial struggle that schools are faced with in the current economic climate, it is imperative that schools be able to avoid costly due process proceedings for IDEA complaints, related to curriculum and instructional methodologies. Most significantly though, is the long-standing need to find effective reading interventions that can finally close the achievement gap that exists between students with disabilities and their typically developing peers.

Given the pressure placed upon schools to have all students passing statewide benchmarks in core subjects, as well as meeting annual federal Adequate Yearly Progress (AYP) goals, coupled with the substantial amount of public funds spent annually on reading curricula, it is imperative that educators understand which methodologies and curricula are most successful for improving educational practices and student achievement (Vanderlinde & van Braak, 2010). While there has been extensive research on the effectiveness of Direct Instruction programs with at risk students over the past forty years, few studies have specifically looked at the effectiveness of these programs with students who have dyslexia or language based learning disabilities. Even fewer studies have been conducted to look at the effectiveness of Orton-Gillingham-based instructional programs. And to date, there have been no studies published which compare the effectiveness of the two methodologies, or explore the experiences of teacher perceptions of the methodologies. Therefore, the purpose of this study is to gain insight into both the effectiveness of scripted Direct Instruction reading programs and Orton-Gillingham-based reading instruction with elementary students with learning disabilities, while also looking at the experiences of teachers as they implement each of the reading interventions under investigation.
Significance of the Problem

The significance of understanding better ways to address the learning needs of students, particularly in the area of reading, has implications at many levels from the local school, to state, regional, and national levels. Given the problem of an ever-increasing achievement gap, between students identified as having disabilities and their non-disabled peers, it is imperative that educators be able to identify the most effective means of literacy instruction. Therefore, this research project is intended to contribute to the literature and discussion on how best to assist students with learning disabilities attain reading proficiency at the national, state, and local level. Students, policy makers, educational researchers, and educators alike can benefit from determining more appropriate instructional strategies for these struggling students.

As the policy makers at the national and state levels continue to work towards improving education through legislation and policy, it is critical that governing bodies fully understand what the most effective practices for teaching reading to students with learning disabilities are, rather than simply continuing to pour large sums of money and human resources into purchasing and implementing reading curriculum backed by the United States of America’s Reading First Initiative as effective research based curricula. Doing so risks wasting continued resources and time on instructional methods that may not be able to produce the desired results for this population of students. It is a necessity then that policy makers develop a better understanding of curriculum and educational pedagogy that are effective for teaching reading to all struggling learners, particularly those most at risk for reading difficulties – students with dyslexia and language based learning disabilities.

At the classroom level, given the importance of reading, and the significant need to help all students achieve reading proficiency, it is imperative that teachers use the most effective
curriculum and interventions possible. This research study aims to help guide the instructional decisions of school administrators and teachers as they select and implement curricular interventions to support struggling readers.

Furthermore, given the limited amount of published research, which shows the effectiveness of the Direct Instruction and O-G-based pedagogies as interventions for students identified as having dyslexia or other language based learning disabilities, this study helps to fill a significant void in the literature. In short, given the poor long-term outcomes for students with learning disabilities who fail to achieve proficiency in reading, this is truly a problem of practice that impacts every level of American society from the individual to the local, state, and national level (Shelley-Tremblay, O’Brien, & Langhinrichsen-Rohling, 2007).

**Research Questions and Hypothesis**

The problem of practice under examination is the persistently low performance in reading achievement of students with learning disabilities. Therefore, the purpose of this study was to gain insight into the potential effectiveness of two commonly used reading pedagogies: the Direct Instruction *Corrective Reading* curriculum and Orton-Gillingham-based instruction with elementary age students who have been identified as having learning disabilities, and the experience that teachers have as they implement these reading intervention curricula with students identified as having learning disabilities.

**Central question.** Which reading intervention is most effective at improving reading achievement in elementary age students with learning disabilities, Direct Instruction or Orton-Gillingham-based instruction?
**Sub-question.**

- What is the experience of teachers/paraeducators as they implement a reading intervention curriculum (scripted Direct Instruction or Orton-Gillingham-based instruction) with students identified as having learning disabilities?

**Null hypothesis.**

**H1:** There is no significant difference between the increase in student reading achievement when either scripted Direct Instruction or Orton-Gillingham-based instruction is used.
Definition of Key Terms

direct instruction: direct instruction, sometimes referred to as “little d. i.” refers to explicit teacher directed instruction of a content skill such as reading decoding, spelling, or mathematic calculations.

Direct Instruction: Direct Instruction, sometimes referred to as “big D. I.” refers to explicit and intensive teacher-directed instruction of basic skills using a scripted method of teaching that focuses on teaching reading decoding, comprehension, spelling, or mathematics using a bottom-up approach. The Direct Instruction model is a “comprehensive system of instruction that integrates effective teaching practices with sophisticated curriculum design, classroom organization and management, and careful monitoring of student progress” (Stein, 1998, p. 227).

Dyslexia: Dyslexia is a neurologically-based specific Learning Disability affecting an individual’s ability to decode, comprehend, and encode printed text. Difficulties with these skills are typically the result of a deficit in the phonological components of language, and occur despite an individual’s average to above average cognitive skills.

Learning Disabilities: Learning Disabilities are a disorder in one or more of the basic processes of understanding and using language, either spoken or written, which leads to deficits in the ability to listen, think, speak, read, write, spell, or solve mathematical calculations. Under the Individual’s with Disabilities Education Act (IDEA), for a school age child to be identified as having a Learning Disability the child must “not achieve adequately for the child’s age or to meet State-approved grade-level standards in one or more of the following areas when provided with learning experiences and instruction appropriate for the child’s age or State-approved grade-

**Corrective Reading:** One of the key reading curricula designed and researched by Siegfried Engelmann in the 1960’s. The full curriculum consists of *Corrective Reading Decoding* Levels A, B1, B2, and C, as well as *Corrective Reading Comprehension* Levels A, B1, B2, and C. Designed for at-risk learners in grades three through twelve, the curriculum systematically and sequentially teaches basic reading decoding skills.

**Orton-Gillingham-based Instruction (O-G):** Sometimes referred to as simply “O-G,” the Orton-Gillingham method of instruction is a “multisensory method of teaching language-related academic skills that focuses on the structure and use of sounds, syllables, words, sentences, and written discourse. Instruction is explicit, systematic, cumulative, direct and sequential” (Birsh, 2005, p. 573).

**Reading Achievement:** Proficient reading achievement in the elementary grades is defined by the ability to decode words, read for meaning, and be able to integrate and interpret texts and apply understanding of the text to make conclusions and evaluations, representing “demonstrated competency over challenging subject matter” (U.S. Department of Education, 2014, p. 224).

**Scaffolding:** In the field of education scaffolding is commonly accepted as “providing differential support to students, based on their individual needs, and sequentially withdrawing the support as appropriate until the students can complete the task unassisted” (Bender & Larkin, 2003, p. 36).

**Wilson Fundations:** A reading curriculum for students in kindergarten through third grade, based upon the principles of Orton-Gillingham methodology of instruction. Systematically and
sequentially teaches the basic components of reading decoding and encoding through a multi-sensory approach.

**Wilson Reading System:** A reading curriculum for students in second grade through adults, based upon the principles of Orton-Gillingham methodology of instruction. Systematically and sequentially teaches the basic components of reading decoding and encoding through a multisensory approach.

**Positionality Statement**

Currently I serve as the Head of the Elementary Division in a small private non-profit school for students with learning challenges. Internationally renowned, the school serves students in first through twelfth grades who have been identified as having dyslexia or other language based learning disabilities, and who have been unsuccessful in a more traditional school setting. Many of the students have been placed at the school as part of their Individualized Education Program (IEP) by their local public school district (LEA), due to the need for intensive intervention in reading to remediate the effects of their learning challenges. As the administrator over this program it is therefore my responsibility to ensure quality instruction for students. This research study therefore has direct and real relevance to me as a scholar-practitioner, as the findings will help me to identify ways to best address the instructional needs of students.

Despite my current position, as well as previous experiences in the field of special education as a teacher and administrator, I hold no strong biases or assumptions regarding the effectiveness of Direct Instruction or Orton-Gillingham-based instruction with students. Instead, in defining my position relative to this area of research, I view myself as guarded. On one hand,
I have some personal experience showing that these instructional methodologies may be beneficial for some students. However, I am equally guarded that the instructional methods are a sure fit for all. I do firmly believe that it is imperative for all students to be successful in learning, and in order for any instructional method or methodologies to be effective for students, the teacher must be willing and able to “buy into” the ideology. Therefore, I feel that it is critical for either of the pedagogies under review in this study to be effective with students, that we find ways to support teachers in successful implementation of these programs, as well as helping them to find satisfaction in implementation and delivery.

Lastly, I view myself as more objective than subjective. Since I tend to be a very logical and data driven person, my methodological preference is to use quantifiable data collection methods. However, I also greatly value the human experience. Therefore, with this in mind, I conducted a quantitative study employing a post-positivist approach, but also supplemented this data by asking teachers about their experience of implementing the curricula under study to gain a more balanced approach.

**Theoretical Frameworks for Addressing Student Achievement**

To guide this study three theoretical frameworks were used as the lens for which this research study was carried out. The first two frameworks coming from the postpositivist theory, and the last one from the social constructivist theory, allowing for a more holistic approach to studying both the effectiveness of the curricula and the experience of the teachers and paraeducators participating in the study.

The first theoretical framework employed is Engelmann’s Theory of Instruction, as this is the basis of the Direct Instruction methodology. In addition, the theoretical framework of
Orton’s Theory of Reading Disabilities is employed, as this is the foundation upon which the Orton-Gillingham methodology of reading instruction is based. Vygotsky’s Sociocultural Theory and Zone of Proximal Development is also used to explore the role of teacher/paraeducator experiences of curriculum scaffolding and social interactions associated with the intervention curricula. In the words of Creswell, using Vygotsky’s theory provides a theoretical framework to study the “subjective meanings of (teachers’ and paraeducators’) experiences” (2013, p. 24) of the appropriateness and effectiveness of the curricula with the given student population. The following section will therefore discuss each of these theories in detail, as well as demonstrate how these theories can be used as theoretical frameworks when looking at the effects of Direct Instruction and Orton-Gillingham-based reading instruction on the reading achievement of elementary age students with learning disabilities.

Engelmann’s Theory of Instruction

While the term “direct instruction” was not coined until the mid-1970’s by Rosenshine, the direct instruction methodology was developed in the 1960’s by Siegfried Engelmann and Wesley Becker at the University of Illinois at Champaign-Urbana (Kim & Axelrod, 2005; Magliaro, Lockee, & Burton, 2005; Stockard, 2010; What Works Clearinghouse, 2007). Since the 1960’s the goal of Engelmann’s work has been to close the achievement gap for students of low socioeconomic backgrounds, or who exhibit some other at-risk characteristic (Grossen, 2004; Grossen & Kelly; 1992; Stockard, 2010). Engelmann’s theory of Direct Instruction is based upon the belief that at-risk students begin school behind typical peers in their prior knowledge of language, reading, writing and mathematics. Therefore, based upon this gap in knowledge, at-risk students must be provided with accelerated learning opportunities so that they
may catch-up to the typical learner as quickly as possible. For without this intervention there would always be an achievement gap between these students and that of the typically developing learners who begin school with more advantages (Engelmann, 1999). See Figure 1.

**Figure 1.**

**Visual Model of Engelmann’s Theory of Instruction**

In order to accelerate the learning of at-risk students, instructional time must be maximized. To do this, Engelmann’s theory posits that not all students in a class or grade level should begin instruction at the same place. Instead, each student should be individually assessed to determine what prior knowledge the student has, as well as what gaps a student may have in
their prior learning. Students are then grouped into small homogeneous groups of two to six students for instruction at their instructional level, rather than the more traditional grade or age level.

In the book *Theory of Instruction: Principles and Applications*, Engelmann and his long-time colleague Douglas Carnine describe the major tenets and foundational principles of the theory (Engelmann & Carnine, 1982). Engelmann’s Theory of Instruction “is based on the idea that many major aspects of instructional design or curriculum development can be achieved analytically, without reference to kids or even behavior” (Engelmann, 1992, p. 101). Both Engelmann and Carnine take a scientific approach to learning, equating learning and achievement to the outcome of a set of variables. One of the major tenets of the theory being that the environment is the primary variable that accounts for student learning and achievement (Engelmann, 1991).

Engelmann recognized that in every learning situation there would always be a student (variable 1) and the environment surrounding the student (variable 2) that when together interacted to create the end product of learning. Engelmann posited that since a learner cannot and should not be held constant, that the instruction had to be carefully controlled in order to analyze the needs of the learner. To analyze these needs of the student along with the steps that he or she needed to learn to successfully master the skill being taught, Engelmann applied a technique common in behavioral theory, task analysis (Stahl, 2001). Engelmann took the goal of reading a passage of text and broke the steps needed to master the skill down into a task analyzed list of sub skills chaining backwards from the target skill (mastery of decoding and comprehending printed text) all the way down to the most basic of sub skills starting at being able to recognize individual letters and their common sounds. Engelmann then focused
instruction on the sub skills that would lead to the quickest path of being able to read, to reduce the instructional time needed to get a learner successfully reading. For this reason Direct Instruction curricula focuses on teaching the letter sounds, rather than taking time to teach letter names, and typically begins by teaching the most frequently occurring consonants first (e.g., m, s, t, and b) along with only a single vowel to begin with. Instruction is fast paced and elicits a high level of student involvement. In this way students can typically successfully decode a simple vocabulary controlled story within as few as ten lessons, instilling both reading skills and confidence in learners (Stahl, 2001).

In an effort to control the environment of the learner and assure quality instruction for all students in each and every lesson, Engelmann designed explicit scripted lessons. These explicit lessons are a critical feature of the model, as the more explicit the instruction for learners, the less likely for errors or misinterpretation. A second and equally critical component of the model is that each and every student is expected to learn at the level of mastery, for every skill being taught. Rather than simply moving on to the next skill, students are assessed at the end of each lesson to measure the level of mastery, and only when mastery has been demonstrated do students move on to the next lesson (Engelmann, 2008; Huit, Monetti, & Hummel, 2009). There are seven key steps used in every scripted Direct Instruction lesson: 1) the teacher reviews prior learning and introduces the skill to be learned in the lesson, 2) the teacher models the target skill, 3) the teacher engages students in guided practice of the targeted skill, 4) the skill is reviewed with students, 5) students then participate in some form of independent practice, 5) formal assessment of the student level of mastery with the taught skill, and 6) behavioral reinforcement. See Figure 2 for an overview of these steps.
Since Engelmann’s theory places a high value on the environment of the learner, as being the primary variable for successful learning, a lot of weight is given to the quality of the instruction with frequent fidelity checks of teachers’ instruction, pacing, and adherence to the scripted design of the curriculum and lessons. When students fail to show progress in mastery of skills, Engelmann’s theory suggests that students haven’t failed but rather the teacher has failed (Engelmann & Carnine, 1982). This is a highly relevant theoretical framework for this study in that the population under study are all students who have previously experienced instructional failure in the area of reading. Additionally, Engelmann’s Theory of Instruction is the very theory
of instructional design from scripted Direct Instruction curricula such as *Corrective Reading* where developed upon.

**Orton’s Theory of Reading Disabilities**

The Orton-Gillingham methodology was first developed in the 1930’s by Dr. Samuel Orton, a pediatric neurologist, and Anna Gillingham, an educator. However, it wasn’t until the 1940’s that Anna Gillingham and her colleague Bessie Stillman further refined and made public the approach for teaching reading skills to students identified as being dyslexic or having some other language based learning disability in their book *Remedial Training for Children with Specific Disability in Reading, Spelling, and Penmanship* (Campbell & Cooke, 2008; Chia & Houghton, 2011; Giess et al, 2012; Gillingham & Stillman, 1997; Ritchey & Goeke, 2006). Despite the fact that Orton and Gillingham began their work of finding a successful means of remediating language disabilities in children and adults with dyslexia, ultimately the two pioneers had two different perspectives on how to go about doing this and therefore parted ways in the 1940’s as they further developed their theories. Despite the split, Orton and Gillingham have remained synonymous names for what has become a larger umbrella of explicit sequential and systematic multisensory synthetic phonetic instructional methodologies for teaching reading to individuals identified as having dyslexia or other language based learning disabilities, commonly referred to as Orton-Gillingham-based instruction or simply O-G.

Dr. Samuel T. Orton is often “recognized as the father of multisensory instruction” (Campbell & Cooke, 2008, p. 269). Orton believed that dyslexia was caused by a neurological dysfunction of the cerebral cortex. This dysfunction being a maturational delay which caused “delayed lateral dominance for language which leads to disruption in perceptual reasoning”
according to Orton (Nourbakhsh et al, 2013, p. 93). Because of this, Orton focused his life’s work on developing his Theory of Reading Disabilities and addressing ways to develop the neuro-lateral dominance in dyslexic patients, something that he came to believe could only be addressed through training of the brain through multisensory processes and practice. Orton believed that the key to remediating dyslexic patients’ lack of lateral brain dominance was to create multiple multisensory opportunities for learning and practice that involved “visual, auditory, and kinesthetic/tactile learning pathways, often referred to as the Language Triangle” (Ritchey & Goeke, 2006, p. 171).

Orton’s Theory of Reading Disabilities is based upon Orton’s belief that the brains of individuals with reading difficulties or disabilities are different from those of the typical learner. Orton surmised that because struggling readers often evidenced similar challenges with language and learning as those of individuals with traumatic brain injuries, that this difficulty in reading was neurologically based. Because of Orton’s work nearly 100 years ago, it is widely accepted that dyslexia and reading disabilities are a neurological disorder, and remains one of the major tenets of Orton’s Theory. Another major tenet of the theory is that individuals with dyslexia or other reading disabilities are impacted by streshosymbolia, a condition that causes their brains to twist or reverse letters and words and even direction of print. Orton posited that since reading occurs in three areas of the brain; the frontal lobe (the center for speech, grammar, language, and comprehension), the temporal lobe (the area of decoding and sound discrimination), and the angular gyrus (the center of the brain that links and makes connections) the reason for the streshosymbolia was that information was not correctly travelling between the two hemispheres of the brain, and therefore wasn’t able to be synthesized and processed properly by the learning disabled individual. To overcome this disconnect, Orton theorized that instruction needed to
engage both sides of the brain through a multisensory approach that incorporated the visual center of the brain as well as the learners’ auditory and kinesthetic/tactile regions at the same time, often referred to as Visual/Auditory/Kinesthetic-Tactile (VAK/T) stimulation. This theory became the basis for the Orton-Gillingham instructional model as well as many other multisensory (VAK/T) learning models.

Figure 3.

Visual Model of Orton’s Theory of Reading Disabilities

A third major tenet of Orton’s theory is that instruction must be explicit, with each of the components of the English language being taught sequentially and systematically in order for reading to make sense to the learner. Specific areas required include: phonemes and
morphemes, such as prefixes, suffixes, and root words, common spelling rules and patterns, and trick words that can neither be sounded out nor encoded using common spelling rules or patterns. Based upon this, Orton believed that reading instruction needed to be multisensory and begin with a foundation of phonemic awareness, followed by development of sound-symbol relationships, after which phonics and decoding/encoding should be taught in tandem, all the while focusing on automaticity of the skills in order to build comprehension for the learner. See figure 4.

**Figure 4.**

**Visual Model of Orton-Gillingham-Based Instructional Design**
Orton’s Theory of Reading Disabilities is a highly relevant theoretical framework for this study as the population under study are all students who have been identified as having dyslexia or another language based learning disability. Additionally, this is the very theory from which Orton-Gillingham-based curricula such as Wilson, Wilson Fundations and Wilson Reading System were derived. The use of Orton’s theory as one of the theoretical frameworks for this study helps to guide the exploration of one of the specific instructional strategies to be implemented, as well as the hypothesis to be tested.

**Vygotsky’s Sociocultural Theory**

Sociocultural Theory, sometimes referred to as SCT, is a theory of cognition and learning that defines learning as a social process built upon interaction between the student, cultural influences, social learning, and socially mediated problem-solving (Rueda, 2011), with “language use, organization, and structure” being the main forms of intercession necessary for an individual to cognitively develop and learn (Lantolf et al, 2007, p. 217). The main tenets of Vygotsky’s Sociocultural Theory are that learning by doing is necessary for the development of cognitive understanding, that learning occurs through social interactions, and that language plays a critical role in an individual’s development. In addition to the importance of language development and social interactions, Vygotsky’s theory focuses on the Zone of Proximal Development and the concept of scaffolding (Wang, 2009; Zaretskii, 2010). Within the framework of the Sociocultural Theory of learning, language, cultural influences, and social interactions not only lead to the development of a student’s knowledge and thinking skills, but also form the foundation for what to think and how to think. Additionally, Sociocultural theory
asserts that development and learning occurs through a process of mediated problem-solving (Ohta, 1995; Pass, 2007). See figure 5.

**Figure 5.**

**Visual Model of Vygotsky’s Sociocultural Theory**

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**Zone of Proximal Development (ZPD).** Vygotsky held that there are two key levels of development. The first level, sometimes referred to as the real level of development, is the level at which an individual is able to independently perform a task or solve problems. Many contemporary educators refer to this as a student’s independent level. The second level is the potential level of development and refers to the level at which an individual can perform a task or solve a problem with the guidance of someone more experienced and knowledgeable about a task. The point in between these two levels is the Zone of Proximal Development (ZPD). This
ZPD, being the zone at which an individual is not yet independent and needs help from a more experienced person to complete, yet at which the task is not so difficult that with skilled teaching and practice the individual could not readily master the skill (McLeod, 2007; Wang, 2009; Zaretskii, 2010). This ZPD is a key concept in Vygotsky’s theory of development and is the basis for scaffolding (Pea, 2004; Verenikina, 2003; Walqui, 2006).

Scaffolding is one of the key frameworks of the modern American education system. Scaffolding refers to adjusting the level of support needed by an individual to achieve a task or skill at which they are not yet independent. Closely related to the concept of the ZPD, in tasks of learning and cognitive development the teacher or tutor provides tasks to the student at the potential level of development and then gradually adjusts the level of the skills being taught, to keep the student within the optimal learning zone of the ZPD and working towards mastery of the desired skills. See figure 6.
Social interactions. Lastly, and most significantly about Vygotsky’s Sociocultural Theory is the important role of social interactions. Vygotsky believed that learning occurred through interactions with an individual’s peers, teachers, tutors, parents, and other community members within the context of the social and cultural setting of the individual (Jarmillo, 1996). Vygotsky focused not only upon the physical components of the social interactions between the individual and those around him or her, but also the significance of the language of social interactions. Specifically, Vygotsky emphasized the importance of modeling behaviors and the
use of verbal language for explanation as key elements for learning and cognitive development (Green & Gredler, 2002; Jarmillo, 1996; Powell & Kalina, 2009).

Theoretical frameworks and their connections to Direct Instruction and Orton-Gillingham. Together Engelmann’s Theory of Instruction, Orton’s Theory of Reading Disabilities, and Vygotsky’s Sociocultural Theory complement one another to build a strong theoretical framework for this research study. In addition to Engelmann’s theory being the basis for Direct Instruction and Orton’s theory being the basis for Orton-Gillingham-based instruction, the two instructional methodologies under review in this study, they both support the use of explicit systematic synthetic phonics instruction for struggling readers. Similarly, Vygotsky’s Sociocultural Theory, one of the most commonly used frameworks within educational research (Anh & Marginson, 2013), and its Zone of Proximal Development (ZPD) lend itself perfectly to this study as it addresses the building blocks of language development and learning.

In short, all of these theories have direct connections to the outcome of student achievement and focus on the role of language usage, organization, structure, and development for learning. The theories also assert similar tenets about the need for students to be active learners, and the importance of learning by doing, through high rates of engagement. According to the sociocultural theoretical framework, “literacy can be thought of as ‘the ability to think and reason like a literate person within a particular society’” (Baker, 2000, p. 101). Not only are both the Direct Instruction and Orton-Gillingham pedagogies designed to teach literacy and reasoning skills, but they were both conceived of within the cultural context which views the ability of an individual to be literate necessary for full participation and self-actualization within our modern society.
Given the goal of closing the long-standing achievement gap in reading, these theories provide a critical framework for supporting all students to find success. When overlaid together to form the theoretical framework for this research study, the Theory of Instruction and Theory of Reading Disabilities will help to explain the results of the study as it directly relates to finding effective reading interventions for students with reading disabilities. Furthermore, the Sociocultural Theory will help to provide a lens for studying teacher and paraeducators perceptions and experiences with the curricula in terms of how appropriate the curricula may be for students with learning disabilities given the level of curriculum scaffolding and social interactions the programs provide. For in the words of James Paul Gee, “if someone wants to know about the development of literacy, he or she should not ask how literacy and language develop. Rather he or she should ask how a specific sociocultural practice embedded in specific ways with printed words develops (2001, p. 31).
Chapter 2: Literature Review

The purpose of this chapter is to provide an extensive review of the literature and research related to the Direct Instruction and Orton-Gillingham-based instructional pedagogies. The chapter is divided into ten sections: (1) significance of the problem under study, (2) current school-based reading instructional models for students with learning disabilities, (3) an overview of the Direct Instruction model, (4) effectiveness of Direct Instruction, (5) an overview of the Orton-Gillingham model, (6) effectiveness of Orton-Gillingham, (7) similarities and differences between the two methodologies, (8) perspectives regarding the two methodologies, (9) role of teacher perceptions and resistance, and (10) a summation and call for further research.

Significance of the Problem Under Study

Over the past two decades there has been an increasing focus upon student achievement and academic growth worldwide. From the curricular reforms that swept through the countries of Latin America in the late 1990’s and early 2000’s (Gvirtz, 2002) to the United States’ No Child Left Behind (NCLB) legislation enacted in 2001 (No Child Left Behind, 2006), and more recently the reforms in India, Pakistan, and Qatar, an increasing number of countries are forcing their educational systems to implement educational reforms focused upon increasing student achievement for all students (Al Attiyah & Lazarus, 2007; Curtis, 2007; Kapur & Mehta, 2007; Masri, 2009; Rugh, 2002; Weber, 2012). Many countries have focused upon implementing reforms through nationalized testing programs, while others have focused upon national curricula and textbook adoption requirements (Gvirtz, 2002; Kamens & McNeely, 2010).
Numerous private consultants and large American universities have begun marketing their services to schools worldwide to assist with implementation of programs and curricula. Despite this, many schools fail to see the progress in student achievement that they had hoped they would see, particularly in the case of students who have special needs or learning challenges. In the words of Klinger and Edwards, “When results do not transfer the assumption by some is that those implementing the model did not use it correctly” (2006, p. 112). Yet all too often, the real reason for the failure is the fact that many schools are attempting to implement canned curriculum programs off the shelf of some publisher or consultant, failing to consider the sociocultural needs of their students and teachers, thereby missing the entire goal of providing students with responsive instruction focused upon meeting their specific learning needs.

Marjorie Lipson of the University of Vermont notes, “Boxed sets are seductive because they promise to ‘take care of’ the challenges facing struggling readers and the teachers charged with their instruction” (2011, p. 373). The reality however is that no two students have the exact same learning needs. More importantly, boxed curricula developed for one sector of the educational market may not meet the needs of all students. Therefore, it is important that educational leaders understand the role of socioculturally responsive curriculum and what that looks like for their own student populations.

While there is research that shows scripted Direct Instruction to be a successful means of teaching students basic skills such as reading, writing, and mathematics, many teachers are resistant to using the instructional pedagogy with their students (Becker & Engelmann, 1973; Engelmann, 1999; Engelmann, 2011; Grossen, 2004; Shippen, Houchins, Steventon, & Sartor, 2005; U.S. Department of Education, 2002). Studies conducted which have looked at teacher perceptions and attitudes about the use of scripted Direct Instruction programs with students
have cited reasons for resistance such as personal beliefs that the programs are ineffective, unresponsive to student needs, and fail to teach students higher level thinking and reading skills beyond just basic memorization and decoding (Vanderlinde & van Braak, 2010). Conversely, while there is little peer-reviewed research showing the effectiveness of Orton-Gillingham based instructional practices, there is considerable case law showing the perceived effectiveness of the model from the perspective of parents and teachers (Ritchey & Goeke, 2006; Rose & Zirkel, 2007).

The following literature review will therefore address three main areas related to implementation of scripted Direct Instruction and Orton-Gillingham-based instructional programs. Areas covered will include a review of the current literature regarding: 1) overviews of scripted Direct Instruction and Orton-Gillingham, what they are, as well as the documented effectiveness of the pedagogies, 2) perspectives regarding the two pedagogies, and 3) the role that teacher perceptions can have upon student achievement. Following a review of the literature, an analysis of the implications of what is known will be presented, as well as implications for future research on the effectiveness of these pedagogies with students who have dyslexia or other language based learning disabilities.

**Current School-Based Reading Instructional Models for Students with Learning Disabilities**

Historically, basal readers have been the main mode of reading instruction for students in American schools since the early 1900’s (Martinez & McGee, 2000). With the passage of PL 94-142 in 1975, special education services for all American students with disabilities became a mandate. While the law afforded students with dyslexia and other language based learning
disabilities access to specially designed instruction, different from the basal reader based instruction provided to typically developing students in the general education setting, the law failed to explicitly define what specially designed instruction is, therefore most educators have taken that simply to mean something different than what is provided within the general education setting (Zettel & Ballard, 1979). Even with later reauthorizations of the law, the current Individuals with Disabilities Education Improvement Act (IDEA), fails to explicitly define what specially designed instruction is (Individuals with Disabilities Education Improvement Act of 2004, 2004).

In the absence of clearly defined and prescribed instructional methodology and curricula in American special education, most special educators have relied upon teacher made and selected materials along with trade books for teaching reading. Even with the implementation of the No Child Left Behind Act (NCLB), which mandates the use of scientifically research-based curriculum in public schools (No Child Left Behind Act of 2001, 2006), this is a practice that has remained in many special education settings. In fact, in a large scale interview of American teachers at the elementary level less than 2% of the teachers interviewed stated that they relied exclusively upon basals for reading instruction. Instead, most teachers reported that they relied primarily on trade books for reading instruction. The highest level of trade books being used with beginning readers at 84% of first grade teachers reporting that they use “moderate, predominant, or exclusive use of Big books and picture books” to teach reading and only slightly dropping off at higher grade levels with 72% of fourth and fifth grade teachers reporting “moderate or greater use of trade chapter books” (Martinez & McGee, 2000, p. 159).

Furthermore, despite the increased calls for scientifically-research based reading curricula that IDEA and NCLB call for “most special education teachers report(ed) that they did not use a
formal reading curriculum but instead created their own (Mariage, Burgener, Wolbers, Shankland, Wasburn-Moses, Dimling, Kosobud, & Peters, 2009). The risk with this approach to reading instruction, using teacher made and selected materials and trade books, is that instruction is neither systematic, sequential, nor comprehensive for the students who are most at risk. While this allows for curriculum and instruction to be individualized to the needs of students, it can also lead to gaps in student learning and development for the most at risk learners any time a change in teacher or school occurs for a student. Furthermore, given the continued failure to improve the reading achievement of students with learning disabilities in American public schools, despite the ever increasing national focus on reading proficiency for all students under NCLB (No Child Left Behind, 2006) it is imperative that more systematic and comprehensive reading curricula be researched to find effective and replicable reading interventions.

**Direct Instruction**

A typical Direct Instruction lesson involves fast paced teacher directed lessons. Reading from a scripted teacher presentation book, the teacher introduces small fragments of knowledge to the students, models the desired learning target, and then provides the students both group and individual practice on the learning target with immediate corrective feedback. Using successive approximations, as each target is met, an additional step is then added. An example of this in reading would be to begin by teaching the letter sound /b/, followed by /t/, /d/, and /a/. After mastery of the sounds then teaching the students to blend two letter sounds such as /ba/ and /at/. Only after mastery of these letter blends would the teacher move on to teaching students the words “at”, “bat”, and “bad”, then finally to reading of a structured sentence such as, “A bad bat is at bat.”
Direct Instruction is sometimes misunderstood to be simply teacher directed instruction using a lecture approach. While Direct Instruction is largely teacher directed, it is student centered and not a pedagogy of lecture. Direct instruction is a systematic approach to accelerating the learning of students (Engelmann, 1999; Stockard, 2010). Stockard (2010) identified the five key instructional elements of Direct Instruction which include: 1) maintaining the focus on student learning at all times, 2) frequent assessment of students to determine which instructional group a student should be placed in, 3) not wasting valuable learning time on skills already mastered but rather allowing students to move on to the next area of learning needed to achieve proficiency in the given subject area, 4) viewing classroom time as learning capital and therefore, maximizing as much instructional time, modeling, and practice as possible in each class period, and perhaps most importantly for reluctant or at-risk learners, 5) there are no opportunities to tune out or hide in the background, instead through small group learning all students are engaged and required to participate in multiple modalities. Students use visual, auditory, and kinesthetic/tactile modalities and are engaged orally throughout each lesson. Additionally, since a key strategy of student engagement is choral response on a given teacher cue (e.g., Teacher: (pointing to a word on the board) “What word?” (and tapping pencil as a visual and auditory cue) Students in unison: “/b/ /a/ /t/ bat”), all students are directed to respond simultaneously limiting their ability to be passive learners and simply mimic their peers.

**Effectiveness of Direct Instruction.** Direct Instruction is perhaps one of the most widely researched methodologies of instruction (Stockard, 2010). Throughout the 1960’s and 1970’s the effectiveness of Direct Instruction was researched throughout public school settings across America. Hundreds of thousands of American students were included in studies of the effectiveness of Direct Instruction teaching methods and the Direct Instruction System for
Teaching Arithmetic and Reading (DISTAR) as part of President Lyndon B. Johnson’s War on Poverty (Eppley, 2011; Kim & Axelrod, 2005). The Project Follow Through research study was sponsored by the U. S. Department of Education and was the largest comparative study of educational pedagogies conducted to date in American history. In all, nearly three-quarter of a million American students were included in the study of 170 diverse communities, although the study did not specifically look at the effectiveness of the methodology with students with dyslexia or other learning disabilities. As part of the multi-year study, 12 educational models were evaluated and compared to determine the most effective instructional practices. The outcome of the study was that Direct Instruction produced the highest results with students academically, cognitively, and social-emotionally (Becker & Engelmann, 1973, 1976; Carnine, 2000; Kim & Axelrod, 2005).

Repeatedly research data has shown the effectiveness of the Direct Instruction method in the short and long term, with students both domestically and internationally (Al-Shammari, Al-Sharoufi, & Yawkey, 2008; Becker & Engelmann, 1973; Coyne et al, 2009). While the original research regarding the effectiveness of Direct Instruction focused upon low income students, and was limited to reading, mathematics, higher-order thinking, and self-perception in kindergarten through third grade (Becker & Engelmann, 1973, 1976; Duffrin, 1996; Kim & Axelrod, 2005), in the fifty years since its inception numerous studies have replicated the effectiveness of the model with a wide variety of students (Al-Shammari et al, 2008; Carlson & Francis, 2002; Coyne et al, 2009; Grossen, 2004). In fact, in a recent analysis of educational reform practices Direct Instruction was found to be one of three top models from 29 reviewed (Shippen et al, 2005).

Despite this extensive research history showing the effectiveness of Direct Instruction, the model is criticized by some groups of educators. In fact, in one review of instructional reform efforts,
Duffrin (1996) described Direct Instruction as having “been around since 1968 and awash in controversy all the while.” More recently, in a longitudinal study conducted by Ryder and Burton (2006), students in urban settings were found to have benefitted more from non-Direct Instruction reading instruction, and that Direct Instruction had no impact upon reducing the number of students referred for special education services.

**Orton-Gillingham**

Anna Gillingham was a skilled educator who began working with Orton in the 1930’s but by the early 1940’s had broken away from the strict medical approach that Orton had undertaken and instead began working with a colleague who was also an educator like her, Bessie Stillman. Gillingham and Stillman quickly began outlining a systematic approach to teaching reading through phonemic awareness and phonics that was then published in their 1946 book *Remedial Training for Children with Specific Disability in Reading, Spelling, and Penmanship*. Since then the book has been reprinted multiple times, with the 8th revised edition published in 1997. With few changes from the original edition the book remains part of the required reading for certification of O-G tutors and teachers (Gillingham & Stillman, 1997).

Orton-Gillingham (O-G) based instruction is an explicit sequential and systematic multisensory synthetic phonetic method of concurrently teaching reading, spelling, and writing focused upon remediation of reading skills for students identified as having dyslexia and fail to find success at learning to read through more traditional reading instruction. Like scripted Direct Instruction, in order to accelerate student learning, students are first assessed to determine their current level of functioning, prior knowledge and skills as well as areas of need, and are then placed into instruction at their individualized Zone of Proximal Development and moved forward
from that level as quickly and efficiently as possible, avoiding wasted instructional time on
information already mastered by the student or too difficult for the student to be able to master at
that point (Manset-Williamson & Nelson, 2005).

O-G is most often thought of a one-on-one instructional approach used with students who
have dyslexia or dysgraphia, however, it can also be employed in small group learning settings
as well as whole classroom instruction. While remediation of reading, spelling and writing
delays are typically the primary focus of O-G based instruction other adaptions of the model
have also been used to address other curricular areas such as mathematics. O-G-based
instruction is similar to scripted Direct Instruction in that explicit and sequential instruction is
provided to students with the focus being to sequentially teach the smaller components of word
parts and requiring students to demonstrate mastery of skills before they are introduced to the
describes O-G-based instruction as a, “multisensory, alphabetic, structured approach to
language” (Gillingham & Stillman, 1997, p. v) rather than a specific approach to teaching
reading and writing, and a typical lesson involves teaching students to identify and manipulate
phonemes in spoken and written words. In each lesson seven steps to teaching synthetic phonics
are used to review and teach new skills: 1) review of the letters and sounds previously learned, 2)
introduction of at least one new phonogram and its corresponding sound, 3) reading of word lists
aloud that incorporate the previously learned phonograms, 4) having the student practice writing
words with the newly taught and previously learned phonograms and phonemes from dictation,
5) having the student practice writing non-sense or made-up words with the newly taught and
previously learned phonograms and phonemes from dictation, 6) having the student write
sentences using words with the previously taught phonograms and phonemes, and 7) oral reading
practice from a controlled text that uses the taught phonograms and phonemes. Using scaffolding, only after each target phonogram or phoneme is met, is an additional skill added (Florida Center for Reading Research, 2015; Gillingham & Stillman, 1997).

**Effectiveness of Orton-Gillingham.** O-G-based instruction is widely held by the International Association of Dyslexia, as well as many parents, to be the best means of remediating reading difficulties in individuals with dyslexia and other language based learning disabilities. In fact, Gillingham and Stillman’s widely published book, *The Gillingham Manual: Remedial Training for Children with Specific Disability in Reading, Spelling, and Penmanship* states “that all children would benefit from the Alphabetic/Phonetic Approach” (1997, p.12). However, unlike the breadth of research detailing the effectiveness of scripted Direct Instruction, there is very limited research looking at the effectiveness of O-G-based instruction over the past seventy years that it has been in use (Chia & Houghton, 2011; Garan, 2005; Giess et al, 2012; Ritchey & Goeke, 2006; Rose & Zirkel, 2007).

According to the National Reading Panel and the National Research Council committee on preventing reading difficulties, “the inclusion of explicit, systematic phonics (is) an essential component of reading instruction” (Campbell & Cooke, 2008; Ehri et al, 2001; NRP, 2000). The O-G approach has long used this very type of approach to teaching reading, spelling, and writing simultaneously, yet oddly there are fewer than 15 peer reviewed research studies outlining the instructional pedagogy as being effective (Ritchey & Goeke, 2006; Rose & Zirkel, 2007). There are few published studies to date that address the effectiveness of the pedagogy. And of those, none have been determined to meet the requirements of the What Works Clearinghouse primarily because the studies either did not use a comparison group or because the sample populations contained fewer than half of the subjects with dyslexia or learning disabilities,
leaving O-G based instruction labeled as scientifically unproven by the U.S. Department of Education (Ritchey & Goeke, 2006; Rose & Zirkel, 2007; Turner, 2008; U.S Department of Education, 2010). However, there are a few peer reviewed published studies that have found O-G-based instruction to be effective over the past few years. Interestingly enough, those studies have focused upon the effectiveness of the pedagogy with students with other types of learning needs such as vision impairments or learners of English as an additional language, and while they have shown the approach to be effective for the unique populations included in their studies, they have not helped to demonstrate that the pedagogy initially designed to help struggling dyslexic students learn to read is actually able to do what it was designed to do (Jubran, 2012; Rowley, McCarthy, & Rines, 2014; Scheffel, Shaw, & Shaw; 2008).

**Similarities and Differences Between the Two Methods**

While the Direct Instruction and Orton-Gillingham-based instructional methods come from two very different theoretical models and backgrounds, there are far more similarities than differences between the two pedagogies. Both of the methods use a structured, explicit systemic synthetic phonics approach in an explicit diagnostic-prescriptive model focused upon intense instruction to help struggling learners to “catch-up” as quickly as possible. Both models use a part to whole approach to teaching reading and spelling simultaneously, focusing first on individual sounds/letters and then moving to gradually larger and more complex sound-symbol relationships and words (e.g., a = /a/ → an → ant → anti → antidisestablishmentarianism). Additionally, both instructional models use the alphabetic-principle of teaching letter sounds before names of letters (Stahl, 2001). Furthermore, both instructional methods assess individual students to determine what prior knowledge and skills the student already has placing them into
instruction within the individual learners Zone of Proximal Development and mastery of content determines when students move-on to the next lesson or skill, rather than simply moving students along based upon age or grade expectations. Both methods also focus upon the need to have students be highly engaged as active learners, rather than passive listeners and both instructional models offer curricular materials for teachers that are explicitly designed, to the point of actually scripting out the steps and language that a teacher is to use during instruction.

The primary differences between the two pedagogies are their theoretical frameworks. Orton-Gillingham-based instruction is based upon Orton’s Theory of Reading Disabilities, which posits that individuals with neurological impairments have difficulties with literacy, and therefore require a multisensory approach to learning in order to engage all areas of reading in the brain and allow for information to cross the brain’s mid-line and thereby reduce the impact of streshosymbolia. For this reason O-G-based instruction is a prescriptive remediation based curriculum that suggests that if a learner isn’t being successful then further diagnostics, individualization of learning, and increased multisensory engagement is needed. Conversely, Direct Instruction is based upon Engelmann’s Theory of Instruction that posits that all students can learn given effective instruction, but that at-risk students will remain behind unless they are provided with explicit and accelerated instruction. Therefore, with DI when students struggle to make progress, the lack of progress is often viewed as the result of improper teaching or failure to fully implement the curriculum with fidelity.

The second major area of difference between the DI and O-G instructional models are their application and use. O-G was designed and has continued to be a model for addressing reading and spelling deficits. However, Engelmann saw his theory of instruction as applicable to any learning situation, therefore DI curriculum materials have been used and developed for just
about every content area from reading, spelling, writing, language development, and mathematics, to thinking skills and behavior.

Lastly, DI and O-G differ from one another when it comes to the level of student engagement. A major tenet of Engelmann’s work was the importance of actively engaging students in learning to maximize instructional time, DI instruction relies largely upon auditory and visual modalities of learning. And there is no specific focus on attempting to engage multiple areas of the learners brain. On the other hand, O-G instruction is designed to be multisensory in nature, so as to engage all areas of the brain involved in reading and language. Therefore, every O-G based lesson involves visual, auditory, and kinesthetic/tactile activities.

**Perspectives Regarding the Two Pedagogies**

**Perspectives of Direct Instruction.** Despite the overwhelmingly positive research results from the studies conducted in the 1960’s and 70’s, the results of the U.S. Department of Education’s Project Follow Through largely never made it into the public education system. While some school district’s implemented the use of Direct Instruction pedagogy and curriculum with small pockets of students, Direct Instruction quickly fell out of favor as a best practice in education due to a culture of educational progressives who believed that student-centered learning was better and simply couldn’t be quantified in research data (Duffrin, 1996; Kim & Axelrod, 2005).

There are several key areas opponents of the Direct Instruction model cite, as why the model should not be used with students. One of the common negatives asserted by educators regarding Direct Instruction is the scripted nature of the instruction. The curriculum materials are standardized and teachers are required to read the scripted lessons word for word. Many
opponents of Direct Instruction decry this, claiming that it deskills teachers and takes away their own personal control and creativity as teachers. Detractors of the model also claim that the model is not responsive to individual needs. Additionally, one of the main detriments of the model, according to opponents, is that Direct Instruction is skill based instilling a basic knowledge of a topic in the student, but never allowing the student the opportunity to construct his own meaning and thereby never allowing the student to develop higher level thinking skills (Achinstein & Ogawa, 2006, Eppley, 2011; Shippen et al, 2005).

Advocates of Direct Instruction argue against these claims. The goal of Direct Instruction is to teach all students to a level of mastery and in order to do so requires being responsive to the needs of each individual student. Engelmann cites the frequent assessment and regrouping of students based on the learning needs of students, as well as the re-teaching and changes in pacing as evidence of common forms of differentiation in Direct Instruction programs (2011). Additionally, in response to the claim that teaching basic skills fails to offer students the opportunity to develop higher level thinking skills, advocates typically cite the findings of research that shows students who receive Direct Instruction have significant gains in the skills being taught as well as cognitive skills (Engelmann, 2011; Kim & Axelrod, 2005). And as for the claims that scripted Direct Instruction programs deskill teachers, advocates cite the fact that it typically takes a teacher two to three years to master Direct Instruction teaching, acknowledging that it would only take that long if a teacher were truly having to learn and improve their practices (Engelmann, 2011; Stockard, 2011). As for the claim that implementation of scripted Direct Instruction models take away from teachers’ personal control and creativity, Engelmann is very clear that the purpose of Direct Instruction has always been to accelerate the learning of at-
risk and struggling students, and thereby help them to succeed, and was never intended to benefit teachers feelings of control or creativity (Engelmann, 2011).

**Perspectives of Orton-Gillingham.** While there may be scant research showing O-G based instruction to be an effective instructional pedagogy for teaching reading to individuals with dyslexia or other learning disabilities, there is significant case law showing it to be one of the most requested interventions for struggling readers (Rose & Zirkel, 2007). In a review of case law related to the Individuals with Disabilities Education Act (IDEA) over the past thirty years, O-G-based reading instruction has been the number one requested methodology for instruction by parents and their advocates (Bhat, Rapport, & Griffen, 2000; Zirkel & Rose, 2007). O-G-based reading instruction also remains highly used by reading tutors and teachers that work with students with dyslexia and other reading challenges. Additionally, the most highly regarded private schools for students with dyslexia, such as Delaware Valley Friends School, Gow School, The Kildonan School, Landmark School, and Mary McDowell Friends School all have used Orton-Gillingham based instructional practices with students for decades with great success (Rose & Zirkel, 2007).

Despite the evidence supporting O-G based instruction as one of the most requested and well received reading methodologies by parents, teachers, and tutors, the majority of schools serving students identified as having dyslexia or other language based learning disabilities have refused to implement the pedagogy with their students due to the lack of published research showing the methodology to be an effective intervention (Rose & Zirkel, 2007). While there has been shown to be a high level of teacher satisfaction with the Orton-Gillingham-based instructional programs and positive outcomes of student learning when these programs have been used, the fact is that the What Works Clearinghouse still labels the effectiveness of O-G-based
strategies as unfounded, saying that “lack of studies meeting WWC evidence standards means that, at this time, the WWC is unable to draw any conclusions based on research about the effectiveness or ineffectiveness of unbranded Orton-Gillingham-based strategies” (Scheffel, Shaw, & Shaw, 2008; U.S. Department of Education, What Works Clearinghouse, Institute of Education Sciences, 2010, p. 1).

With the requirements under the current federal mandates of No Child Left Behind (NCLB) and the Individuals with Disabilities Education Act (IDEA), public schools, as well as non-public schools receiving public funds, are limited in their curriculum choices to those which have been determined to be scientifically research based methodologies. Therefore, schools are limited in their curriculum choices and despite the widespread perceptions of the believed effectiveness of O-G-based instruction for remediation of reading difficulties with students identified as having dyslexia or other language based learning disabilities, not all schools are willing or able to offer the methodology to their students, even when other methodologies have failed to address the learning needs of the student (Ritchey & Goeke, 2006; U.S., NCLB, 2006). Given that there are over 2.3 million students within the American public school systems eligible under IDEA as students with learning disabilities, and the long standing achievement gap continues to remain largely unchanged, it is imperative that at-risk students have access to any and all curricula and methodologies that may be of benefit to them (Manset-Williamson & Nelson, 2005; U. S. Department of Education, National Center for Education Statistics, 2014).

**Role of Scaffolding and Social Interactions**

While most special education teachers in the United States report that they do not use any sort of formal reading curriculum when working with their students, instead electing to use
materials that they have made or selected from various sources (Mariage, Burgener, Wolbers, Shankland, Wasburn-Moses, Dimling, Kosobud, & Peters, 2009), the use of scaffolding of instruction is a widely employed technique for meeting the needs of struggling learners (Marinak & Gambrell, 2013; McGee & Nelson, 2013; Silliman, Bahr, Beasman, & Wilkinson, 2000; Winn, 1994). In the words of Fisher and Frey, scaffolding and its related social interactions allow for “principles of differentiated instruction provide(ing) a decision-making framework for adjusting each (lesson) to stretch, but not break, learners” (2014, p. 349-350). In other words, effective scaffolding allows a teacher to address individual students’ learning needs at the level they are currently at, rather than presenting a lesson or skill that is beyond a student’s current level of functioning and keeping and them from being able to engage with the curriculum material and learn (Fisher & Frey, 2014; Graves & Braaten, 1996; Lutz, Guthrie, & Davis, 2010; Marinak & Gambrell, 2013; McGee & Nelson, 2013; Silliman et al, 2000).

Scaffolding, as an educational term, was first used by Wood, Bruner, and Ross in 1976 when they defined it as “the process that enables a child or a novice to solve a problem, carry out a task or achieve a goal which would not be possible to achieve without some external help” (p. 90). Closely related to Vygotsky’s concept of the Zone of Proximal Development (ZPD) (Chen, Chia-En Teng, Lee, & Kinshuk, 2011; Wood & Wood, 1996), scaffolding is a necessary support for struggling learners to be able to access curriculum, skills, and concepts that are outside their understanding (Ankrum, Genest, & Belcastro, 2014; Chen et al, 2011; Graves & Braaten, 1996; Kim & White, 2008; Silliman et al, 2000). Scaffolding typically involves formal or informal assessment of a student’s current level of functioning in a particular skill area, and then implementing instruction at what is deemed to be at the student’s instructional level. The instructional level is different for each and every student and is gauged as the mid-point between
the individual’s independent level (the level that they are able to complete the task or skill successfully without assistance) and their frustration level (the level at which they are unable to independently complete the task or skill even with support, and therefore would simply become frustrated rather than absorb any new learning). This mid-point being the student’s instructional level or Zone of Proximal Development (ZPD) (Fisher & Frey, 2014; Wood & Wood, 1996).

While formal assessments are often used to initially determine students’ instructional levels, social interactions between the teacher and students are the biggest determinants of students’ scaffolding needs, particularly for struggling learners with motivational issues (Marinak & Gambrell, 2013). Marinak and Gambrell (2013) suggest that “there is a critical human factor that must be considered when attempting to reach struggling readers, specifically . . . a personalized, responsive, relationship-based approach” (p. 44-45) such as scaffolding provides. Furthermore, extensive research on learning has shown again and again the importance of the teacher-student relationship for student success and achievement (Alderman & Green, 2011; Ankrum, Genest, & Belcastro, 2014; Commander & de Guerrero, 2013; Lutz, Guthrie, & Davis, 2010; Marinak & Gambrell, 2013; Winn, 1994). Ankrum, Genest, and Belcastro (2014) define scaffolding as a “learner-centered construct” (p. 40) in which differentiation and support from the teacher may take on many different forms dependent upon the individual needs of the student, something which can only successfully occur if the teacher has a positive and understanding social relationship with the student.

Several studies have been conducted on the effectiveness of scaffolding. Consistently research has proven the strategy to be effective in supporting struggling students’ learning and achievement (Ankrum, Genest, & Belcastro, 2014; Chen et al, 2011; Fisher & Frey, 2014; Kim & White, 2008; McGee & Nelson, 2013; Silliman et al, 2000; White & Kim, 2008). In a review
by Fisher and Frey (2014), it was found that students’ reading achievement increased more when taught using instructional materials slightly above their instructional level, so long as the teacher provided appropriate scaffolding for the student to be able to access the materials. In a study conducted by Margolis and McCabe in 2006, it was determined that the level and quality of scaffolding that a student received had a greater correlation to the students’ reading achievement, than that of the actual scripted curriculum in the study. Similarly, in two separate studies conducted by Ge and Land (2003) and Chen and colleagues (2011), scaffolding was found to be the key determinant of student gains. In fact, scaffolding has been found to be so instrumental in the success of struggling learners that Graves and Braaten even developed a reading support model based upon the method referred to as the Scaffolded Reading Experience (SRE) (1996).

Both Engelmann’s scripted Direct Instruction pedagogy and the Orton-Gillingham-based instruction pedagogy employ scaffolding as a key component of instruction. Rather than simply beginning at a particular lesson or level of instruction with students, both use an intervention model that requires assessment of students to determine their instructional level before being placed into the programs. Then through on-going formal and informal assessment the students’ instructor is expected to make instructional decisions to help the student progress as quickly as possible, while refraining from pushing the student to quickly or placing them into a frustration level rather than instructional level. This connection to scaffolding may be one of the key reasons that Direct Instruction and Orton-Gillingham-based instruction are so often sought out for students with learning disabilities.
Summation and Call for Further Research

The most important component in selecting a curriculum is to make certain that the methodology chosen adequately addresses the learning needs of the specific students. Without a solid core curriculum focused upon the needs of all students, it is inevitable that students will fail to make expected progress. Schools are the “repositories of national culture and mediators of power,” (Findlow, 2008, p. 339). To accomplish this the content of the curriculum employed must be considered, as well as the format in which the curriculum is delivered.

Direct Instruction is a scientifically research based pedagogy shown to be effective with a variety of students, and particularly those at-risk of learning challenges (Grossen, 2004; Stockard, 2010). There is a wealth of research extending back over forty years that demonstrates the effectiveness of Direct Instruction for teaching literacy (Becker & Engelmann, 1973; Engelmann, 1999; Engelmann, 2011; Grossen, 2004; Shippen, Houchins, Steventon, & Sartor, 2005; U.S. Department of Education, 2002; What Works Clearinghouse, 2007)

Direct Instruction has been widely debated regarding its’ appropriateness of meeting students’ learning needs. Despite the decades of research showing it to be an effective means of instructional practice for teaching a wide variety of content areas, from reading, writing, mathematics, cognitive and social-emotional skills, some educators have argued that it is not a responsive or appropriate curriculum (Eppley, 2011; Skibbe et al, 2011). However, when the major tenets of the curricular model are compared to the learning needs of students with dyslexia or other language based learning disabilities, the pedagogy is seen to offer many of the needed components for student success. Specifically, Direct Instruction which is largely teacher directed, is able to offer an instructional model that provides them with targeted instruction focused upon the learning needs of individual students. At the same time, scripted Direct
Instruction models are able to help maintain a focus on the learning of the students at all times, thereby increasing student engagement, a key for increasing student learning and achievement (Coyne et al, 2009). Additionally, another key component of Direct Instruction is the fact that all students are required to participate in multiple modalities, something that has shown to increase learning (Campbell & Cooke, 2008; Giess et al, 2012).

Orton-Gillingham-based instruction, while highly regarded by many parents, teachers, tutors, and private advocates, as being the best way to remediate reading deficits in students with dyslexia or other language based learning disabilities, lacks the label of being a scientifically research based instructional methodology by the What Works Clearinghouse due to the limited published research showing the methodology’s effectiveness. As a result of the status of being an unscientifically proven methodology, few public schools are willing or able to implement the instructional approach without further evidence showing its effectiveness, leaving access to O-G-based instruction limited largely to students’ whose families are able to afford private school tuition or private tutors.

When considering the unique needs of students with learning disabilities in reading, both the Direct Instruction and Orton-Gillingham-based instructional pedagogies offer a number of positive supports. By giving multiple opportunities for modeling, practice, and immediate corrective feedback, students are able to make progress through guided instruction and support. Additionally, both methodologies afford students with dyslexia and other learning disabilities opportunities for explicit and direct instruction of the phonemes, grammar rules, and vocabulary of the language, verses more open-ended learning models in which students are expected to make meaning of the language through their own experiences. This explicit systematic and
sequential model of instruction provided by the Direct Instruction and Orton-Gillingham methodologies makes learning better defined and scaffolded by both student and instructor.

Despite these strengths, clearly further research is needed to assess the effectiveness of the two pedagogies and determine if one is better than the other in remediating the learning needs of students with dyslexia or other language based learning disabilities in the area of reading. Additionally, given the importance that scaffolding plays in the support of struggling learners, and the role that teachers play in providing that scaffolding, it will be important to explore the experiences that teachers have as they implement these pedagogies. As teacher experiences and perceptions can also shed light on the effectiveness of the curricula with the given student population.
Chapter 3: Methodology

The purpose of this chapter is to clearly present the methodology used to attempt to answer the research questions of this study. More specifically, this chapter provides a review of the problem of practice and specific research questions addressed in the study, as well as an in depth discussion of the population, sampling strategy, data collection and analysis methods, instruments, and procedures that were used. Additionally, means to address issues of validity, reliability, generalizability of the study, and protection of human subjects will be discussed.

Problem of Practice

The problem of practice under examination in this study is the persistently low performance in reading achievement for students with learning disabilities. Therefore, the primary research question in this study was designed to determine the potential effectiveness of two commonly used reading pedagogies: the Direct Instruction Corrective Reading curriculum and Orton-Gillingham-based instruction, with elementary age students who have been identified as having learning disabilities. In addition, the secondary research question was designed to gain a better understanding of the experiences of teachers and paraeducators in implementing these two intervention curricula.

Research Questions

The central research question that this study focuses on is: Which reading intervention is most effective at improving reading achievement in elementary aged students with learning
disabilities, Direct Instruction or Orton-Gillingham-based instruction? A secondary supplemental question also helped to contribute to a better understanding of the experiences of teachers and paraeducators as they work to implement these types of reading interventions with students with learning disabilities. Specifically: What is the experience of teachers/paraeducators as they implement a reading intervention curriculum (scripted Direct Instruction or Orton-Gillingham-based instruction) with students identified as having learning disabilities?

**Null Hypothesis**

**H1:** There is no significant difference between the increase in student reading achievement when either scripted Direct Instruction or Orton-Gillingham-based instruction is used.

**Research Design**

This study employed a quasi-experimental research design to investigate the effectiveness of two curricular reading interventions, for elementary age students with learning disabilities, at improving their reading achievement. Fraenkel, Wallen, and Hyun cite experimental research as “one of the most powerful research methodologies that researchers can use” (2012, p. 265). One of the primary reasons for this is that experimental methodologies can clearly identify the relationships between independent and dependent variables, and therefore provides the strongest research methodology available for testing hypotheses involving cause and effect (Fraenkel, Wallen, & Hyun, 2012).

While true experimental design is often perceived of as being a more reliable means of research, given the higher level of control for threats to internal validity, quasi-experimental
design is more widely used in educational settings, as randomly assigning students to treatment and control groups can lead to disruptions in learning. Furthermore, with appropriate controls for extraneous variables and threats, the quasi-experimental design can demonstrate just as well the effect that an independent variable has, or may likely have, upon the dependent variable (Creswell, 2012). Therefore, this study employed a quantitative approach using a quasi-experimental design to study the effectiveness of the intervention and control instructional curricula used upon the outcome of student reading achievement, and a supplemental open-ended interview to gain a better understanding of the experiences that the teachers and paraeducators have regarding their role in implementing the particular instructional methodologies.

Since study participants could not be randomly assigned to instructional groups, given that students had previously been assigned into class groupings based upon the school schedule, and redistribution of students solely for participation in the treatment and control groups was not possible nor ethical, the preexisting instructional groups of students and teachers were randomly assigned to the treatment or control groups. Assignment to the treatment or control groups was done through random sampling. Each instructional group in the school was assigned a number and then a random numbers table was used to assign each of the instructional groups either to treatment group 1 (Direct Instruction using Corrective Reading), treatment group 2 (Orton-Gillingham-based instruction using Wilson), or the control group. Students in all three groups received the same pre-test and post-test using the Northwest Evaluation Association’s Measures of Academic Progress (MAP-R) Reading assessment. However, each of the three groups received a different form of reading instruction during the ten-week course of the study. Students in treatment group 1 received ten-weeks of reading instruction using the Corrective Reading curriculum, a scripted Direct Instruction methodology. Students in treatment group 2
received ten-weeks of reading instruction using the *Wilson* curriculum, an Orton-Gillingham-based methodology. Finally, those students in the control group received ten-weeks of reading instruction through teacher made and selected materials and trade books.

**Research Site and Sampling**

**Research site.** Since the focus of this study was on assessing the effectiveness of reading interventions with elementary age students identified as having learning disabilities, a study site with a large population of learning disabled elementary students was required. Therefore, the study site used was a school that specifically serves students in first through twelfth grades who have been identified as having dyslexia or other language based learning disabilities. The school, located in Washington, D.C., is a private non-profit day school that serves both parentally placed students through private tuition, as well as students who have been placed at the school by their local public school through the Individuals with Disabilities Education Act (IDEA) Individualized Education Program (IEP) process. Students attending the school primarily come from the District of Columbia, Maryland, and Virginia. However, there are some students who come from further away including outside of the United States (e.g., Australia, Bermuda, Spain, etc.).

According to the District of Columbia’s Office of the State Superintendent of Education (OSSE), the school is a fully approved nonpublic day school for students in grades one through twelve. The total school population is 377 students: 7% African American, 4% Asian, 6% Hispanic, 1% Middle Eastern, 8% Multiple Races, 3% International, and 71% Caucasian, with 100% of the students identified as having special learning needs. There are 231 students identified as male (61%) and 146 students identified as female (39%).
Sampling. The target population included in the study consisted of ninety students in first through fourth grades; 7% of these students were African American, 2% were Asian, 6% were Hispanic, 4% were Middle Eastern, 1% Multiple Races, 8% International, and 72% Caucasian, with 100% of the students identified as having special learning needs. Additionally, of these ninety target students, 36 (40%) were female and 54 (60%) were male.

The sampling methodology employed used convenience sampling, including all students enrolled and attending the school in the identified grade levels. The population chosen was selected because the researcher is an administrator at the school. While there are inherent limitations with employing convenience sampling, particularly the fact that the researcher cannot state with full confidence that the findings can be generalized, or are representative of the larger population, the site provided access to a large population of elementary aged students with learning disabilities that would have been hard to gain access to elsewhere. Additionally, convenience sampling can provide useful and important information for answering problems of practice (Creswell, 2012; Fraenkel, Wallen, & Hyun, 2012).

A power analysis was conducted using the power analysis formula and Lipsey’s Sample Size Table (Creswell, 2012, p. 611) to determine the minimum number of participants needed for the study, while still being able to generate rigorous data analysis. Allowing for a 5% margin of error and a power of .80 with an effect size of .90, the minimum target sample size for ANCOVA analysis was determined to be 20 or greater for each of the treatment and control groups. Given that the identified study site had an enrollment of 90 students in first through fourth grades, and all of these students were invited to participate in the study, there were enough study participants to allow for roughly 30 students per treatment and control group. Therefore,
even with an attrition rate of two students over the course of the study, 2.2%, the sample size was sufficient to achieve a high degree of power.

Data Collection

Instruments.

*Measures of Academic Progress – Reading (MAP-R).* To measure students’ reading achievement (pre-test and post-test) the Northwest Evaluation Association’s *Measures of Academic Progress – Reading (MAP-R)* was used. This is a cross-grade computer adaptive, standardized norm-referenced reading achievement test that has been in use nationally and internationally since 2000, using normative data from more than 10.2 million participants across a variety of socioeconomic levels and geographic settings for students attending both public and private schools. The *MAP-R* is normed and validated for individuals in kindergarten through grade twelve. Validity for the tool has been determined to be between .66 and .91 using Pearson correlation coefficients to compare the assessment to 52 state and province reading/language arts tests. Reliability has also been found to be high, with reliability at .94 or higher at all grade levels (Kingsbury, Olson, Cronin, Hauser, & Houser, 2011; Northwest Evaluation Association, 2004; Northwest Evaluation Association, 2015).

The *MAP* tests are designed to assess the skills of all students, from the typically developing student, as well as high achieving students and those with learning disabilities or other challenges. Because of the cross-grade computer adaptive testing drawing upon content from multiple grade levels, the tool allows for assessment of students both above and below grade level. The computer based assessments are administered to students as a whole group, small group, or individually, and self-level to the ability of the individual student. While
students in kindergarten through grade two take the *Measures of Academic Progress for Primary Grades (MPG)* version of the assessment and students in grade two through twelve take the *Measures of Academic Progress (MAP)* version of the assessment, this is a distinction based upon the student’s grade level only, and does not affect the student’s scores as both versions of the assessment use a scaled score based on the unidimensional Rasch model and Rasch unIT (RIT) scale (Northwest Evaluation Association, 2011; Wang, McCall, Jiao, & Harris, 2013). Furthermore, since the test uses a computer-adaptive model all students’ assessments are individualized making it easy to assess mixed age and grade level students without having to worry about needing to administer multiple versions of the test.

The *MAP-R* measures four sub-areas of reading: Word Meaning, Literal Comprehension, Interpretive Comprehension, and Evaluative Comprehension. Students taking the MPG version of the *MAP-R* are also assessed in the areas of Phonological Awareness, Visual Discrimination/Phonics, and Concepts of Print. For most students the test takes between 30 and 60 minutes to complete and involves 33 – 50 questions total. However, the test is untimed, so some students may take longer to compete the items (Northwest Evaluation Association, 2011).

Examples of items from the *MAP-R* test include having the students decode and read phonetically regular and irregular words such as; car, balloon, and conspicuous and then match the word to a picture that correlates with the word. Other items from the *MAP-R* include short sentences and passages of text that the student is asked to read and then give a missing word that makes sense within the context of the passage such as, “Woof,” said the _____, biting the hand that fed it.” Since this is an assessment tool that is used in many public and private schools within the United States, and can be used up to four times per year with students without altering
its statistical validity, it was therefore deemed to be an appropriate option for pre and post-testing of study participants’ reading achievement.

Open-Ended Interviews. An open-ended interview was conducted with the teachers and paraeducators, following completion of the ten-week intervention period. Specifically, the teachers and paraeducators were asked the following questions: 1) Tell me about your experience using the_____ (Corrective Reading, Wilson Fundations/Wilson Reading System, or teacher-made and selected materials) curriculum. 2) How does the _____ (Corrective Reading, Wilson Fundations/Wilson Reading System, or teacher-made and selected materials) curriculum scaffold the skills needed for students to acquire reading skills? 3) How do you feel about that? 4) What do you think about the _____ (Corrective Reading, Wilson Fundations, Wilson Reading System, or teacher-made and selected materials) curriculum? 5) When you implemented the _____ (Corrective Reading, Wilson Fundations, Wilson Reading System, or teacher-made and selected materials) curriculum did you augment or provide any additional scaffolding to the curriculum in anyway? 6) Is there anything else that you’d like to share about your experience using the_____ (Corrective Reading, Wilson Fundations, Wilson Reading System, or teacher-made and selected materials) curriculum with students? Data from the interviews was used to gain a better understanding of the social interactions between teacher/paraeducator and student, and experiences that the teachers and paraeducators had regarding their role in implementing the particular literacy curriculum they are assigned to implement. Additionally, interview data was used to help gain insight into the teachers’/paraeducators’ perceptions of how well the assigned curricula met their students’ Zone of Proximal Development (ZPD) during the instructional intervention period.
Procedures

Procedures for the study included first gaining approval from the Head of School in order to access and use data for the purpose of this research. Orientation training was then provided to those classroom teachers and paraeducators who may be teaching reading as part of one of the treatment groups during the study. Given that IRB approval was not be received until September, at which point there would not have been time available for training, all teachers and paraeducators assigned to teach reading at the study site during the 2015-2016 school year were provided with the trainings at no cost prior to the start of the school year.

All reading teachers and paraeducators at the study site received intensive Orton-Gillingham training at the Associate Level, as well as reading instruction using the Wilson Reading curriculum, totaling forty hours during the summer months of June and July, since the training involved more hours than could be completed during the pre-service orientation week. Intensive DI training and instruction on teaching reading using the Corrective Reading curriculum was then provided to all reading teachers and paraeducators during the pre-service orientation week at the end of August.

Baseline testing. All students participated in a pre-test of their reading achievement using the MAP-R assessment. Following completion of the pre-test with all students, each of the pre-existing instructional groups were assigned to one of three groups. Group 1 consisted of 27 students who were assigned to receive ten-weeks of reading instruction using Direct Instruction Corrective Reading. Group 2 consisted of 28 students who were assigned to receive ten-weeks of reading instruction using Orton-Gillingham-based Wilson. Lastly, the remaining 35 students were assigned to the control group, to receive ten-weeks of reading instruction using teacher made and selected materials and trade books.
Students assigned to treatment group 1 were then administered the *Corrective Reading Decoding Placement Test* (see Appendix A) to determine the appropriate level to begin instruction. A four-part curriculum-based measure, the *Corrective Reading Decoding Placement Test* measures students’ oral reading accuracy and fluency rate, to determine the appropriate Zone of Proximal Development in the instructional curriculum. This assures that instructional time is not lost to teaching skills already at mastery level, while at the same time making certain that students are not introduced to content or skills that they may not yet have the foundational skills to be successful with (Engelmann, 2008).

Students assigned to treatment group 2 were then administered the *Wilson Fundations Placement Test* (see Appendix B) to determine their appropriate level to begin instruction. Similar to the *Corrective Reading Decoding Placement Test*, this is a curriculum-based measure to assess individual students’ previously mastered skills, as well as to determine areas of deficit. Covering letter naming, sound-symbol awareness for consonants, vowels, and blends, as well as sight word reading, the assessment helps to determine the appropriate instructional level for students to avoid wasting instructional time on previously mastered skills, while simultaneously making certain that students don’t begin instruction outside of their Zone of Proximal Development (Wilson, 2008).

Following completion of baseline and placement assessment of all students, a ten-week intervention period ensued for all three of the groups (treatment group 1, treatment group 2, and the control group). All students received reading instruction by a Special Education teacher or paraeducator who had been trained in the instructional methodology, for a period of 40 minutes daily, five days a week for ten consecutive weeks.
**Corrective Reading instruction.** For students receiving instruction with the *Corrective Reading* Decoding Strategies series, either Level A or Level B1 depending upon the instructional level of the students in the group as determined by their placement test scores. Regardless of where students placed into the program, each lesson followed the same three-part format for word attack, group reading, and workbook exercises.

**Sample lesson.** Below is an abbreviated sample lesson from *Corrective Reading Decoding Level B1* (Engelmann, Carnine, Johnson, Meyer, Becker, & Eisele, 2008, p. 14-23):

**Lesson 2:**

*Word Attack Exercise 1:* Review Rules and Expectations – each lesson begins with the teacher verbally reminding students of the rules and expectations for the lesson.

*Word Attack Exercise 2:* Pronunciation of Words – each lesson the teacher reads a set of sounds or words aloud first modeling the correct pronunciation of the sounds/words, then having the students chorally say the sounds/words on cue.

Teacher: “I’ll say some words that you’re going to read. Say them just the way I say them.

Teacher: “First word: slam. Say it (Signal.)”

Students: “Slam”

Teacher: “Yes, slam.”

Teacher: “Next word: clap. Say it (Signal.)”

Students: “Clap”

Repeating the steps until all students are able to demonstrate mastery of the skill.
Word Attack Exercise 3: Pronunciation of Word Parts – each lesson the teacher then models segmentation of sounds within words and then has the students chorally say the sounds/words on cue.

Teacher: “Listen: if. Say it. (Signal.)”

Students: “if.”

Teacher: “My turn to say the first sound in (pause) if: /i/. Your turn. Say the first sound. (Signal.)”

Students: “/i/”

Teacher: “My turn to say the last sound in if: /f/. Your turn. Say that sound. (Signal.)”

Students: “/f/”

Teacher: “Say the sounds in if again. First sound. (Signal.)”

Students: “/i/”

Teacher: “Last sound. (Signal.)”

Students: “/f/”

Each lesson the teacher models and practices segmentation of five phonetically regular words with students, repeating the steps for all five words until all students are able to demonstrate mastery of the skill.

Word Attack Exercise 4: Letter Sounds – the teacher reviews, models, and has students practice reading sounds as a group and independently.

Teacher: “Open your Student Book to Lesson 2. Everybody in the group can earn 8 points for doing well on reading these sounds and words. At the end of the Word-Attack exercises, I’ll call on individuals. If the individuals read well,
everybody in the group will earn 8 points. Touch part 1. You can say the sound for each of these letters if you listen to the last part of the letter name. Touch the first letter. That letter is L. The last part of the letter name is /l/. The letter L makes the sound /l/. What sound? (Signal.)”

Students: “/l/”

Teacher: “Touch the next letter. What’s the letter name? (Signal.)”

Students: “S”

Teacher: “The letter makes the sound /s/. What sound? (Signal.)”

Students: “/s/”

Over the course of the lessons the letter sounds increase in difficulty so that students are reading more complex patterns of sounds and words.

*Group Reading Exercise 12: Sentence Reading* – the teacher reviews, models, and has students practice reading as a group and individually, previously taught words in sentences.

Teacher: “Open your Student Book to Lesson 2, part 5. Everybody, touch part 5. I’ll read the first three sentences slowly. Touch each word I read and try to remember it. Sentence 1: This (pause) cap (pause) fits (pause) in (pause) that (pause) pack. . . I’ll call on individual students to read the sentences. Here are the rules that you are to follow: One: Point to each word that is read. Two: Read loudly when I call on you. If the group reads the sentences without making more than 3 errors, everybody in the group earns 6 points. Read sentence 1. (Call on a student).
Workbook Exercise 13: Writing Letters for Sounds. In this portion of the lesson the teach dictates sounds reviewed at the beginning of the lesson in the Pronunciation portion of the lesson and has students practice writing the corresponding letters for the sound.

Teacher: “Find part 2. You’re going to write letters for the sounds that I say. Touch the first space. The first sound is (pause) /a/. What sound? (Signal.)”

Students: “/a/”

Teacher: “Write the letter for /a/. Touch the next space. The sound for that space is (pause) /m/. What sound? (Signal.)”

Students: “/m/”

Teacher: “Write the letter for /m/”

Instructional pacing. Throughout each section of the lesson the teacher only moves on to the next exercise when all students are able to demonstrate mastery of the skill being taught or reviewed. For this reason, each teacher got through a different number of lessons with her students each week. It was observed that as teachers developed more comfort and experience with the instructional program that they were able to increase their pacing. On average each of the instructional groups got through a total of four lessons per week. By using a predictable signal such as a snap, clap of the hands, or a tap of a pen or pencil on the table the students were all cued to respond simultaneously limiting students’ abilities to simply mimic or copy their peers, thereby increasing student engagement as well as making it instantly obvious which students had mastered a concept, versus which students may need further repetition and practice of a particular skill, thereby helping to support mastery and appropriate instructional pacing. Finally, every lesson was scripted out for teachers in a color-coded teacher’s presentation book, with blue font for the portion that the teacher was supposed to read to the students, including
error corrections and black font for the correct responses that are required from students before the teacher may move on to the next step in the lesson, making the process of implementing instruction very straightforward for teachers.

**Wilson instruction.** For students receiving instruction with the *Wilson* curriculum, each lesson followed a lesson from the *Wilson* series, either *Wilson Fundations* or *Wilson Reading System* depending upon the instructional level of the students in the group as determined by their placement test scores. Regardless of where students placed into the program, each lesson followed the same four-part format each day: Letter-Keyword-Sound, Sky Write/Letter Formation, Echo/Letter Formation, and Student Notebook.

**Sample lesson.** Below is an abbreviated sample lesson from the *Wilson’s Fundations Teacher Manuel: Level 1* (Wilson Language Training Corporation, 2012, p. 70-71);

**Week 1, Day 1:**

*Letter-Keyword-Sound:* the teacher introduces and teaches the letter-sound association for the letters t, b, and f. Students are taught the letter sounds using sound card and using a visual cue for each letter sound (e.g. a, /a/, apple) (visual), listening to and repeating the sound of the letters (auditory).

*Sky Write/Letter Formation:* the teacher introduces and teaches the correct letter formation for the letters t, b, and f modeling the correct letter formation and placement on the writing grid (visual) while verbally talking students through the steps of writing the letters (e.g. a t is a sky letter so we start at the sky line and draw a line straight down, when we get to the grass line we pick-up our pencil and go to the top and cross) (auditory), and then having students make the letters with their bodies before practicing writing the letters (kinesthetic).
**Echo/Letter Formation:** the teacher models the correct sound made by each letter and then has students practice saying aloud and then writing the letter on the board while orally saying the letters’ sounds (visual, auditory and kinesthetic).

**Student Notebook:** the teacher has the students find the letters in the sound section of their notebooks and asks the students to name each of the letters (auditory), give the picture cue for the letter (visual), and the sound that the letter makes (e.g., “t, top, /t/”) (auditory) having the students color in the corresponding key word pictures (kinesthetic).

**Instructional pacing.** Each unit in the *Wilson Fundations* and *Wilson Reading System* curricula are divided into approximately fifteen lessons. It was expected that teachers would complete five lessons per instructional week and one full unit every three weeks. On average each of the instructional groups got through a total of four to five lessons per week.

**Control group instruction.** Using the individual student Individualized Education Programs (IEPs), teachers and paraeducators developed and delivered instruction to students based upon their individualized instructional needs in the area of reading using teacher selected trade books and/or teacher made materials, the method that most special education teachers in America have long used to instruct students with learning disabilities (Martinez & McGee, 2000). While teachers and paraeducators working with the students in the control group were allowed to use the instructional materials that they identified as appropriate for the student or students they were working with, as part of the fidelity check they were monitored to assure that they were providing instruction in one or more of the five strands of reading instruction: Phonemic Awareness, Phonics, Fluency, Vocabulary, and Comprehension and that instruction was aligned with the needs outlined on the individual student IEPs.
**Instructional pacing.** It was expected that teachers would complete a total of five lessons per instructional week and on average each of the instructional groups got through a total of five lessons per week.

**Post-Testing.** At the conclusion of the ten-week treatment period, all students were again assessed using the *MAP-R* as a post-test. *MAP-R* Pre-test and post-test scores were then used to determine individual student reading achievement growth over the course of the ten-week intervention period. Additionally, teachers and paraeducators were then also asked to participate in an open-ended interview to gain an understanding of the experiences that the teachers and paraeducators had during the intervention period, as well as their perception of how well the assigned curricula met their students’ Zone of Proximal Development (ZPD) during the instructional intervention period.

See Appendix F for a checklist of the procedural checklist and timeline of the study.

**Fidelity of Implementation**

Fidelity of implementation is critical to the ultimate effectiveness of any instructional model (Benner et al, 2011; Pyle, 2012). Therefore, to ensure that the findings of the study were truly representative of full and accurate implementation of the reading methodologies being studied, fidelity checks were completed with each teacher and paraeducator participating in the study, three times over the course of the ten-week intervention period. A research assistant observed three separate lessons taught by each of the teachers/paraeducators to check for fidelity of implementation and instruction using the appropriately corresponding fidelity check tool, during week three, six, and nine of the treatment intervention period. For teachers/paraeducators teaching students in treatment group 1, using the Corrective Reading Direct Instruction
curriculum, the tool used to monitor and assess fidelity was the *Corrective Reading* Fidelity Observation Form (see Appendix C). For teachers/paraeducators instructing students in treatment group 2, using Orton-Gillingham-based *Wilson*, the tool used to monitor and assess fidelity was the *Wilson Reading System* Fidelity Observation Form (see Appendix D). Lastly, for teachers/paraeducators teaching students in the control group the University of Oregon’s Reading First Five-Minute Observation Form was used (see Appendix E).

**Data analysis**

**Preparation of the data file.** Data was collected from the *Measures of Academic Progress – Reading* (MAP-R) (Northwest Evaluation Association, 2011) at baseline and post-treatment intervention phases. Data was also collected through open-ended interviews with teachers and paraeducators post-treatment. Cleaning, preparing and organizing data for analysis is a critical component of quantitative research before analysis and meaningful interpretation can occur (Creswell, 2012). Additionally, it is important that confidentiality of research subjects be maintained (Fraenkel, Wallen, & Hyun, 2012). Therefore to ensure that baseline and post-intervention data were collected and entered accurately, as well as maintained confidentially, students, teachers, and paraeducators participating in the study were assigned a participant identification number and both the list of study participants and their assigned identification numbers were maintained in a password protected excel data file stored on a password protected computer only accessible to the researcher. At no time has this data file or other confidential student documents or reports been maintained together.

An analysis of the quantitative data was completed using IBM’s statistical analysis software. Upon completion of both the baseline and post-intervention assessments, the data was
entered into an SPSS 23.0.0.0 data file. This file was stored on a password protected flash-drive, which was kept secured in a locked file cabinet within the researcher’s office, separate from the excel data sheet of study participants and their assigned identification numbers. All formats of study data, hard copy and electronic, will be maintained securely in a locked file cabinet within the researcher’s office for a period of three years from the completion of the study, after which time all data will be permanently destroyed.

In order to detect any missing data and/or remove any inaccurate or flawed data from the data set, descriptive research methods were used to review and clean the data. As part of this process descriptive statistics were reported out for each of the variables. Descriptive statistics, frequencies, central tendency and spread were calculated. Doing so allowed the researcher to detect any obvious errors or omissions, such as missing data fields, making certain MAP-R scores were within plausible range of RIT scores, gender of study participants was only male or female, and to identify any other outliers in the data set. This was particularly important as outlier data can indicate faulty data and decrease statistical power (Fraenkel et al, 2012).

An analysis of the data from the teacher/paraeducators interviews was completed using ATLAS.ti 1.0.43 statistical analysis software. Upon completion of the post-intervention interviews, the data was entered into an ATLAS.ti 1.0.43 data file. Like the quantitative data files, these files were kept stored on a password protected flash-drive, which was secured in a locked file cabinet within the researcher’s office, separate from the excel data sheet of study participants and their assigned identification numbers. All formats of study interview responses and data, hard copy and electronic, will be maintained securely in a locked file cabinet within the researcher’s office for a period of three years from the completion of the study, after which time all data will be permanently destroyed.
Choice of Statistical Technique

Given that this was a quasi-experimental study using preexisting reading groups of study participants, along with the fact that randomized assignment of each pre-existing reading group into experimental and comparison groups was neither practical nor ethical, and the fact that the dependent variable being measured was continuous (gain in students’ reading achievement score as measured by the MAP-R), one-way analysis of covariance, ANCOVA, was used as the primary statistical method for quantitative data analysis. By using one-way ANCOVA, statistical tests were conducted to assess differences between the treatment and control groups on the dependent variable of reading achievement, after controlling for the effects of the covariates of student pre-test scores on the MAP-R, thereby removing or controlling for individual student difference in reading achievement prior to the implementation of the treatment variable. Therefore, after cleaning and transforming the data, an analysis of the data was begun with frequency distributions to make certain that each of the two treatment groups and the control group had an approximately equal number of study participants, an important factor necessary for further statistical analysis using ANCOVA as the size of the treatment and control groups needed to be approximately equal in size for ANCOVA to be reliable (Mayers, 2013).

One-way ANCOVA is used to test the main effects of the categorical independent variable on a continuous dependent variable while controlling for the effect of other continuous variables that may co-vary with the dependent (Statistics Solutions, 2013). In this study one-way ANCOVA was used to determine the impact of the covariates. However, before ANCOVA could be used to analyze the data, it first had to be determined if there were any outliers, as data points outside of the typical spread can have a detrimental effect upon the one-way ANCOVA accuracy. Therefore before running the one-way ANCOVA analysis, assumption testing was
conducted to make certain that the data could in fact accurately be analyzed with ANCOVA (Mayers, 2013; Tabachnick & Fidell, 2007).

There are several key assumptions with ANCOVA. First, there must a reasonable correlation between the covariates and dependent variable as evidenced by the Pearson’s coefficient being between $r = 0.30$ and $r = 0.99$, it was therefore important to determine if a reasonable correlation existed between the covariate of the students’ baseline reading scores on the MAP-R and the dependent variable of reading scores on the MAP-R post intervention. To test for this the Pearson correlation coefficient was run using SPSS 23.0. Without a correlation between the covariate and dependent variable, the covariate could not be used in the statistical analysis, and therefore, ANCOVA would not have been able to be used to analyze the data.

Additionally, there must be homogeneity of variance in homogeneity of regression slope. To test for this Levene’s test for equality of variances was conducted. While Levene’s test was determined to be greater than <0.05, further analysis of the data showed that the groups were in fact homogeneous and therefore, ANCOVA could be used reliably to analyze the data.

Additionally, to gain a better understanding of the experiences that the teachers and paraeducators had regarding their role in implementing the particular curriculum of their intervention or control group (scripted Direct Instruction, Orton-Gillingham-based instruction, or teacher-made and selected materials), each teacher and paraeducator was asked to complete a supplemental open-ended interview. Data analysis was then used to analyze and report out the findings, using the basic principles of phenomenology: “understanding the essence of the experience”, “studying several individuals who have shared the experience” and “analyzing data for significant statements, meaning units, textual and structural description, and description of the “essence” (Creswell, 2013, p. 104-105) using an analytic strategy approach (Creswell, 2013).
First, interview notes from each of the respondents were entered into an ATLAS.ti 1.0.43 file. Then, using the word frequency tool available in ATLAS.ti 1.0.43 the responses were coded. These coded responses were then labeled into one or more coding categories and then indexed by themes. Counting frequency of the codes was then completed and the data was reviewed for consistency and any potential omissions, and summarized into patterns or trends of similarities and differences. An analysis of this data summary was then used to describe the personal experiences of these teachers and paraeducators from which a picture of their experiences could be represented into a narrative and visual format.

Finally, using the data from the MAP-R and the summarized open-ended interview themes were then organized into files by teacher/paraeducators and then the group that they were assigned to (treatment group 1, treatment group 2, or control group). Following this, an interpretation of the data was developed relating the data back to the theoretical frameworks used for the study, as well as to draw an analysis of the data sources to one another, in particular the mean reading achievement gains for the students in each of the intervention and control groups in relation to the experiences that the teachers/paraeducators of each group had. This interpretation of the meaning of the analyzed data was then used to develop a composite description that provides what Creswell (2013) calls an “explicit structure of the meaning of the lived experience” (p. 195) for both students and teachers/paraeducators in this study as the MAP-R data provided insight into the effectiveness of the reading curricula, while the supplemental open-ended interviews provided insight into the actual experiences of the students and teachers/paraeducators related to social interactions and scaffolding of the instruction.
Validity, Reliability, and Generalizability

Validity and reliability. Issues of validity and reliability are critical in all research studies (Fraenkel, Wallen, & Hyun, 2012). Validity refers to the appropriateness, meaningfulness, correctness, and usefulness of the inferences” while reliability refers to “the consistency of scores or answers from one administration of an instrument to another, and from one set of items to another.” (Fraenkel, Wallen, & Hyun, 2012, p. 147). To provide the highest level of validity and reliability clear definition of key terms: direct instruction, Direct Instruction, dyslexia, learning disabilities, Corrective Reading, Orton-Gillingham-based Instruction, Reading Achievement, Wilson Fundations, and Wilson Reading System, which are solidly tied to relevant research and theory were provided (Fraenkel, Wallen, & Hyun, 2012; Muijs, 2011). In addition, fidelity of implementation was monitored and assessed for each of the instructional groups; treatment group 1, treatment group 2, and the control group and to reduce the risk of repeated measurement reliability, student participants were administered the MAP-R as a Pre and Post-Test measure of reading achievement, an assessment tool designed for repeated use up to four times per year with over 35,000 computer adaptive items. And by using ATLAS software to code the themes that emerged from the teacher/paraeducator data, the coding was done blindly increasing the reliability of the analysis. Finally, by triangulating data from the multiple data sources and presenting the findings in a narrative that is richly detailed, the study offers a higher level of validity than simply using a singular source of data (Creswell, 2013).

Generalizability. In addition to the potential risks that validity and reliability play in quality of research findings, the generalizability of a research study is of key importance (Muijs, 2011). To assure the highest level of generalizability from the findings of the study, and therefore be able to “say something about the characteristics of the population rather than just
our (the) sample” (Muijs, 2011, p. 56) population selection procedures were used to increase the generalizability of the findings.

Through appropriately addressing critical elements of validity and reliability and potential threats to these essential principles of quality research, the end results of the study are more fully generalizable to the larger population of the students with learning disabilities throughout the United States, and the work that so many schools and organizations are undertaking in the efforts to reform and improve education for all students.

**Possible extraneous variables.** Fraenkel et al (2012) and Creswell (2012) both provide comprehensive lists of potential extraneous variables that can impact the findings in any research study. These extraneous variables can include: maturation of subjects, testing threats, instrument decay, history, lack of implementation fidelity, experimental treatment diffusion, and compensatory equalization of treatments.

To help to control and limit the impact of these potential extraneous variables, a quasi-experimental design was employed in this study where (1) the same seven teachers and ten paraeducators implemented the intervention and control curricula, (2) fidelity checks were completed a minimum of three times with each teacher and paraeducator, (3) the sample population selected to be used was demographically similar to the population, (4) a pre-test and post-test model was used to measure student reading achievement, and (5) the ANCOVA statistical technique for analysis was used to help to eliminate the effects of preexisting differences in reading achievement among the student participants as well as provide some controls for maturation, testing threats, instrument decay, regression, and history (Fraenkel et al, 2012).
Additionally, since the MAP-R is a computer administered and scored assessment instrument, the likelihood of validity threat of instrument decay was reduced. Similarly, since the assessment was administered within each student’s regular classroom setting, location threat was also minimized. Computer administration of the MAP-R also reduced threats to internal validity, given the clearly established protocols for administration.

Furthermore, experimental treatment diffusion, when the control group wishes to be part of the treatment group, was not thought to be an issue in this study given the age of the students participating in the study, and the fact that the treatment and the control groups, happened within each group of students’ individual classroom settings away from the other groups.

Protection of Human Subjects

Like all ethical research, this study focused upon making a “contribute(tion) to science and human welfare” (Fraenkel, Wallen, & Hyun, 2012, p. 62). All guidelines put forth by the Institutional Review Board (IRB) of Northeastern University (NEU) were followed regarding the use of human subjects. Steps were taken to make certain that the privacy of all participants in the study were fully protected (Creswell, 2012). A protocol of informed consent was followed to assure that all participants were protected. This included getting permission from the IRB prior to beginning the process of carrying out the study, or collecting any data. Teachers and paraeducators who were invited to take part in the study were notified orally and in writing about the goals of the study as well as the data collection, analysis, and storage methods that were used in the study. All adult participants (teachers and paraeducators) were asked to sign a consent form signifying his or her desire to be included in the study. Additionally, each participant, was informed of his or her right to withdraw from the study at any time.
Furthermore, to address any potential conflicts of interests, or potential harm that could arise from the fact that the principal investigator in this study was an administrator at the school being used as the study site, school staff, rather than the principal investigator administered all data collection tools. Also, as part of the process of informed consent for teachers who participated in the study, it was clearly identified that choosing to participate or not in the study had no impact, positively or negatively, upon their employment status.
Chapter 4: Research Findings

This study was conducted to investigate the effectiveness of two commonly used reading pedagogies: the Direct Instruction Corrective Reading curriculum and Orton-Gillingham-based instruction with elementary age students who have been identified as having learning disabilities, and the experience that teachers have as they implement these reading intervention curricula with students within a private school for children with learning disabilities in Washington, D.C. The study employed a quasi-experimental design. The design methodology used was similar in design to a true pre-test/post-test randomized experimental design. However, since students had previously been assigned class groupings based upon the school schedule, and redistribution of students solely for participation in the treatment and control groups was not possible, nor ethical, the preexisting instructional groups of both teacher and students were randomly assigned to the treatment and control groups using a random numbers table. All students participated in a pre-test of their reading ability using the Northwest Education Association’s Measures of Academic Progress – Reading (MAP-R). Students in treatment group 1 then received reading instruction using the Direct Instruction curriculum Corrective Reading 40 minutes a day, five days a week, for ten-weeks. Students in treatment group 2 then received ten-weeks of reading instruction using the Orton-Gillingham-based curriculum Wilson Fundations or Wilson Reading System 40 minutes a day, five days a week, for ten-weeks. Students in the control group then received reading intervention instruction using teacher made and selected materials for 40 minutes a day, five days a week, for ten consecutive weeks. At the conclusion of the ten-week treatment intervention period all of the students were reassessed using the Northwest Education
Association’s *Measures of Academic Progress – Reading (MAP-R)* as a post-test. Additionally, all teachers and paraeducators participating in the study were then asked to participate in an interview with the researcher about their experiences implementing the curriculum with their students and their perceptions about the respective curricula using an open-ended interview.

Given that there were three groups of students in the study, two treatment groups and a control group, and that all of the students in the three groups had participated in the same pre-test and post-test measure of their reading, along with the fact that the dependent variable measured was continuous, one-way analysis of covariance or ANCOVA, was used as the primary method of statistical analysis following a process to test necessary assumptions. By using analysis of covariance, the covariate of the pre-test scores was able to control for any preexisting group differences and allowed for a better analysis of the impact of the assigned treatments upon the dependent variable. In addition, data from the teacher and paraeducator interviews was analyzed using ATLAS.ti 1.0.43 software to look for patterns or themes of similarities and differences between the teachers’ and paraeducators’ experiences in implementing the assigned curriculum with their students.

The discussion that follows provides a summary of the key findings in relation to the research questions: Which reading intervention is most effective at improving reading achievement in elementary age students with learning disabilities, Direct Instruction or Orton-Gillingham-based instruction? What is the experience of teachers/paraeducators as they implement a reading intervention curriculum (scripted Direct Instruction or Orton-Gillingham-based instruction) with students identified as having learning disabilities?
Demographics of the School, Population, and Sample

Enrollment at the school has remained stable during the past decade with only a slight increase in enrollment, although the demographics of the population have begun to be more diverse racially and ethnically over the past three to five years. At the time that the study was conducted a total of 377 students were enrolled in the school from first through twelfth grades, 39% of whom are identified as female and 61% as male, and all of whom have been diagnosed as being dyslexic or having a language based learning disability. The 90 students enrolled in the elementary program at the school exhibited a similar demographic profile of those in the school as a whole.

Table 1. School and Target Group Population and Sample Demographics

<table>
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<th></th>
<th>N</th>
<th>Female</th>
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<th>Caucasian</th>
<th>Hispanic</th>
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<th>Middle Eastern</th>
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<td>7</td>
<td>2</td>
<td>72</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. All numbers listed above are percentages except for the numbers listed under N.

All students in the elementary program of the school, first through fourth grade, were included in the study. However, due to mobility, two of the students were excluded from the analysis, as one of them withdrew prior to completion of the study and the second student enrolled after the treatment intervention period had begun.

Fidelity of Implementation of Intervention Curricula

To ensure the highest level of implementation fidelity possible, all teachers and paraeducators in the study were provided with training on implementation and use of the
intervention curricula employed in the study prior to the start of the school year. In addition, during the ten-week intervention period, a research assistant observed three separate lessons taught by each of the teachers/paraeducators to check for fidelity of implementation during the delivery of instruction using an appropriately corresponding fidelity check tool. Fidelity checks occurred during weeks three, six, and nine in each of the classrooms. For teachers and paraeducators teaching students in treatment group 1, using the Corrective Reading Direct Instruction curriculum, the Corrective Reading Fidelity Observation Form checklist was used (see Appendix C). For teachers and paraeducators teaching students in treatment group 2, using the Orton-Gillingham-based Wilson Fundations or Wilson Reading System curriculum, the Wilson Reading System Fidelity Observation Form was used (see Appendix D). For teachers and paraeducators teaching students in the control group using teacher made/selected materials the University of Oregon’s Reading First Five-Minute Observation Form was used (see Appendix E). Throughout all fidelity check observations teachers and paraeducators were observed to be implementing the assigned curriculum with 96% fidelity or better (see Table G1 in Appendix G).

**Assumption Checking**

A dataset is required to meet a set of assumptions before the analysis of covariance test can actually be used (Mayers, 2013; Tabachnick & Fidell, 2007). Therefore, the necessary assumption checking was completed and it was determined that none had been violated, thereby validating that analysis of covariance could in fact be used as an accurate statistical analysis measure. Below is a summary of the assumption checking that was performed.
Approximately equal sample size—assumption met. Although the original plan was to include all 90 students enrolled in first through fourth grade at the school, due to one student withdrawing from the school during the period of the study and another enrolling after the start of the intervention period, only 88 students in total were included in the study data. Additionally, because students were previously assigned to instructional groups based upon the school schedule and some classes had a larger number of students, the two treatment groups and control groups did not contain exactly 30 students each, as originally projected. However, with a total of 25 in treatment group 1 and 28 in treatment group 2, and 35 in the control group, the sample size requirement for one-way ANCOVA was met (Tabachnick & Fidell, 2007). Given that all of the first through fourth grade students who were enrolled and attending the school throughout the study period were included in the study, there was no opportunity to have increased the sample size to more than \( n = 90 \).

Absence of outliers—assumption met. Outliers are data points that are extreme, in that they do not follow the observed pattern of the remaining data points (Muijs, 2011). Outliers can impact the effectiveness of data analysis when using the one-way ANCOVA, and reduce the accuracy of the results (Mayers, 2013). Because of this, the data was closely analyzed for outliers. Two outliers were found in the pre and post-test scores of reading achievement. One was an outlier in that the student received a score of BR (below range) on both the pre and post-tests, and the second student scored more than forty points above all of the other students on both the pre and post-test scores. These two outliers were therefore excluded from the final data analysis. Thus, while the study began with a total of 90 students, excluding the two students that did not participate in the full treatment period, and excluding the two outliers, left a total of 86 valid cases. Data analysis was therefore completed on these 86 valid cases. See Appendix H.
(Table H1 and Table H2) for the data set information regarding minimum, maximum, mean, and standard deviation for the covariate and dependent variables in the study, of these 86 cases.

**Normal distribution of covariate and dependent variable--assumption met.** The boxplots show that the covariate (MAP-R pre-test scores) and dependent variable (MAP-R post-test scores) were normally distributed (see Figures in Appendix H). The covariate and dependent variables also met the skewness and kurtosis criteria, as all of the values for these tests fell between -1 and +1 (see Tables in Appendix H). As a result of these tests the assumption of normality was determined to have been met.

**Correlation between covariate and dependent variable--assumption met.** The correlation of the covariate (MAP-R pre-test scores) and the dependent variable (MAP-R post-test scores) for reading achievement gains for students in all three groups was found to be highly correlated using the 2-tailed Pearson Correlation \( r = .919 \). Therefore, the assumption of a correlation between the covariate and dependent variables was determined to have been met, as the correlation was greater than 0.5 \( r >0.5 \) and according to Cohen’s classification of Pearson’s \( r \) “0.5 or more (is defined) as ‘large’” (Blaikie, 2003, p. 111).

**Linearity--assumption met.** Linear regression slopes must display a straight line with plotted points close to the aim line if the data presented has a high correlation. Conversely linear regression slopes that demonstrate a curvilinear line demonstrate low or non-existent correlation (Morgan, Leech, Gloeckner, & Barrett, 2007). As demonstrated by the linear regression graph in Appendix H (Figure H3), the relationship for the dependent variable in each of the three groups is clearly linear. Therefore, the linearity assumption was determined to have been met.

**Homogeneity of regression slopes--assumption met.** When analyzing the effect of the between-subject factors for the treatment and control groups in comparison to the dependent
variable, \((MAP-R \text{ post-test scores})\) for all groups, the alpha level was determined to not be significant \((p = 0.05)\). See Appendix H (Table H3). Since the \(p\) value was found to not be less than 0.05 it was determined that there was no significant interaction between the covariate \((MAP-R \text{ pre-test scores})\) and the independent variable (treatment group). Had there been a significant interaction the assumption would have been violated and the statistical analysis choice of ANCOVA would not have been appropriate. However, given that the homogeneity of regression slopes was found, the homogeneity assumption was determined to not have been violated and the assumption met.

**ANCOVA Analysis**

As outlined above, the data in this study met all of the required assumptions needed to use the statistical analysis method of analysis of covariance. One-way ANCOVA was therefore used as the primary statistical analysis tool to compare the adjusted means of the reading performance variables of covariate \((MAP-R \text{ pre-test scores})\) to the dependent variable \((MAP-R \text{ post-test scores})\) for students in each of the three treatment groups (treatment group 1, treatment group 2, and control group).

**Hypothesis Testing**

The null hypothesis for this study was: There is no significant difference between the increase in student reading achievement when either scripted Direct Instruction or Orton-Gillingham-based instruction is used. As demonstrated below, after including pre-test scores as a covariate in the statistical analysis of covariance (ANCOVA) using SPSS 23.0, no statistically significant difference was found for students who had participated in the Direct Instruction group
(\(M = 178.960, SD = 13.5077\)), the Orton-Gillingham group (\(M = 188.071, SD = 12.3676\)), and those in the control group (\(M = 189.939, SD = 28.3228\)) (See Table 2). As shown in Table 3, in assessing the degrees of freedom, with two treatment groups and one control group of 86 total students included in the study, no statistical significance was found in the reading achievement between the three groups at the conclusion of the treatment period as measured by the adjusted post-test scores \((F(2,86) = .604, p = .549)\). Additionally, the observed power for this test was low at Observed Power\(^2 = .147\), thereby supporting the null hypothesis that there was no significant difference between the groups post treatment (See Table 3).

While neither treatment group evidenced a statistically significant difference in increase of the dependent variable, reading achievement, when compared to that of the control group, students in both treatment groups and the control group all showed improvement from their pre-test scores to their post-test scores. Students in treatment group 1 (Corrective Reading – Direct Instruction) generated the largest increase, although this increase was not statistically significant, when compared to treatment group 2 (Wilson – Orton-Gillingham-based Instruction) and the control group. The mean score for students at post-test was 186.900 in treatment group 1 (Corrective Reading – Direct Instruction) versus 184.730 for students in treatment group 2 and 186.759 for students within the control group, when ANCOVA was used to compare the adjusted means and control for the pre-test scores (See Table 4).
Table 2. Mean Raw Scores for Dependent Variable at Pre and Post-Test

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-Test</th>
<th>Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SE</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Instruction</td>
<td>174.320</td>
<td>10.8271</td>
</tr>
<tr>
<td>Corrective Reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>185.893</td>
<td>12.6998</td>
</tr>
<tr>
<td>Orton-Gillingham Wilson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>185.727</td>
<td>26.8087</td>
</tr>
<tr>
<td>Control Teacher Made/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selected Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>182.465</td>
<td>19.5555</td>
</tr>
</tbody>
</table>

Table 3. Test of Between-Subject Effects for Dependent Variable
Dependent Variable: RIT Post-Test

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
<th>Observed Power²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>30534.124</td>
<td>3</td>
<td>10178.041</td>
<td>151.355</td>
<td>.000</td>
<td>.847</td>
<td>1.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>61.574</td>
<td>1</td>
<td>61.574</td>
<td>.916</td>
<td>.341</td>
<td>.011</td>
<td>.157</td>
</tr>
<tr>
<td>RIT Pre-Test</td>
<td>28664.495</td>
<td>1</td>
<td>28664.495</td>
<td>426.261</td>
<td>.000</td>
<td>.839</td>
<td>1.000</td>
</tr>
<tr>
<td>Tx Group</td>
<td>81.217</td>
<td>2</td>
<td>40.609</td>
<td>.604</td>
<td>.549</td>
<td>.015</td>
<td>.147</td>
</tr>
<tr>
<td>Error</td>
<td>5514.201</td>
<td>82</td>
<td>67.246</td>
<td>.100</td>
<td>.015</td>
<td>.147</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3015770.000</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>36048.326</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. R Squared = .847 (Adjusted R Squared = .841)
2. Computed using alpha = .05
Table 4. ANCOVA Results for the Dependent Variable

<table>
<thead>
<tr>
<th>Group</th>
<th>M</th>
<th>SE</th>
<th>95% Confidence Interval Lower Bound</th>
<th>95% Confidence Interval Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Instruction</td>
<td>186.9001</td>
<td>1.685</td>
<td>183.549</td>
<td>190.251</td>
</tr>
<tr>
<td>Corrective Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>184.7301</td>
<td>1.558</td>
<td>181.630</td>
<td>187.830</td>
</tr>
<tr>
<td>Orton-Gillingham Wilson</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>186.7591</td>
<td>1.436</td>
<td>183.903</td>
<td>189.616</td>
</tr>
<tr>
<td>Control Teacher Made/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selected Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Covariates appearing in the model were evaluated at the following values: RIT FALL 2015 = 182.465.
Open-Ended Interview Data Analysis

Open-Ended Survey Data Analysis

This study raised the sub-question of: What is the experience of teachers/paraeducators as they implement a reading intervention curriculum (scripted Direct Instruction or Orton-Gillingham-based instruction) with students identified as having learning disabilities? To answer this question teachers and paraeducators who had taught students in the three groups in the study were asked to participate in an open-ended interview following conclusion of the ten-week intervention period and post-testing with students. Interview responses were entered into a Microsoft Excel Spreadsheet and then analyzed using ATLAS.ti 1.0.43 analytical and coding software.

Interview participants. While there were a total of seventeen teachers and paraeducators involved in the research study that had taught students in one or more of the treatment groups, only a total of eleven teachers and paraeducators consented to participate in the interviews. Of the eleven that participated, seven were teachers and four were paraeducators.
Two of the interview participants had taught students in treatment group 1 using *Corrective Reading*. Four of the interview participants had taught students in treatment group 2 using *Wilson*. The additional five interview participants had taught students in the control group using materials that they had made and/or selected (See Table 5).

**Table 5.** Open-Ended Interview Participants

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Teacher</th>
<th>Paraeducator</th>
<th>Treatment Group 1</th>
<th>Treatment Group 2</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>11</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Participants</td>
<td></td>
<td></td>
<td></td>
<td><em>Corrective Reading</em> – Direct Instruction</td>
<td><em>Wilson</em> – Orton-Gillingham-based Instruction</td>
<td>Teacher-made/selected materials</td>
</tr>
</tbody>
</table>

**Interview questions.** Those that participated in the interview were asked the following six questions; 1) Tell me about your experience using the_____ (*Corrective Reading, Wilson Fundations/Wilson Reading System, or teacher-made and selected materials*) curriculum.  2) How does the _____ (*Corrective Reading, Wilson Fundations/Wilson Reading System, or teacher-made and selected materials*) curriculum scaffold the skills needed for students to acquire reading skills? 3) How do you feel about that? 4) What do you think about the _____ (*Corrective Reading, Wilson Fundations, Wilson Reading System, or teacher-made and selected materials*) curriculum?  5) When you implemented the _____ (*Corrective Reading, Wilson Fundations, Wilson Reading System, or teacher-made and selected materials*) curriculum did you augment or provide any additional scaffolding to the curriculum in anyway? 6) Is there anything else that you’d like to share about your experience using the _____ (*Corrective Reading, Wilson Fundations, Wilson Reading System, or teacher-made and selected materials*) curriculum with students?
Themes derived from the data. Following conclusion of the interviews, a multi-step process of analysis was begun to examine themes. An inductive analytic approach to data analysis was conducted based upon the multi-stage approach of Smith, Flowers, and Larkin (2009) and the basic principles of phenomenology for “understanding the essence of the experience” (Creswell, 2013, p. 104-105).

Step 1: Reading and reviewing responses. As an initial step the researcher read and reviewed the responses from each of the study respondents to the six interview questions. This step allowed the researcher to become familiar with how individual participants responded to the open-ended interview questions. Following the reading of the responses the researcher then typed the responses into a Microsoft Excel spreadsheet and then reread the responses to make certain that all data had been entered correctly. This reading and review allowed the researcher to become more familiar with the responses of the study participants, while assuring that all data was correctly entered.

Step 2: Initial noting. This step allowed for the researcher to begin looking at the responses for initial themes and trends. Once the Microsoft Excel spreadsheet was uploaded into ATLAS.ti 1.0.43 software, an initial review for responses related to key themes that had been derived from the adopted theoretical frameworks of Engelmann’s Theory of Instruction, Orton’s Theory of Reading Disabilities, and Vygotsky’s Sociocultural Theory’s Zone of Proximal Development (ZPD) and social interactions was completed. Key themes analyzed for included; multi-sensory learning, scaffolding, social interactions, and overall experience of implementation.

Step 3: Developing emergent themes. Using the word frequency tool available in the analysis software, the researcher then focused on the emerging themes and studying the
responses for “significant statements, meaning units, textual and structural descriptions” (Creswell, 2013, p. 104-105) using an analytic strategy approach to analyze the data (Creswell, 2013). Emerging themes in the data were then coded into categories corresponding to the theoretical frameworks employed in the study and then indexed by themes. A frequency count of the emergent codes was then completed (see Table 6).

Table 6. Emergent Codes/Themes

<table>
<thead>
<tr>
<th>Emergent Codes/Themes</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>21</td>
</tr>
<tr>
<td>Curriculum appropriate</td>
<td>11</td>
</tr>
<tr>
<td>Curriculum meets needs</td>
<td>11</td>
</tr>
<tr>
<td>Curriculum materials</td>
<td>11</td>
</tr>
<tr>
<td>Scaffolding appropriate</td>
<td>11</td>
</tr>
<tr>
<td>Student success</td>
<td>11</td>
</tr>
<tr>
<td>Format and structure</td>
<td>5</td>
</tr>
<tr>
<td>Scope and sequence</td>
<td>5</td>
</tr>
<tr>
<td>Comprehension</td>
<td>4</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>3</td>
</tr>
<tr>
<td>Implementation Challenges</td>
<td>3</td>
</tr>
<tr>
<td>Benefits</td>
<td>2</td>
</tr>
<tr>
<td>Decoding</td>
<td>2</td>
</tr>
<tr>
<td>Errorless Learning/Error Correction</td>
<td>2</td>
</tr>
<tr>
<td>Explicitness</td>
<td>2</td>
</tr>
<tr>
<td>Differentiation</td>
<td>1</td>
</tr>
<tr>
<td>Experience</td>
<td>1</td>
</tr>
<tr>
<td>Multi-sensory</td>
<td>1</td>
</tr>
<tr>
<td>Risk-Taking</td>
<td>1</td>
</tr>
<tr>
<td>Student-teacher relationship</td>
<td>1</td>
</tr>
</tbody>
</table>

Step 4: Searching for connections across the emergent themes. Using the ATLAS.ti 1.0.43 software the interview response data was then further analyzed to look for connections across the themes, and the three theoretical frameworks. As part of this step a visual map of key words and themes was developed to allow the researcher to view the connections and alignments.
across the theme categories. While neither Smith, Flowers, and Larkin (2009) nor Creswell (2013) provide a specific governing process for completing this step, it was necessary for the researcher to remain broadminded and open in looking at these theme categories to consider possible connections and overlaps between the themes.

**Step 5: Moving to the next interview.** In this step the researcher repeated prior steps one through four with the remaining ten study participants’ interview responses. While the process remained the same for each of the interview responses, it was important that themes be looked at separately for each respondent to allow for development of all possible themes across the various respondents.

**Step 6: Looking for patterns across all of the interviews.** In the final step of analysis and interpretation, the researcher looked for emerging patterns as the interview responses were compared across all of the study participants. By closely examining the similarities and differences across the respondents in the two treatment groups and the control group, allowed the researcher to develop a more comprehensive list of the major themes and subthemes (See Table 7 below).

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Role of scaffolding</td>
<td>1a. Appropriateness of curriculum</td>
</tr>
<tr>
<td></td>
<td>1b. Differentiation</td>
</tr>
<tr>
<td></td>
<td>1c. Error Correction/Errorless learning</td>
</tr>
<tr>
<td>2. Role of multi-sensory learning</td>
<td></td>
</tr>
<tr>
<td>3. Implementation</td>
<td>3a. Challenges</td>
</tr>
<tr>
<td></td>
<td>3b. Strengths</td>
</tr>
<tr>
<td>4. Student-Teacher Relationships</td>
<td>4a. Communication</td>
</tr>
<tr>
<td>5. Overall Experience</td>
<td>5a. Student success</td>
</tr>
<tr>
<td></td>
<td>5b. Teacher satisfaction</td>
</tr>
</tbody>
</table>
The section below provides a description of each of these themes and subthemes through the narrative responses of study respondents.

**Theme 1: Role of scaffolding.** For the purpose of this study scaffolding was defined as breaking learning tasks into smaller distinct skills and providing instruction and support to the learner at their current level, while helping them to achieve at successively higher levels (Kozulin et al, 2003; Verenikina, 2003). All of the teachers and paraeducators interviewed for this study felt that the curriculum they used offered a high level of scaffolding for their students’ learning and that this ultimately was the reason for the students’ success, regardless of the curriculum that they had used with their students. In the words of one teacher, “Scaffolding starts at the most basic level which is what they (students) need and then moves them forward in a way that they can find success.” Put in another way, “scaffolding helps to find success at whatever the level of the student and then limit(s) their errors as they move along at pace for successful learning.” Seen as a key element of successful curriculum, all of the teachers and paraeducators in the study cited the need for proper scaffolding for any student to find success, “but particularly for students with learning challenges when it comes to literacy.”

For those teachers and paraeducators that used *Corrective Reading*, *Wilson Fundations*, or *Wilson Reading System* with their students, each and everyone of them commented on the high degree of scaffolding provided by these curricula and the way in which they sequentially moved students from “part to whole” as a better fit for their students in comparison to what had previously been used in their classrooms. Teachers and paraeducators alike applauded the high level of scaffolding inherent in the programs with statements such as, “Scaffolding starts at the most basic level which is what they need and then moves them forward in a way that they (the students) can find success, but the curriculum also allows for differentiation to give each child
the needed level of skills to be successful” and “The curriculum (Corrective Reading) teaches the skills in a sequence that scaffolds their (the students’) learning naturally.” Another teacher explained, “the scaffolding (of the Wilson Reading System) helps to find success at whatever the level of the student and then limit(s) their errors as they move along.” Several teachers also referred to the explicitness of the programs and how that was a benefit for their students citing that the “chronological order (of Corrective Reading) makes sense – helps to fill the gaps and knowledge needed to be successful.”

All but one of the teachers and paraeducators interviewed referenced the need for curriculum used with their students to have sufficient scaffolding. One teacher even went so far as to say, “As a teacher, I wouldn’t use any curriculum that couldn’t provide this necessary support for students,” evidencing just how important scaffolding of new learning is for the population of students in this study. Teachers and paraeducators in both the Direct Instruction Group and the Orton-Gillingham based Group also talked about the importance of “(s)piraling curriculum and lessons (to) assure that students make connections and don’t forget prior learning” and for those that used the Direct Instruction curriculum with their students there was particular praise for the way in which the “program naturally scaffolds strategies and skills” as well as the way in which the program “built upon the skills they (students) already have and what they need to learn next” to allow students to continue having success even as greater expectations are placed upon them.

One subtheme that emerged related to scaffolding was the role of differentiation. Two of the paraeducators who taught students using the Orton-Gillingham-based Wilson stated that “the scaffolding of the curriculum was very clear and well thought out” but even more importantly that the differentiation allowed by placing students at their needed instructional level (rather than
a grade level) “produces more success for students” and similarly that they “like(d) that we have the flexibility to move at individual students’ pace and skill level” making the program a “win-win for students with learning disabilities.” Teachers and paraeducators who taught students using the Direct Instruction Corrective Reading curricula also noted the importance of differentiation in meeting the learning needs of students with learning differences citing the importance of both “meeting students where they’re at” and “teaching the skills in a sequence that scaffolds and differentiates their learning in a natural and supportive manor.” This same theme was raised by teachers of students in the control group, with statements such as “when designing/picking the materials that best meet the needs of students it is critical to be able to scaffold(ing) and differentiate the learning for students based upon where they are and where they need to go next.”

Two less prominent subthemes that emerged from the interview data analysis were appropriateness of the curriculum and errorless learning. All of the teachers and paraeducators that participated in the interviews expressed the importance of the appropriateness of the curriculum, “the match between the curriculum and the needs of the learner.” Three of the study participants even openly shared that “if an assigned curriculum isn’t a good match” for their students they “simply won’t use it” “no matter who says they are required to” use it. One of the teachers who had taught students in the control group boldly stated that it is the role of a special education teacher to “make that fit . . . even if it means having to design our own materials.” A second teacher who had taught students in the control group expressed, “As teacher we do a good job at knowing what is appropriate for our students, more so than most educators and most definitely more so than school administrators – after all we know our kids.” All of the interview participants, both teachers and paraeducators alike, expressed the importance of whatever
curriculum is used with students with learning challenges that the curriculum support errorless learning as learning is so difficult for many students that “the last thing you want is for a student to have to relearn something that they incorrectly learned.” One example was “b/d and p/q reversals are so hard for kids with dyslexia to begin with, the last thing you want is to have to reteach them something once they begin making connections, simply because the learning wasn’t errorless.” Another teacher that had taught students in the Direct Instruction Corrective Reading group stated, “the DI program is good for these kids. Lots of repetition – which these kids need. . . (it’s a) good program in that it provides them with immediate success and limits their errors, which encourages them to try harder and take risks.”

**Theme 2: Role of multi-sensory learning.** When teachers and paraeducators were asked if they augmented or provided any additional scaffolding to the curricula they were assigned to implement as part of the study, an interesting and unexpected theme emerged. Six of the eleven (55%) teachers and paraeducators who participated in the interview responded that yes, they had in fact augmented additional scaffolding with some sort of multi-sensory learning activity. All six of the educators that shared this had been assigned to treatment group 1 (Direct Instruction – Corrective Reading) or treatment group 2 (Orton-Gillingham based – Wilson). These teachers and paraeducators described scaffolding “extra learning opportunities in a ‘game’ format”, “bringing in . . . hands-on activities,” with an overall goal of trying “to make it more multi-sensory for the students.” Teachers and paraeducators who were assigned to teach students in the control group also referenced using multi-sensory learning activities, such as “magna tiles to make the sounds tactile” and “tracing and copying letters in cursive and then from memory with eyes closed” as ways to augment the curriculum they used with students, but overall took it for granted that lessons were structured around multi-sensory experiences for students. Where
as, the teachers and paraeducators in the two treatment groups all referenced the need for augmenting the curriculum with additional multi-sensory learning opportunities for students. One teacher in treatment group 1 summed it up by saying, “I really like the scope and sequence and I’ve tried to make it more multi-sensory for the students. Moving forward (I) would like to implement more multi-sensory activities because it is the multi-sensory component that really makes learning stick for these kids.”

**Theme 3: Implementation challenges.** For teachers and paraeducators that had been required to implement *Corrective Reading, Wilson Fundations* or *Wilson Reading System* with their students, all of them (100%) stated that it had been harder than they had anticipated, at least initially. Some of their difficulties they attributed to the fact that the curriculum was new and they were still learning. However, all of them (100%) also expressed they had difficulties with finding ways to keep the repetitive lessons from getting boring. With time, the teachers and paraeducators came to realize that the students didn’t find the repetitious activities and lessons as boring. Therefore, as they began to see the level of success their students demonstrated, they came to value the repetition and routine as it was benefitting the students. Further, all of the teachers and paraeducators who had used *Corrective Reading, Wilson Fundations* or *Wilson Reading System* with their students stated they valued (33%) or highly valued (67%) the success that the explicit and sequential programs offered to their students and for that reason they were willing to deal with the repetition and routine even if they personally found it boring. In the words of one teacher that implemented the *Wilson Reading System*, “a well thought out curriculum makes the teacher job easier that (than) what we've done in the past since all of the materials are provided. There is a clear sequence and we have the confidence that we are doing what is needed for students, particularly when we see the level of success that our kids are
Another teacher who had implemented the Corrective Reading with her students stated, “I feel like it works. It’s very clear and specific. It can be very dry and kids, and myself, can get bored so being able to incorporate extra things helps. But the bottom line is students are successful.”

Study participants that participated in the interviews also stressed the strengths of the programs they had used with students. Consistently, teachers and paraeducators alike, made reference to the strengths of the programs they had been assigned to use. For those that had been assigned to use Corrective Reading or Wilson, the explicitness of the programs and their sequential nature were viewed as strengths by all (100%) of those that had used them. One teacher reflected on this sequential nature of the scripted programs saying that she “really (felt) that it meets the needs of struggling learners.” Another said she “love(d) the flexibility to give the students the level of practice they need(ed) to be successful.” Consistently all of the teachers talked about the programs they had been assigned to use as “meet(ing) the needs of kids as evidenced by the success the kids have.” And that “if I (the teacher) feel like it works and it’s a good fit for the students that is the sign of a strong program that meets the needs of learners.”

**Theme 4: Student-Teacher relationships.** Another key theme that became evident through the analysis of the interview data, was the significance of the student-teacher relationship. Both teachers and paraeducators interviewed cited the importance of the relationship between the student and teacher for success of student learning. In fact, multiple interview participants posited that the relationship between student and teacher is “equally or more important” that the curriculum employed. In the words of one teacher, “without establishing a positive relationship and rapport with my students first, they will neither be able to let down their guard with me, nor will I be able to effectively understand their true learning
needs.” Another stated, “I think that being able to approach reading through the context of our relationship helps to make reading more fun and interactive for kids.”

A sub-theme related to student-teacher relationships that emerged was that of communication. Over and over interview respondents raised the importance of communication both between teacher and student, as well as between the team of staff working with the student or students. Several of the teachers reported that “as a classroom team we met weekly to plan and create plans to address the specific needs of the students.” When asked about the purpose of these team meetings teachers and paraeducators alike reported that “without frequent and ongoing communication between all members of the educational team (teachers, Speech Language Therapist, Occupational Therapist, etc.) it is impossible to allow for learning and pacing at the rate, and in the way that best meets the needs of each and every child/student.” Put in another way, one teacher simply stated that, “communication is what makes the curriculum work and helps the student to ultimately succeed.”

Theme 5: Overall experience. Regardless of the curriculum used, all of the teachers and paraeducators reported having a positive experience implementing the curriculum with their students and felt that the curriculum used met the needs of their students. Two sub-themes emerged related to the overall experience as well, specifically student success and teacher satisfaction.

For teachers and paraeducators who used Corrective Reading, Wilson Fundations, or Wilson Reading System each and everyone of them attributed their positive experience to the fact that lessons were already laid out for them and that they could spend more time on teaching the skills rather than trying to make or modify materials that they may have previously used. Additionally, teachers and paraeducators who had used the Corrective Reading, Wilson
Fundations, or Wilson Reading System related that their positive experiences with the programs were directly related to seeing the success that their students had in acquiring new reading skills over the course of the ten-weeks. Several of these teachers rattled off lists of new skills that their students were able to master during the course of the ten-week intervention period (e.g., “the Floss Rule, r controlled vowels”, etc.) and in the words of one teacher who had used Corrective Reading with her students, “I’ve had a whole lot of success with the curriculum with my students, and anything that helps my students to reach success is positive in my mind.” Teachers and paraeducators that had been assigned to teach their students using the Direct Instruction Corrective Reading or the Orton-Gillingham-based Wilson also cited the routine as a positive for their students saying that it “is helpful to provide a format and structure” because “the kids know that we are going to have each of the various drills (and) reading time (each day)” and “it benefits the kids to know what to expect.”

While teachers and paraeducators in the control group also expressed that they had positive experiences in relation to the success of their students, they were not able to give specific and concrete examples of student success and instead related their positive experiences to being able to be flexible and “pick and choose” what students needed to learn citing, “being able to make materials and select the specific tools/resources makes it more flexible and responsive to (the) needs of students.”

Convergent and divergent themes across the three groups. Across the five major themes derived from the interview data; role of scaffolding, role of multi-sensory learning, implementation, student-teacher relationships, and overall experience, there were some key areas of convergent themes, as well as divergent themes, when each of the treatment and control groups were compared. The primary areas of convergent themes included the fact that teachers
and paraeducators in all three groups (treatment group 1, treatment group 2, and the control group) felt that the curriculum they employed with their students met the needs of students. Related to this, all of the teachers and paraeducators in the three groups felt that the curriculum they used with students offered an appropriate level of scaffolding and that the scaffolding had a direct relationship to the success of the students at improving their reading achievement (see Table 8).

Teachers and paraeducators across the three groups expressed divergent themes related to the level of multi-sensory learning that their respective curricula offered students, repetitiveness of the lessons, and the difficulty of implementation of the curricula. Specifically, teachers and paraeducators in the two treatment groups expressed that they felt the curricula they used (Direct Instruction – Corrective Reading or Orton-Gillingham based instruction – Wilson) lacked enough multi-sensory learning opportunities. Whereas, teachers and paraeducators in the control group expressed that the lessons they delivered to students contained a high level of multi-sensory learning activities. Teachers and paraeducators in the two treatment groups also expressed concerns with the repetitiveness of the lessons and referenced the curricula as being boring to implement. In contrast, teachers and paraeducators in the control group expressed a high level of satisfaction with the fact that they were given the flexibility and freedom in designing lessons, something that the majority expressed as engaging and revitalizing for themselves as well as their students. Lastly, all of the teachers and paraeducators in the two treatment groups expressed that implementation of the assigned curricula were more difficult to deliver than they had anticipated, “although it grew easier over time” as they became more familiar and practiced with the curriculum programs. In contrast, only 80% of the teachers and paraeducators in the
control group expressed difficulties with implementation of the curricula despite having the added responsibility of selecting and/or making their own materials (see Table 8).

Table 8. Open-Ended Interview Themes

<table>
<thead>
<tr>
<th></th>
<th>Teacher &amp; Paraeducators in Treatment Group 1</th>
<th>Teacher &amp; Paraeducators in Treatment Group 2</th>
<th>Teacher &amp; Paraeducators in Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Corrective Reading – Direct Instruction</em></td>
<td><em>Wilson – Orton-Gillingham-based Instruction</em></td>
<td>Teacher-made/selected materials</td>
</tr>
<tr>
<td>Curriculum met the needs of students</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Curriculum offered an appropriate level of scaffolding for students</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Success of students was due to the level of scaffolding provided by the curriculum</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Curriculum offered an appropriate level of multi-sensory learning for students</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Curriculum was easy to implement</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Curriculum was moderate to difficult to implement</td>
<td>100</td>
<td>100</td>
<td>80</td>
</tr>
</tbody>
</table>
Experience of implementing the curriculum with students was positive.

| Experience of implementing the curriculum with students was positive. |
|---|---|---|
| 100 | 100 | 100 |

Note. All numbers listed above are percentages.

Conclusion

There is extensive research on the effectiveness of Direct Instruction programs such as Corrective Reading with at risk students, dating back more than forty years. Few studies in the seminal research on Direct Instruction have specifically looked at the effectiveness of the instructional pedagogy with students identified as having dyslexia or language based learning disabilities. Even fewer studies have been conducted to look at the effectiveness of the Orton-Gillingham-based instructional pedagogy. To fill the gap in the research related to effectiveness of these reading intervention programs with elementary students identified as having dyslexia or language based learning disabilities, a protocol was designed and implemented in this study to assess and compare the effectiveness of the two instructional pedagogies.

Having met all of the necessary assumption testing, analysis of variance (ANCOVA) was used to analyze the data. Based upon the findings, the null hypothesis was supported, as findings did not show a significant difference in student reading achievement between those students in treatment group 1 (Corrective Reading – Direct Instruction), treatment group 2 (Wilson – Orton-Gillingham-based Instruction), or the control group. This study failed to provide explicit evidence that elementary age students with dyslexia or language based learning disabilities who receive reading instruction using a systematic and sequential reading curriculum such as Direct Instruction’s Corrective Reading or Orton-Gillingham-based Wilson make greater achievement
gains when compared to students who are instructed using teacher made or selected instructional materials. Furthermore, this study failed to provide quantitative evidence that students instructed using Direct Instruction’s *Corrective Reading* curriculum make any greater gains in reading achievement when compared to students who are instructed using Orton-Gillingham-based *Wilson* curricula. However, the study was able to provide insight into the experiences of teacher and paraeducators as they implemented reading intervention curricula, and perhaps most notably their perceptions of the role scaffolding, multi-sensory learning, and communication play in the instruction of students with learning disabilities.
Chapter 5: Discussion of Research Findings and Implications

The focus of this chapter is to unite the research results discussed in Chapter Four with the theoretical frameworks and previous research discussed as part of the literature review. Additionally, this chapter will present a discussion of the implications of these results as well as limitations of the study and suggested directions for future research.

Discussion of Problem Under Study and Methodology

The problem of practice under examination in this study was the persistently low performance in reading achievement for students with learning disabilities. Therefore, the purpose of this study was to gain insight into the effectiveness of two commonly used reading pedagogies, Direct Instruction Corrective Reading and Orton-Gillingham-based Wilson, with elementary aged students identified as having learning disabilities. Additionally, this study sought to provide insight into the experiences teachers and paraeducators had as they implemented these reading intervention curricula with students identified as having learning disabilities. Most importantly however, this study can help to guide the instructional decisions of school administrators and teachers, as they work to select and implement curricular interventions to remediate and support struggling readers to find success in one of the most critical academic skills needed for students’ success, reading.

The study employed a quasi-experimental research design. After assessing students’ reading achievement using the Northwest Evaluation Associations’ (NWEA) Measures of Academic Progress in Reading (MAP-R) as a pre-test, all of the reading instructional groups in
the school were then assigned to a treatment group or the control group. Classes of students were randomly assigned to either the Direct Instruction group, the Orton-Gillingham group, or the teacher made/selected materials group. Following this, reading instruction was implemented for a period of ten-weeks using the assigned curricula at the conclusion of which all students’ reading achievement was reassessed using the Northwest Evaluation Associations’ (NWEA) *Measures of Academic Progress in Reading (MAP-R)* as a post-test. Data analysis was then completed using one-way ANCOVA, following testing to assure that all necessary assumptions had been met, to compare the adjusted means of the dependent variable for each of the three intervention groups. Additionally, all teachers and paraeducators participating in the study were asked to participate in an interview with the researcher about their experiences implementing the curriculum with their students, and their perspectives about the assigned curricula, using an open-ended interview format. Data from these interviews was then analyzed using ATLAS.ti 1.0.43 software to look for trends or themes in the teachers and paraeducators’ experiences implementing the assigned curriculum with their students.

**Discussion of Major Findings**

**Reading Achievement Data.** The primary research question in this study was; which reading pedagogy is most effective at improving reading achievement in elementary aged students with learning disabilities, Direct Instruction or Orton-Gillingham-based instruction?

The results of the study showed that the students who participated in the reading intervention treatment groups and the control group did not differ statistically significantly on the dependent variable of reading achievement. More specifically, the descriptive statistical finding of the analysis of covariance (ANCOVA) showed no statistically significant difference between
the reading achievement of students in the Direct Instruction group, the Orton-Gillingham group, or the teacher made/selected materials group. However, while not statistically significant in difference, the students in the Direct Instruction group did demonstrate a very slight increase in their post-testing scores in comparison to students in the Orton-Gillingham-group and the teacher made/selected materials group.

Students in the Direct Instruction group were instructed using the Corrective Reading curriculum. Direct Instruction dates back to the 1960’s when Siegfried Engelmann and Wesley Becker first trialed their instructional model, based upon Engelmann’s Theory of Instruction, which focused upon helping at-risk students “catch-up” academically. While there is over forty years of extensive data showing the Direct Instruction methodology to be a successful means of teaching students basic reading skills (Becker & Engelmann, 1973; Engelmann, 1999), few studies have specifically looked at the effectiveness of the instructional model with elementary aged students with dyslexia or other language based learning differences.

While classes of students were randomly assigned to the treatment and control groups, students in the Direct Instruction group had raw mean scores on the pre-test measure more than 10 points lower ($M = 174.320, SD = 10.8271$) than the raw mean scores of students in the Orton-Gillingham group ($M = 185.893, SD = 12.6998$) and the teacher made/selected materials group ($M = 185.727, SD = 26.8087$). When the post-test scores from each of these groups were analyzed using ANCOVA for the dependent variable, the adjusted mean scores for students in the Direct Instruction group was $M = 186.900 (SE = 1.685)$, with the Orton-Gillingham group at $M = 184.730 (SE = 1.558)$, and the teacher made/selected materials group at $M = 186.759 (SE = 1.436)$ showing that the students in the Direct Instruction group did in fact demonstrate a slightly greater gain when compared to students in both of the other groups. However, this difference
was not large enough to be considered statistically significant, as the effect size of this increase was very small ($p = .050, Np2 = .002$).

Students in the Orton-Gillingham group were instructed using the *Wilson Fundations* or *Wilson Reading System* curriculum. As discussed in Chapter Two, the Orton-Gillingham-based instructional model was first developed in the 1930’s by Dr. Samuel Orton and Anna Gillingham, based upon Orton’s Theory of Reading Disabilities. Unlike the Direct Instruction model, Anna Gillingham and her colleague Bessie Stillman developed the instructional approach specifically for teaching students identified as being dyslexic or having some other form of language based learning disability (Campbell & Cooke, 2008; Chia & Houghton, 2011; Giess et al, 2012; Gillingham & Stillman, 1997; Ritchey & Goeke, 2006). However, in the nearly seventy years since the first publication of Remedial Training for Children with Specific Disability in Reading, Spelling, and Penmanship (Gillingham & Stillman, 1997) little empirical research has been published definitively showing the instructional model to be effective with the targeted student population, although Orton’s Theory remains the basis for multi-sensory learning in classrooms with dyslexic and language impaired students throughout North America.

Students in the Orton-Gillingham group also showed growth in their reading achievement scores from pre-test to post-test. However, despite having the second highest mean of the three groups at pre-test ($M = 188.071, SD = 12.3676$) the group had the lowest adjusted mean at post-test ($M = 184.730, SE =1.558$) evidencing the least growth of the three groups over the ten-week treatment period.

Finally, students in the third group were instructed using teacher made and selected materials. While American education law, dating back to the passage of Public Law 94-142 in the 1970’s has mandated specially designed instruction for students with disabilities such as
dyslexia and learning disabilities in public education settings, with the absence of clearly defined and prescribed instructional methodology and curricula many special education teachers have relied heavily upon teacher made and selected materials (Mariage et al, 2009). The practice of using teacher made and selected materials has not changed much, even with the mandates under the No Child Left Behind (NCLB) legislation of the past fifteen years, despite the requirements of NCLB to use scientifically-research based reading curricula (Mariage et al, 2009). The risk of this practice being that students may receive instruction that is neither systematic, sequential, nor comprehensive. Additionally, while teacher-made and selected materials may allow for curriculum and instruction to be individualized for each and every student, the approach may also lead to gaps or holes in student learning and development. Furthermore, there have been no empirical studies showing this to be an effective model for remediation of basic reading skills in struggling readers identified as having dyslexia or other language based learning disabilities.

Students in the group who received reading instruction using teacher made and selected materials demonstrated the highest mean score at pre-test ($M = 189.939$, $SD = 28.3228$), yet the adjusted mean following the ten-week treatment period was only $M = 186.759$ ($SE = 1.436$), an average of 3.18 RIT points lower than the mean at pre-test. While the adjusted mean post treatment was higher than students in both the Direct Instruction group ($M = 186.900$, $SE = 1.685$) and the Orton-Gillingham group ($M = 184.730$, $SE = 1.558$), it demonstrated a decline in the mean score for the students who received reading instruction with teacher made and/or selected instructional materials. While this difference was not large enough to be considered statistically significant, as the effect size of this increase was very small ($p = .050$, $Np^2 = .002$), it is concerning to think that any of the students’ reading achievement scores would decline. However, it is even more concerning to see that so many of the students’ scores showed a
decline, which then pulled the overall adjusted mean below what it had been at pre-test, prior to the ten-weeks of instruction. Additionally, it is important to note that students in this group had the widest variance in scores with a range from 131 to 226 (range = 95) at pre-test which then grew even more variant following the treatment period with scores ranging from 135 to 239 (range = 104) raising the question of what might have occurred to student reading achievement had the treatment continued for a longer period of time. It is possible to hypothesis that the use of teacher made and selected materials may have worked for some of the students, but not others, and that with continued used of this instructional methodology reading achievement of the students in the group might have become even more disparate leading to a greater and greater need for differentiation and individualization of instruction, and an increasing number of students performing outside of the group norm. Or even more concerning, failing to make growth and/or making such slow growth that they continue to fall further behind their typically developing peers.

In short, while there was no statistically significant difference between the adjusted scores of students in the Direct Instruction group, the Orton-Gillingham group, or the teacher made/selected materials group following the ten-week treatment period, the scores suggest that given a longer treatment period there may have been a more statistically significant difference in the reading achievement scores, with students in the Direct Instruction group potentially outperforming students in the other two groups. Given that the student reading achievement scores in the Direct Instruction and Orton-Gillingham groups became more analogous following the treatment period, where as the reading achievement scores in the teacher made and selected materials group became more disparate, it is reasonable to postulate that a longer treatment
period would have helped to close the achievement spread with students in the first two groups and widened the gap for students in the teacher made/selected materials group.

**Interview Data.** As discussed previously, the second phase of this study was to gain insight into the experiences of educators as they implemented the assigned reading curricula with their students. Therefore open-ended interviews were completed with seven teachers and four paraeducators using six interview questions, with interview questions aimed to collect data on the educators personal experiences implementing the curriculum, how well they felt the curriculum scaffolded the skilled needed by students, and any augmentation they may have felt needed by the curriculum, respectively. Analysis of the responses from the interview participants revealed five key themes that addressed the research question.

**Theme 1: Role of scaffolding.** For the purpose of this study scaffolding was operationally defined as “providing differential support to students, based on their individual needs, and sequentially withdrawing the support as appropriate until the students can complete the task unassisted” (Bender & Larkin, 2003, p. 36), in other words, breaking learning tasks into smaller distinct skills and providing instruction and support to the learner at their current level while helping them to achieve at successively higher and higher levels (Kozulin et al, 2003; Verenikina, 2003). All of the teachers and paraeducators interviewed as part of this study felt the curriculum they had been assigned to use with their students offered a high level of scaffolding and that ultimately the scaffolding was the reason for the students’ success. Scaffolding was viewed by the teachers and paraeducators as a key element of successful curricula, particularly for students with learning challenges. So important in fact, that one teacher even went so far as to say, “As a teacher I wouldn’t use any curriculum that couldn’t provide this necessary support for students.” Directly related to this, those interviewed cited the need not only for appropriate
curriculum that matches the needs of the learner, but also differentiation or the ability to accommodate the individual learning needs of the student(s), and errorless learning.

As discussed in Chapter One, scaffolding is a key element of Vygotsky’s Zone of Proximal Development (ZPD), a component of Sociocultural Theory (Wang, 2009; Zaretskii, 2010). One of the theoretical frameworks employed in this study, Vygotsky’s Sociocultural Theory, posits that there are two key levels of development for any learner. The first of these levels, sometimes referred to as the real level of development, is the level in which a learner is able to perform independently. The second level is the potential level of development and refers to the level at which the learner is able to perform a task with the guidance and support of someone more experienced or skilled in the given task. It is the point in between the real level of development and the potential level of development that is the Zone of Proximal Development (ZPD). The ZPD is the zone at which a learner is not yet independent and needs help from a more experienced or skilled person to successfully complete the task, yet the task is not so difficult that they are unable to master the goal with the support of someone more experienced guiding them (McLeod, 2007; Pea, 2004; Walqui, 2006; Wang, 2009; Zaretskii, 2010). It was Vygotsky’s belief that in tasks of learning and cognitive development that without sufficient scaffolding and support an individual would not be successful in acquiring new learning (Kozulin et al, 2003).

Engelmann’s Theory of Instruction posited that at-risk students begin school behind their peers in prior knowledge of language, reading, writing, and mathematics and therefore must be provided with accelerated learning opportunities so that they may catch-up to the typical learner as quickly as possible and not risk widening the achievement gap over time (Engelmann, 1999). Engelmann argued that in order to close this gap not all students in a given class or grade level
should begin instruction at the same place. Instead, Engelmann argued that each student should be individually assessed to determine their prior level of knowledge and skills, as well as what gaps in knowledge a student may have, with instruction then tailored to the student(s) specific instructional needs so as to help them reach the targeted academic goals, a concept very similar to Vygotsky’s Zone of Proximal Development. For a more in depth discussion of Engelmann’s theory see Chapter One.

Teachers and paraeducators being interviewed as part of this study were very much in line with the theoretical frameworks employed in the study. Just as Engelmann and Vygotsky theorized the need for scaffolded instruction that focuses upon the specific learning and support needs of the student, and neither wastes precious instructional time by reteaching skills that have been mastered, but also doesn’t present learning tasks that are so above the students’ current independent functioning level as to overly challenge or “turn off” the learner from even attempting the learning activity. All of the teachers and paraeducators clearly articulated the need for scaffolded instruction for students with dyslexia and other language based learning disabilities, supporting that this instructional methodology is important not only for student success, but for teacher buy-in as well.

**Theme 2: Role of multi-sensory learning.** This theme referred to the amount of instruction that was visual, auditory, and kinesthetic/tactile (VAK/T) in each of the assigned curricula, and the role that these VAK/T learning activities helped students to engage in the learning and retain the skill or skills being taught.

As discussed in Chapter One, Orton’s Theory of Reading Disabilities is based upon Orton’s belief that the brains of individuals with dyslexia or other reading disabilities are neurologically different from typical learners (Nourbakhsh, et al, 2013). Orton postulated that
the stresosymbolia, or reversals, exhibited by many individuals with dyslexia along with the fact that reading occurs in three separate areas of the brain; the frontal lobe, the temporal lobe, and the angular gyrus, requires that reading instruction be taught sequentially and systematically, and that one must engage all three of these areas of the brain while building connections or pathways across the two hemispheres in order to be effective (Campbell & Cooke, 2008; Nourbakhsh et al, 2013; Ritchey & Goeke, 2006).

When teachers and paraeducators being interviewed as part of this study were asked if they augmented or provided any additional scaffolding to the curricula that they had been assigned to implement with their students, six of the eleven (55%) responded that they had implemented additional scaffolding in the form of multi-sensory learning opportunities. More specifically, all six of the educators who stated that they had added additional supports through multi-sensory learning activities for their students were in the Direct Instruction group. Examples of multi-sensory learning opportunities that were added included using small tiles or other manipulatives to “make sounds tactile,” “tracing and copying letters,” and various games. However, none of the examples given seemed to have been consistently applied.

The teachers and paraeducators in the Orton-Gillingham group and the teacher made/selected materials group also referenced the need for multi-sensory learning in order to best support their students’ learning. But none of the educators in the Orton-Gillingham or teacher made/selected materials groups augmented their instruction with multi-sensory learning activities, instead taking for granted that these types of learning were already built into the curricula that they were using.

It is of note that the teachers and paraeducators being interviewed as part of this study were very much in line with the theoretical frameworks employed in the study. Just as Orton
theorized the need for multisensory learning activities that included VAK/T in order for cross hemisphere learning and retention of knowledge to take place, the educators in all three of the instructional groups held the belief that the needs of students with dyslexia or other learning disabilities are different from those of their non-disabled peers, this difference being neurologically based. Further, the teachers and paraeducators being interviewed in the study clearly articulated their common beliefs about the importance of multi-sensory learning to engage all areas of the students’ brains through multi-modality learning. This insight may be helpful for the development of future intervention curricula.

Further, while the majority of the educators assigned to instruct their students using Direct Instruction took it upon themselves to augment the curriculum with additional multi-sensory learning activities this augmentation was not seen to be consistent and failed to give all of the students in the group the VAK/T supports Orton’s Theory postulates that they require for the cross hemisphere connections needed for long-term retention of learning (Campbell & Cooke, 2008; Nourbakhsh et al, 2013; Ritchey & Goeke, 2006). Therefore, while the reading achievement data showed that the students in the Direct Instruction group had the largest gain in achievement, although not a gain which was statistically significant (see the earlier discussion in this chapter) it is speculation that this gain might have been greater had all of the students in this group received consistent multi-sensory instruction as part of each lesson administered over the ten-week treatment period, given the neurological structures of the brain and Orton’s Theory of Reading Disabilities.

**Theme 3: Implementation.** This theme referred to the strengths and challenges that the teachers and paraeducators faced in implementing the curricula they had been assigned to use with their students. All of teacher and paraeducators being interviewed who had been
assigned to the Direct Instruction group or the Orton-Gillingham group expressed that implementation of the assigned curriculum had initially been more difficult than they had expected. Some of these difficulties were attributed to the fact that the curriculum was new to them, and despite the initial professional development provided, they were still learning. All of the educators that were assigned to the Direct Instruction and Orton-Gillingham groups also expressed that they had had difficulties with the repetitiveness of the lessons and feelings of boredom. It is important to point out that these feelings of boredom were attributed to the adults only, none of the teachers or paraeducators expressed that their students were evidencing or expressing boredom with the lessons, in fact just the opposite. These same teachers and paraeducators who expressed boredom with the repetitiveness of the lessons, expressed that they found that their students did not find the lessons as repetitive or boring, but rather appreciated the routines of the lessons and the success that they had with them. However, as each and every one of the educators being interviewed came to observe the success of their students with the programs, they came to value the repetition and routine as well, expressing that they felt it was this very repetitiveness that ultimately led to the students’ success.

It is important to also point out that while teachers and paraeducators in the teacher made/selected materials group did not express any implementation challenges, this is to be expected as they had total freedom to implement any instructional materials that they desired. It would therefore be reasonable to assume that if the educators in this group had faced any challenges with the instructional materials they were using that they would have simply selected other materials.

All of the teachers and paraeducators being interviewed as part of the study reflected upon the strengths of the curriculum materials they had been assigned to use. Those assigned to
the Direct Instruction and Orton-Gillingham groups focused upon student learning, citing the explicitness of the programs and their sequential nature as being a benefit for students. Teachers and paraeducators in the teacher made/selected group also focused upon the strengths of their assigned curriculum, but instead focused on the flexibility and personal choice for the teacher/paraeducator as being key. Consistently though, all of the teachers and paraeducators talked about the programs they had been assigned to use as “meet(ing) the needs of kids as evidenced by the success the kids have” showing that of the educators were focused on helping their students to experience success.

**Theme 4: Student-teacher relationships.** Another key theme that emerged from the interviews was the significance of the student-teacher relationship. All of the teachers and paraeducators being interviewed cited the importance of this relationship for effective and successful student learning. A relationship so important that several of the interview participants suggested that the relationship between student and teacher may actually be more important than the curriculum used with students. As a related subtheme of student-teacher relationships, communication between the student and teacher was raised by all of the interview participants. In the words of one very eloquent teacher, “communication is what makes the curriculum work and helps the student to ultimately succeed.”

Vygotsky’s Sociocultural Theory defines learning as a social process for students with “language use, organization, and structure” being the main forms of negotiation needed for a learner to grow and develop (Lantolf et al, 2007, p. 217). Therefore, Sociocultural Theory places significant emphasis on communication between the student and teacher. More specifically, language cultural influences, and social interactions between the student and teacher not only lead to the development of a student’s knowledge and thinking skills, but also form the
foundation for what to think and how to think (Ohta, 1995; Pass, 2007). While there is a more in-depth discussion of the theoretical framework of Sociocultural Theory in Chapter One, it is important to point out that the teachers and paraeducators in this study saw student-teacher communication as critical for student success. Stated by one of the teachers, “being able to approach reading through the context of our relationship (that of student and teacher) helps to make reading more fun and interactive for kids.” This need to have a positive and real relationship between student and teacher with open communication raises some concerns about the use of scripted curriculum such as the teachers and paraeducators used in the Direct Instruction group. However, in fidelity check observations performed in the classrooms during the treatment period the educators were observed to find ways to incorporate both the need for unscripted communication and natural relationship building with students while maintaining the fidelity of the program and adhering to the scripted lessons, simply by building in time to socially connect and talk with students prior to beginning the lessons, and then again as a wrap-up at the end of the lessons. An example of this was in one classroom where the teacher began each day’s lesson by asking each student in the reading group to share one positive or special thing about their day and something that they were looking forward to that day. Then at the end of the lesson the teacher would then ask each student to share something that they felt particularly successful or proud of from that day’s lesson, and something that they felt they were still struggling with. While this only took about 5 minutes at the beginning and end of each class period it clearly helped to build a relationship between the students and teacher and helped to give the teacher more of a sense of control over her relationships with the students, making the fact that the rest of the lesson was scripted easier to accept.
According to Vygotsky’s Sociocultural Theory students can only experience successful learning when learning activities are scaffolded so as to be in the Zone of Proximal Development (ZPD) and “more advanced activities (are) in conjunction with another person, i.e. in the social relational setting” (Anh & Marginson, 2013, p. 147-148) with the quality of the student – teacher relationship as a critical determinant of the students’ success (Kozulin, Gindis, Ageyev, & Miller, 2003). It is interesting to note that the educators being interviewed in this study acknowledged this without any formal awareness of Vygotsky’s theory. Perhaps even more interesting to note however, is the fact that students in the Direct Instruction group with the teacher that purposely built in time at the beginning and end of each days’ lesson to talk with the students about their day and foster her relationships with the students, demonstrated greater gains at post-testing when compared to all of the other students included in the study. Given this insight, future studies to look at the effectiveness of reading interventions with struggling readers should include time for student-teacher relationship building in the study protocol, whether that is on a daily basis or prior to the implementation of the curriculum under study. Even more importantly though, all school administrators and teachers should be aware of this, and find time in the school day for regular student-teacher relationship building for struggling learners, if not all students.

**Theme 5: Overall experience.** Student success and teacher satisfaction were the two primary areas of focus that arose as part of the theme of overall experience. Regardless of the curriculum used, all of the educators being interviewed reported having positive experiences implementing the assigned curriculum with their students. Two related sub-themes that emerged from this were student success and teacher satisfaction. While all of the teachers and paraeducators being interviewed expressed that they had positive experiences with
implementation of their assigned curriculum in this study, teachers and paraeducators in the Direct Instruction and Orton-Gillingham groups attributed their positive experiences to the student success and the fact that the lessons were already planned out for them, allowing them more time to focus on teaching the skills rather than making and modifying materials. Conversely, while teachers and paraeducators in the teacher made/selected materials group also expressed that they had positive experiences implementing the instruction with their students over the ten-week treatment period, they were not able to provide any specific or concrete examples of student success, instead relating their feelings of positive experiences to the flexibility that making and selecting their own curriculum materials gave them.

Implications

**Practical implications.** The findings of this study have several practical implications that are relevant to national, state and school level policy makers and administrators, as well as teachers and reading specialists working directly with elementary aged students identified as having dyslexia or other language based learning disabilities. Reading achievement of students with disabilities has continued to lag behind that of non-disabled students nationally. Despite every national education legislation in the last two decades including provisions for the mandate to close this achievement gap, schools and districts throughout the United States have only continued to see a widening of this gap (Apple, 2008; Haager & Vaughn, 2013; Roberts, 2012; U.S. Department of Education, 2014; Wei, Blackorby, & Schiller, 2011). In order to help all students to achieve reading proficiency it is imperative that educators use the most effective curriculum and interventions possible.
This study provides insight into the effectiveness of two educational pedagogies, scripted Direct Instruction and Orton-Gillingham-based instruction, for reading instruction of struggling readers with learning disabilities. The first of these educational methodologies, Direct Instruction, has been used in schools since the 1960’s and has increasingly been used with struggling readers in the United States and internationally over the past decade as it has been backed by the United States Department of Education’s What Works Clearinghouse as a scientifically research-based educational pedagogy, even though it was never designed for use with students with learning disabilities (Becker & Engelmann, 1973; Engelmann, 1999; Kim & Axelrod, 2005; Shelton, 2010). The second methodology, Orton-Gillingham-based instruction has been around since the 1930’s as an instructional methodology for teaching reading to students with dyslexia and other language based learning disabilities. While widely upheld as highly effective by both teachers and parents, many schools have been resistant to using the methodology, as there is a lack of published research showing it to be effective and therefore has not been backed by the United Stated Department of Education’s What Works Clearinghouse (Giess et al, 2012; Ritchey & Goeke, 2006; Turner, 2008; U.S. Department of Education, 2010).

While the data presented in the study fails to provide clear support for one instructional pedagogy over another, as being best for improving the reading achievement of students with reading disabilities, it does provide insight into three different approaches for addressing the need with students as well as insights into the experiences of teachers and paraeducators as they work to implement reading intervention curricula. Growth was seen in student reading achievement scores in all three groups (Direct Instruction, Orton-Gillingham, and teacher made/selected materials). With students in the Direct Instruction group evidencing the largest gain, although not statistically significant, implying that given a longer treatment period the
methodology may have had the potential to increase the reading achievement of students while simultaneously helping to close the achievement gap, as supported by existing research on other populations of students (Becker & Engelmann, 1973; Engelmann, 1999; Grossen, 2004; Shippen et al, 2005). Conversely, with students in the teacher made/selected materials group demonstrating a decline in the mean score at post-test, it is concerning to think that the most commonly used instructional approach in special education, the use of teacher made and selected materials (Mariage et al, 2009; Martinez & McGee, 2000), may actually be contributing to disparate learning patterns of students. A practice that may potentially be leading to a greater need for differentiation and individualization of instruction and an increasing number of students performing outside of the norm, which may in turn be leading to students falling further behind their non-disabled peers, thereby actually contributing to the achievement gap rather than helping to close it.

The findings from the open-ended interviews also suggest that teachers and paraeducators view scaffolding and multi-sensory learning opportunities as critical for the success of students with learning disabilities when it comes to learning new reading skills, suggesting that any reading intervention programs may benefit from incorporating these two components for both the buy-in of the educators that will be using the curriculum, and ultimately the success of their students. Additionally, responses from the interviews provide an important reminder that educators need to be supported as they work to implement any new curriculum. While professional development programs can offer training and support prior to implementation of any curriculum initiative, there will always be challenges as the curriculum is rolled out for use with students. This is significant, as without support to overcome the challenges a teacher may be inclined to put aside the new materials and return to the freedom of what they have previously
been using, even if that material hasn’t proven to be meeting the learning needs of students. Similarly, when implementing scripted curriculum of any kind it is important to address the potential for teacher boredom with the repetitive scripted nature of the curriculum, finding ways to give teachers some freedom and control of ways and times to foster positive and natural student-teacher relationships and communication. In short, to assure successful implementation with full fidelity of any new curriculum, support for the educators using the materials is critical.

**Research implications.** Student reading achievement data shows that the reading skills of students with disabilities lag far behind that of their non-disabled peers. Further, despite all of the efforts over the past two decades to close this achievement gap in the United States, the gap has only continued to widen (Disability Statistics & Demographics Rehabilitation & Training Center, 2014; Reardon et al, 2012; U. S. Department of Education, 2014; U. S. Department of Education, 2012; U. S. Department of Education, 2012b). This study helps to fill the research gap by providing much needed research regarding the effectiveness of two reading pedagogies, Direct Instruction and Orton-Gillingham-based instruction, with elementary aged students who have dyslexia or other language based learning disabilities. While there is extensive research on the effectiveness of Direct Instruction (Becker & Engelmann, 1973, 1976; Carnine, 2000; Engelmann, 1999; Kim & Axelrod, 2005), the bulk of the research regarding the effectiveness of the Direct Instruction pedagogy has been with at-risk students and those from low socio-economic backgrounds (Becker & Engelmann, 1973, 1976; Duffrin, 1996; Kim & Axelrod, 2005). While there has been some research conducted to look at the effectiveness of Direct Instruction with students with disabilities, the focus has primarily been on individuals with cognitive delays and autism as opposed to dyslexia or other language based learning disorders. Additionally, there is limited research available on the effectiveness of the Orton-Gillingham
pedagogy, despite the widespread belief that it is an effective a methodology for remediating reading challenges in individuals with dyslexia and other language based learning disabilities (Ritchey & Goeke, 2006; Rose & Zirkel, 2007). This study provides additional research on the effectiveness of these two pedagogies as well as the experiences of teachers and paraeducators as they work to implement these curricula with students. While the quantitative results of the study did not prove to be statistically significant, it is hoped that the data along with findings from the open-ended interviews can help to further the discussion about the need for additional research in this area to better support the learning needs of students with learning disabilities.

Implications for Generalizability. External validity refers to the ability to generalize the cause-and-effect relationship to other people and settings (Creswell, 2012). The initial sample size in this study was 90 first through fourth grade students with dyslexia or other language based learning disabilities. While no two students with a learning disability are exactly the same, it is reasonable to assume the findings from the study are generalizable to the larger population of elementary aged students with learning disabilities. However, for research studies focused upon curriculum implementation to have a high degree of ecological generalizability the results of a study must come from multiple settings (Gall, 1976), therefore it is important to note that this study took place within a single private school setting for students with learning disabilities in Washington, D. C., and the results consequently may not be fully generalizable to other school settings as the results were obtained from a single urban setting.

Limitations of the Study

There are several limitations of this study that may have impacted the results. One potentially significant limitation was the relatively short duration of the treatment period. The
study duration was limited to ten-weeks, during which time there were several school holidays and closures for religious observance days and parent-teacher conferences. Even if school had met daily for the full ten-week period, reading class periods were only forty minutes daily and by the time students had transitioned into classes and instruction began teachers often only had between 30 and 35 minutes of instructional time each day to implement the assigned treatment curriculum. It is recommended that future research extend the length of daily instructional periods along with the length of the study to a full school year. Doing so might offer a richer view of student reading achievement progress over time.

Another limitation of this study was the size of the treatment and control groups. While the study included all of the students enrolled in the school’s elementary program, given the small size of the school, there were only 90 students included in the study. With one student withdrawing from the school and another beginning after the start of the study, the total number of participants was reduced to 88. Ultimately, the total number of students included in the data analysis was 86, as two additional students proved to be outliers. This small sample size spread across the two treatment groups and the control group left a relatively small number of study participants in each of the groups. Future research would benefit from having a larger sample size, including having participants from a wider range of grade levels as most elementary settings in the United States serve students in kindergarten through fifth or sixth grades. By including a larger sample size in future research the findings would be more valid and reliable. Further, including study participants from multiple school settings would also allow for more generalizable findings.

A third limitation of this study was that student reading achievement data was not analyzed by specific grade level or broken down to take in effect students that may have had
comorbid diagnoses such as attentional or other disorders (e.g., Attention Deficit Disorder or Attention Deficit Disorder with Hyperactivity), hearing impairments, etc. It is recommended that future research analyze the effects of the curricula upon students at specific grades levels, as it is possible that the effectiveness of the curricula may have differing effects upon students at different grade and developmental levels. Additionally, to target the effectiveness of the pedagogies under study with students who are solely diagnosed with learning disabilities it is recommended that future research exclude study participants who may have comorbid disorders.

Lastly, an additional limitation of the study was the fact that it was conducted solely in a specialized school for students with learning disabilities. While the site allowed for access to a large population of elementary students with language based learning disabilities in a single setting, the downside is that this setting may not be truly indicative of the more inclusive general education setting of which most elementary students with learning disabilities experience. Specifically, all of the teachers teaching reading at the school had master’s degrees in special education and were licensed and credentialed special education teachers. Similarly, all of the paraeducators in the study had at least bachelor’s degrees as well as additional advanced training in working with students with special learning needs. Given the background and training of these teachers and paraeducators it is possible that they were more attune to the learning needs of their students and therefore placed a larger importance upon the role of curriculum scaffolding. Therefore, for more fully generalizable findings, it is suggested that future research in this area be conducted in more traditional general education settings and/or pull out settings such as resource rooms.
Conclusion

Sixty-six percent of American fourth graders are not proficient in reading, a statistic that hasn’t changed much since the early 1990s (U.S. Department of Education, 2014; U. S. Department of Education, 2014b). Even more alarming is the fact that thirty-two percent of American fourth graders lack even basic reading skills as measured by the National Assessment of Educational Progress (NAEP) (U. S. Department of Education, 2014). Despite No Child Left Behind (NCLB) and the shift towards Common Core Curriculum Standards (CCCS) in the United States within the past two decades, reading proficiency has remained largely flat and unchanged since the early 1990’s (Reardon et al, 2012; U. S. Department of Education, 2014; U. S. Department of Education, 2012; U. S. Department of Education, 2012b). As alarming as these reading statistics are, student reading achievement data is even more dismal for students identified with disabilities.

Less than ten percent of students with disabilities in the United States have proficient reading skills by the time they reach eighth grade (Disability Statistics & Demographics Rehabilitation & Training Center, 2014; U. S. Department of Education 2015). Despite the national attention to this problem in past years, reauthorization of the IDEA law, implementation of NCLB, and the CCCS, the gap has not only failed to close, but it has actually slowly widened (Wei, Blackorby, & Schiller, 2011). Therefore, it is imperative that school administrators and teachers be informed about the best curricular interventions to support struggling readers with disabilities.

While the quantitative phase of this study did not reveal statistically significant findings due to the time constraints of the treatment period and the relatively small sample size, the qualitative data is very useful because it not only suggests that given a longer treatment time that
students with dyslexia or other language based learning disabilities who are instructed using the Direct Instruction or Orton-Gillingham pedagogies may outperform those students who are instructed using teacher made and/or selected materials, as the data for the students in the teacher made/selected materials group actually grew more disparate over the course of the treatment period. Therefore, while the findings of this study were inconclusive regarding the effectiveness of the Direct Instruction and Orton-Gillingham instructional pedagogies with elementary aged students with learning disabilities, as there was not a statistically significant difference in the adjusted reading scores of the students in the treatment and control groups, the data along with the previous research cited in this study suggests that Direct Instruction, and possibly Orton-Gillingham as well, may be effective pedagogies to use in supporting students with learning disabilities to become more effective readers.

Perhaps even more significantly, the qualitative findings from the teacher and paraeducator interviews conducted in this study helped to provide insights into the implementation of reading intervention curricula with students with learning disabilities in classroom settings. The themes that surfaced in these interviews offer insight for future development of reading intervention curriculum as they provide awareness of the importance that educators place upon scaffolding and multi-sensory learning opportunities in educational materials, as well as the student-teacher relationship, for students with learning disabilities. Further, the interview findings suggest the need for on-going support of teachers and paraeducators as they implement new curricula so that they may overcome any implementation challenges and successfully implement the materials with full fidelity. Lastly, it is hoped that this study may help to contribute to the research on instructional pedagogies for teaching reading to elementary aged student with learning disabilities, as well as inspire further research on this
critical topic as improving educators’ understanding of how to increase the literacy rates of struggling readers is imperative for the future of our society.
Appendix A: Corrective Reading Decoding Placement Test

Decoding Placement Test

Preparation
Reproduce one copy of the test for each student and each tester. A reproducible copy appears on pages 50 and 51 of this guide.

Administration
Select a quiet place to administer the test. Students who are to be tested later should not observe or hear another student being tested. You will need a test form for each student and a stopwatch or a watch with a second hand. When administering the test, sit across from the student. Position the test form so that the student cannot see what you are writing on the form.

Fill out the top lines of the test form (student information). Keep this filled-out test form and hand the student a clean copy of the test.

PART I
Tell the student Read this story out loud. Follow along with your finger so you don’t lose your place. Read carefully. Begin timing as soon as the student begins reading the first sentence.

Record each decoding mistake the student makes in oral reading. Mark an X on the filled-out form to show where the student made each mistake.

- If the student adds a word that does not appear in the story, mark an X between two words to show where the word has been added.
- If the student misidentifies a word, mark an X above the misidentified word. Do not count the same misidentified word more than once. (For example, if the student misidentified the name “Hurn” four times, count only 1 error.)
- If the student cannot identify a word within 3 seconds, say the word and mark an X above it.
- If the student makes a mistake and then self-corrects by saying the correct word, mark an X above the word.
- If the student sounds out a word but does not pronounce it at a normal speaking rate, ask What word? If the student does not identify it, mark an X above the word.
- Do not count the rereading of a word or phrase as an error if the word is read correctly both times.

Note: If you wish to use diagnostic procedures, you can use additional code information to indicate the type of mistake the student makes. You may, for example, write SC above self-corrections, SO above sound-out mistakes, and O above the omitted words. You may also wish to write in what the student calls the misidentified words or what the student adds.

After each word-identification error, tell the student the correct word.
Appendix A

When recording the errors, make sure your copy of the story is not visible to the student. The student should not be able to see the marks you are making.

Stop timing as soon as the student completes the story.

Enter the total errors for Part I on the appropriate line at the top of the filled-in test form. Also record the time required by the student to read Part I.

Refer to the placement schedule for Part I to determine placement or whether you should administer another part of the test.

PART II

Part II is a series of sentences that are to be read aloud by the student. You do not need to time this part of the test. To administer, present the section labeled Part II and tell the student Read these sentences out loud. Follow along with your finger so you don’t lose your place. Read carefully.

Record each decoding error the student makes while reading. When the student finishes reading Part II, enter the total errors for Part II on the appropriate line at the top of the test form. Then determine the student’s placement by referring to the placement schedule for Part II. Fill in the “Placement” blank at the top of the test form.

PARTS III and IV

Each of these sections is a passage that is to be read aloud by the student and timed. To administer, present the appropriate section and tell the student I’m going to time your reading of this selection. Read out loud and read carefully. Record errors as specified for Part I.

When the student finishes reading Part III, enter the total errors and time required at the top of the test form. Then refer to the placement schedule for Part III to determine placement or whether you should administer Part IV.

When the student finishes reading Part IV, enter the total errors and time required at the top of the test form. Then determine the student’s placement and fill in the “Placement” blank.
# Appendix A

## Decoding Placement Schedule

<table>
<thead>
<tr>
<th>ERRORS</th>
<th>TIME</th>
<th>PLACEMENT OR NEXT TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART I</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 or more</td>
<td>—</td>
<td>Administer PART II Test</td>
</tr>
<tr>
<td>12 to 21</td>
<td>more than 2:00</td>
<td>Level A, Lesson 1</td>
</tr>
<tr>
<td>12 to 21</td>
<td>2:00 or less</td>
<td>Administer PART II Test</td>
</tr>
<tr>
<td>0 to 11</td>
<td>more than 2:00</td>
<td>Level B1, Lesson 1</td>
</tr>
<tr>
<td>0 to 11</td>
<td>2:00 or less</td>
<td>Administer PART III Test</td>
</tr>
<tr>
<td><strong>PART II</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 or more</td>
<td>—</td>
<td>No Corrective Reading placement; use a beginning reading program</td>
</tr>
<tr>
<td>8 to 40</td>
<td>—</td>
<td>Level A, Lesson 1</td>
</tr>
<tr>
<td>0 to 7</td>
<td>—</td>
<td>Level B1, Lesson 1</td>
</tr>
<tr>
<td><strong>PART III</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 or more</td>
<td>—</td>
<td>Level B1, Lesson 1</td>
</tr>
<tr>
<td>6 to 15</td>
<td>more than 2:30</td>
<td>Level B1, Lesson 1</td>
</tr>
<tr>
<td>6 to 15</td>
<td>2:30 or less</td>
<td>Level B2, Lesson 1</td>
</tr>
<tr>
<td>0 to 5</td>
<td>more than 2:30</td>
<td>Level B2, Lesson 1</td>
</tr>
<tr>
<td>0 to 5</td>
<td>2:30 or less</td>
<td>Administer PART IV Test</td>
</tr>
<tr>
<td><strong>PART IV</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 or more</td>
<td>—</td>
<td>Level B2, Lesson 1</td>
</tr>
<tr>
<td>4 to 8</td>
<td>more than 1:30</td>
<td>Level B2, Lesson 1</td>
</tr>
<tr>
<td>4 to 8</td>
<td>1:30 or less</td>
<td>Level C, Lesson 1</td>
</tr>
<tr>
<td>0 to 3</td>
<td>more than 1:20</td>
<td>Level C, Lesson 1</td>
</tr>
<tr>
<td>0 to 3</td>
<td>1:20 or less</td>
<td>Doesn't need Corrective Reading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decoding program</td>
</tr>
</tbody>
</table>
Decoding Placement Test

Name ___________________________ Class ______________ Date __________

School __________________________ Tester ______________

PART I  Errors ___________ Time __________

PART II Errors ___________ Time __________

PART III Errors ___________ Time __________

PART IV Errors ___________ Time __________

Placement __________________________

---

PART I

Kit made a boat. She made the boat of tin. The nose of the boat was very thin. Kit said, "I think that this boat is ready for me to take on the lake." So Kit went to the lake with her boat.

Her boat was a lot of fun. It went fast. But when she went to dock it at the boat ramp, she did not slow it down. And the thin nose of the boat cut a hole in the boat ramp.

The man who sold gas at the boat ramp got mad. He said, "That boat cuts like a blade. Do not take the boat on this lake any more."

---

PART II

Can she see if it is dim?
And it can fit in a hand.
Now the hat is on her pet pig.
I sent her a clock last week.
How will we get dinner on this ship?
The swimming class went well.
When they met, he felt happy.
Then she told me how happy she was.
The tracks led to a shack next to the hill.
They said, "We will plant the last of the seeds."
What will you get when you go to the store?
You left lots of things on her desk.
PART III

Hurn was sleeping when it happened. Hurn didn't hear the big cat sneak into the cave that Hurn called his home. Suddenly Hurn was awake. Something told him, "Beware!" His eyes turned to the darkness near the mouth of the cave. Hurn felt the fur on the back of his neck stand up. His nose, like noses of all wolves, was very keen. It made him very happy when it smelled something good. But now it smelled something that made him afraid.

Hurn was five months old. He had never seen a big cat. He had seen clover and ferns and grass. He had even eaten rabbits. Hurn's mother had come back with them after she had been out hunting. She had always come back. And Hurn had always been glad to see her. But now she was not in the cave. Hurn's sister, Surt, was the only happy smell that reached Hurn's nose.

PART IV

During a good year, a large redwood will produce over twelve pounds of seed, which is nearly a million and a half seeds. And the year that our redwood seed fluttered from the cone was an exceptionally good year. The parent tree produced over fifteen pounds of seed that year, enough seed to start a forest that would be six square miles in size. However, only a few redwood seeds survived. In fact, only three of the seeds from the parent tree survived their first year, and only one of them lived beyond the first year.

Obviously, our seed was lucky. It was a fortunate seed because it was fertile. If a seed is not fertile, it cannot grow, and about nine out of every ten redwood seeds are not fertile. Our seed also had the advantage of landing in a place where it could survive. If it had fallen on a part of the forest floor covered with thick, heavy litter, it probably would not have grown. If it had fluttered to a spot that became too dry during the summer, it would have died during the first year. Our seed landed in a spot where moles had been digging.
Appendix B: *Wilson Fundations Interventions Placement Inventory*

The Intervention Placement Inventory can be used when Fundations is implemented primarily as an Early Intervention and is not being used as a Whole Class supplemental program for prevention. The results of this inventory can be used to determine the Fundations instructional level for student intervention groups. This inventory can also be used in multi-grade classrooms.

There are four sections:
- **Name Letters**
- **Sound to Letter Correspondence**
- **Write Letters / Words**
- **Read Words**

Three sections are administered to an individual student *(Name Letters, Sound to Letter Correspondence and Read Words)*. One section *(Write Letters / Words)* can be given to an individual or it can be administered to a group.

**USE LEVEL K FUNDATIONS**

If student scores:
- below 80% **Name Letters**
- below 45% **Sound to Letter Correspondence**
- below 30% **Write Letters / Words**

Note: If the student who is placed in this level is in grade 1 or above, switch the student to Level 1 Fundations after the completion of Level K, Unit 1 (12 weeks).

**USE LEVEL 1 FUNDATIONS**

If student scores:
- at least 85% **Name Letters**
- at least 50% **Sound to Letter Correspondence**
- at least 30% **Write Letters / Words**
- 25% - 60% **Read Words**

**USE LEVEL 2 FUNDATIONS**

If student scores:
- 100% **Name Letters**
- at least 90% **Sound to Letter Correspondence**
- at least 90% **Write Letters / Words**
- at least 60% **Read Words**
### Intervention Placement Inventory

Put a ☐ next to any item the student answers correctly, and a ☐ next to any incorrect answer.

#### Name Letters

<table>
<thead>
<tr>
<th>Letter</th>
<th>a</th>
<th>f</th>
<th>t</th>
<th>u</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>s</td>
<td>g</td>
<td>a</td>
<td>z</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>R</td>
<td>N</td>
<td>P</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Z</td>
<td>E</td>
<td>I</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

#### Sound to Letter Correspondence

YOU DICTATE THE SOUND AND THE STUDENT SHOULD NAME THE CORRESPONDING LETTER. ASK STUDENT WHAT LETTER SAYS "_"?

<table>
<thead>
<tr>
<th>Sound</th>
<th>/m/</th>
<th>/l/</th>
<th>/s/</th>
<th>/l/</th>
<th>/l/</th>
</tr>
</thead>
<tbody>
<tr>
<td>/n/</td>
<td>/n/</td>
<td>/p/</td>
<td>/l/</td>
<td>/z/</td>
<td></td>
</tr>
<tr>
<td>/o/</td>
<td>/r/</td>
<td>/b/</td>
<td>/n/</td>
<td>/d/</td>
<td>/e/</td>
</tr>
<tr>
<td>/h/</td>
<td>/sh/</td>
<td>/a/</td>
<td>/th/</td>
<td>/e/</td>
<td></td>
</tr>
</tbody>
</table>

#### Write Letters / Words

HAVE STUDENTS WRITE ON PAPER YOU PROVIDE TO THEM. DICTATE THE FIRST TEN ITEMS BY SAYING THE LETTER NAME, THE NEXT FIVE ITEMS BY SAYING THE LETTER SOUND AND THE LAST FIVE BY SAYING THE WORD.

<table>
<thead>
<tr>
<th>Letter</th>
<th>p</th>
<th>k</th>
<th>m</th>
<th>r</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>u</td>
<td>a</td>
<td>e</td>
<td>b</td>
<td>j</td>
<td></td>
</tr>
<tr>
<td>/i/</td>
<td>/g/</td>
<td>/l/</td>
<td>/ch/</td>
<td>/e/</td>
<td></td>
</tr>
<tr>
<td>dot</td>
<td>thud</td>
<td>step</td>
<td>sting</td>
<td>blast</td>
<td></td>
</tr>
</tbody>
</table>

#### Read Words

HAVE STUDENTS READ OFF THE READ WORDS CHART.

<table>
<thead>
<tr>
<th>Word</th>
<th>cap</th>
<th>tub</th>
<th>sit</th>
<th>led</th>
<th>box</th>
</tr>
</thead>
<tbody>
<tr>
<td>dent</td>
<td>trip</td>
<td>club</td>
<td>drag</td>
<td>lost</td>
<td></td>
</tr>
<tr>
<td>stamp</td>
<td>slang</td>
<td>crust</td>
<td>blend</td>
<td>honks</td>
<td></td>
</tr>
<tr>
<td>brave</td>
<td>stove</td>
<td>plates</td>
<td>fort</td>
<td>parked</td>
<td></td>
</tr>
<tr>
<td>stain</td>
<td>donkey</td>
<td>bleed</td>
<td>stray</td>
<td>spools</td>
<td></td>
</tr>
</tbody>
</table>

### Scoring

- **# correct**
- **Level**

<table>
<thead>
<tr>
<th># correct</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>below 80%</td>
<td>K</td>
</tr>
<tr>
<td>85 - 100%</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>100%</td>
</tr>
<tr>
<td>90 - 100%</td>
<td>2</td>
</tr>
<tr>
<td>30 - 90%</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>90 - 100%</td>
</tr>
</tbody>
</table>

*Whenever scores overlap (ex. 100% indicated for both Level 1 and 2 in Name Letters section) use other sections to guide decision.*
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>cap</td>
<td>tub</td>
<td>sit</td>
<td>led</td>
<td>box</td>
<td></td>
</tr>
<tr>
<td>dent</td>
<td>trip</td>
<td>club</td>
<td>drag</td>
<td>lost</td>
<td></td>
</tr>
<tr>
<td>stamp</td>
<td>sling</td>
<td>crust</td>
<td>blend</td>
<td>honks</td>
<td></td>
</tr>
<tr>
<td>brave</td>
<td>stove</td>
<td>plates</td>
<td>fort</td>
<td>parked</td>
<td></td>
</tr>
<tr>
<td>stain</td>
<td>donkey</td>
<td>bleed</td>
<td>stray</td>
<td>spoils</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C: Corrective Reading Fidelity Observation Form

Corrective Reading
Fidelity Observation Form

SCHOOL DISTRICT:

SCHOOL NAME:

TEACHER’S NAME (LAST):

TEACHER’S NAME (FIRST):

Is this the first school year that the teacher has implemented the instructional model?

- Yes
- No

OBSERVER:

OBSERVER E-mail:

Has the observer established inter-rater reliability with an approved trainer?

- Yes
- No

DATE:

START TIME:

END TIME:

PROGRAM LEVEL:
LESSON Number:

NUMBER OF STUDENTS OBSERVED:

GRADE LEVEL(S) OF STUDENTS OBSERVED:

NUMBER OF LESSONS TAUGHT TO DATE THIS SCHOOL YEAR:
Read the following statements and check the box that best describes your observation of the IMPLEMENTATION of each instructional skill. The observation should last through the entire reading lesson. Space is provided at the end of this form for comments.

**SCALE**
Not Observed - 0 (Select this option if an instructional skill should have been implemented and was not)

Improperly Implemented - 1

Somewhat Properly Implemented - 2

 Appropriately Implemented - 3

Not Applicable (N/A) - Select this option if an instructional skill was not applicable to the lesson being taught)

**SET UP/MANAGEMENT**

<table>
<thead>
<tr>
<th>Statement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Materials are organized and readily available.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Teacher can see all students; students can see teacher.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Lesson begins within 2-3 minutes of designated time.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Rules for reading are posted, reviewed &amp; referred to.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Teacher provides positive reinforcement/specific praise.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Teacher reinforces rules in a non-confrontational fashion.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. All students are on-task; off-task behavior is addressed.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>8. Teacher delivers instruction according to script.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. Teacher provides clear signals.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. 100% of student responses are on signal and confident.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11. Teacher looks at students when they respond.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12. Teacher delivers instruction at a brisk pace (at least 10-12 responses from students per minute)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13. Teacher affirms final responses.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14. Teacher corrects each student mistake properly.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>15. Students start over after each error correction.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>16. Teacher provides individual turns to check for mastery.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>17. Students are tracking.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>19. Students meet Individual Test criterion on first attempt and earn points for Word Attack.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>20. Teacher completes Word Attack in 10-15 minutes (B1-C).</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
### STORY READING

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. Teacher reminds students of error limits for story parts.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>22. Students are tracking.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>23. Teacher corrects all errors immediately.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>24. Teacher corrects all errors properly.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>25. Students meet the error criterion or part is reread.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>26. Teacher asks comprehension as designated.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>27. Teacher correctly asks group vs. individual questions.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>28. Teacher corrects comprehension errors properly.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>29. Teacher affirms answers in complete sentences.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>30. Teacher completes Story Reading in 15-20 minutes (B1-C)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

### BI, B2 AND C CHECK-OUTS

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. Seating/partners are pre-determined.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>32. Transition occurs in 2 minutes or less.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>33. Teacher prompts students to read, check and switch roles</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>34. Individual Reading Progress Charts are up-to date.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>35. Students complete Check-outs within 10 minutes.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
### WORKBOOK

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>36. Teacher instructs when indicated during exercises.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. Teacher monitors independent work during exercises.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. Student work is graded and corrected.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. Students are experiencing a high level of success.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. Point charts in workbooks are complete and up-to-date.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DATA NOTEBOOK

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>41. Lessons taught are recorded on Lesson Gain Chart.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. Student scores on Benchmark Tests or CBA's are recorded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43. When needed, teacher has re-taught and re-tested students who did not pass an assessment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. Teacher is averaging 4-5 lessons completed per week.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45. At least 80% of students within groups are at mastery.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please rate using the following scale:
Not At All (0)
Needs Improvement (1)
Satisfactory (2)
Outstanding (3)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>The time allocated for the lesson was sufficient.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>The teacher covered an appropriate amount of material for the time allocated.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>The delivery of the lesson was paced to students’ needs.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

COMMENTS:

Once this form is submitted, the information below will automatically be calculated and a final report will be sent via email to the observer along with an electronic version of the completed observation form. Please check the box below acknowledging that the final scores will be tallied by the NCSIP/NCDPI Data Evaluation Team.

I agree that upon submission, the final score of this fidelity observation will be tallied by the NCSIP/NCDPI Data Evaluation team and provided to me via email.

☐ Agree

Level A

TOTAL NUMBER OF ITEMS APPLICABLE TO THE LESSON:

TOTAL NUMBER OF ITEMS NOT OBSERVED:

TOTAL NUMBER OF POINTS:

Fidelity Score (TOTAL POINTS/TOTAL NUMBER OF ITEMS APPLICABLE TO THE LESSON)

Levels B1, B2, and C
TOTAL NUMBER OF ITEMS APPLICABLE TO THE LESSON

TOTAL NUMBER OF ITEMS NOT OBSERVED

TOTAL NUMBER OF POINTS

Fidelity Score (TOTAL POINTS/TOTAL NUMBER OF ITEMS APPLICABLE TO THE LESSON)
Appendix D: Wilson Reading System Fidelity Observation Form
NUMBER OF STUDENTS OBSERVED:  

GRADE LEVEL(S) OF STUDENTS OBSERVED:  

LESSON:  
- Group  
- One-On-One  

BLOCKS OBSERVED (select all that apply):  
- One  
- Two  
- Three  

NUMBER OF LESSONS TAUGHT TO DATE THIS SCHOOL YEAR:  

Read the following statements and check the box that best describes your observation of the IMPLEMENTATION of each instructional skill. The observation should last through the entire reading lesson. Space is provided at the end of this form for comments.  

SCALE  
- Not Observed - 0 (Select this option if an instructional skill should have been implemented and was not)  
- Improperly Implemented - 1  
- Somewhat Properly Implemented - 2  
- Appropriately Implemented - 3  
- Not Applicable (N/A) - Select this option if an instructional skill was not applicable to the lesson being taught  

DECODING (Block 1)  

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Teacher uses sound cards during the quick drill.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2. Teacher teaches/reviews concepts using sound/symbol/suffix cards.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3. Student reads word cards (real/nonsense).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>4. Sound tapping and/or syllable scooping is used with word cards as needed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5. Student reads word lists (real/nonsense).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>6. Student reads silently before reading orally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>7. Scooping, modeling, and/or rereading is used during sentence reading as needed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>8. The Decoding step of the lesson is completed in about 20-25 minutes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
### SPELLING (Block 2)

<table>
<thead>
<tr>
<th>9. Teacher conducts a quick drill in reverse exercise. Student repeats sounds and points to or writes the correct letter.</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Teacher teaches/reviews concepts for spelling.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>11. Appropriate strategies are used (e.g. sound tapping is used for segmentation with spelling - required for steps 1 and 2, syllable frames are used for multisyllabic words).</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>12. Teacher delivers instruction at a brisk pace (at least 10-12 responses from students per minute)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>13. Teacher conducts dictation of sounds properly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>14. Teacher conducts dictation of real words properly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>15. Teacher conducts dictation of nonsense words properly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>16. Teacher conducts dictation of sight words properly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>17. Teacher conducts dictation of sentences with proofreading properly.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>18. Teacher asks student questions to guide student in correcting any errors.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>19. The spelling step of the lesson is completed in about 20 – 25 minutes.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### CONTROLLED PASSAGE READING (Student) – only 1 of these would be demonstrated in a lesson; Part 9 or 10, but not both usually (Block 3, part 9)

| 20. Teacher discusses title, builds background knowledge and previews vocabulary. | 0 | 1 | 2 | 3 | N/A |
| 21. Student reads passage silently | 0 | 1 | 2 | 3 | N/A |
| 22. Student processes the story, replaying what has been visualized and then retells the story in detail. | 0 | 1 | 2 | 3 | N/A |
| 23. Scooping, modeling of fluent reading or rereading is used. | 0 | 1 | 2 | 3 | N/A |
| 24. The passage reading step of the lesson is completed in about 15-30 minutes. | 0 | 1 | 2 | 3 | N/A |

### NON-CONTROLLED PASSAGE READING (Teacher) (Block 3, part 10)

| 25. Teacher discusses title and builds background knowledge. | 0 | 1 | 2 | 3 | N/A |
| 26. Teacher reads enriched text aloud | 0 | 1 | 2 | 3 | N/A |
discussing vocabulary, modeling thinking aloud, and building visualization through sketches. Student is engaged in the process with the teacher.

27. Student processes and retells the story using sketches as needed.

28. The passage reading step of the lesson is completed in about 15-30 minutes.

### INSTRUCTIONAL TECHNIQUES

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>29. Teacher uses error correction throughout the lesson.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Teacher uses questioning techniques appropriately.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. Teacher weaves in concepts appropriately</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. Language concepts are taught using correct terminology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LESSON PLANS/DATA COLLECTION

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. Lesson plans are evident during review of teacher folder.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. Student's progress is appropriately charted and maintained in the student or teacher notebook.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. End of Step Post testing data is evident in teacher notebook.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. Student notebook is in use during the lesson and is up-to-date.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please rate using the following scale:
Not At All (0)
Needs Improvement (1)
Satisfactory (2)
Outstanding (3)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>The time allocated for the lesson was sufficient.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The teacher covered an appropriate amount of material for the time allocated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The delivery of the lesson was paced to students' needs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### COMMENTS:
Once this form is submitted, the information below will automatically be calculated and a final report will be sent via email to the observer along with an electronic version of the completed observation form. Please check the box below acknowledging that the final scores will be tallied by the NCSIP/NCDPI Data Evaluation Team.

I agree that upon submission, the final score of this fidelity observation will be tallied by the NCSIP/NCDPI Data Evaluation team and provided to me via email.

☐ Agree

TOTAL NUMBER OF ITEMS APPLICABLE TO THE LESSON:

TOTAL NUMBER OF ITEMS NOT OBSERVED

TOTAL NUMBER OF POINTS:

Fidelity Score (TOTAL NUMBER OF POINTS/TOTAL NUMBER OF ITEMS APPLICABLE TO THE LESSON)

Submit
## Five-Minute Observation Form

**Instructor:** ____________________________

### Instructor provides corrective feedback after initial student responses.
- Provides affirmations for correct responses
- Promptly corrects errors with provision of correct model
- Limits corrective feedback language to the task at hand
- Ensures mastery of all students before moving on

### Instructor encourages student effort.
- Provides feedback during and after task completion
- Provides specific feedback about student’s accuracy and/or effort
- Majority of feedback is positive
- Celebrates or displays examples of student success in reading

### Students are engaged in the lesson during teacher-led instruction.
- Gains student attention before initiating instruction
- Paces lesson to maintain attention
- Maintains close proximity to students
- Transitions quickly between tasks
- Intervenes with off-task students to maintain their focus

### Students are engaged in the lesson during independent work.
- Independent work routines and procedures previously taught
- Models task before allowing students to work independently
- Checks for student understanding of the task(s)
- Students use previously-learned strategies or routines when they come to a task they don’t understand
- Independent work is completed with high level of accuracy

### Students are successful completing activities at a high criterion level of performance.
- Elicits a high percentage of accurate responses from group
- Elicits a high percentage of accurate responses from individuals
- Holds same standard of accuracy for high performers and low performers

### Focus:

<table>
<thead>
<tr>
<th>Focus</th>
<th>Phonemic Awareness</th>
<th>Phonics</th>
<th>Fluency</th>
<th>Vocabulary</th>
<th>Comprehension</th>
</tr>
</thead>
</table>

**Comments:**
### Appendix F: Procedural Checklist

<table>
<thead>
<tr>
<th>Date</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/5/2015</td>
<td>Gained approval from the Head of School to access and use data for the purpose of the research study.</td>
</tr>
<tr>
<td>6/15/2015 – 7/31/2015</td>
<td>All teachers and paraeducators assigned to teach reading at the research site during the 2015-2016 school year received Orton-Gillingham training at the Associate Level, as well as reading instruction using the <em>Wilson</em> Reading curriculum.</td>
</tr>
<tr>
<td>8/24/2015 – 8/28/2015</td>
<td>All teachers and paraeducators assigned to teach reading at the research site during the 2015-2016 school year received DI training and teaching reading using the <em>Corrective Reading</em> curriculum.</td>
</tr>
<tr>
<td>9/14/2015 – 9/16/2015</td>
<td>All students participating in the study underwent a pre-test assessment of their reading achievement using the <em>Measures of Academic Progress - Reading (MAP-R)</em>.</td>
</tr>
<tr>
<td>9/17/2015</td>
<td>All instructional groups were assigned one of three instructional methodologies for reading: <em>Corrective Reading</em> (treatment group 1), <em>Wilson</em> (treatment group 2), or Teacher made and selected materials and trade books</td>
</tr>
<tr>
<td>9/18/2015</td>
<td>Students in the <em>Corrective Reading</em> Group (treatment group 1) were administered the <em>Corrective Reading Decoding Placement Test</em> to determine the appropriate level and lesson to begin instruction at. Students in the <em>Wilson</em> Group (treatment group 2) were administered the <em>Wilson's Fundations Placement Test</em> to determine the appropriate level to begin instruction at.</td>
</tr>
<tr>
<td>Date Range</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>9/21/2015 – 12/4/2015</td>
<td>Once all baseline data had been collected, the intervention groups (Treatment 1) and (Treatment 2) as well as control group begin receiving instruction for 40 minutes daily, five days a week for a period of ten-weeks.</td>
</tr>
<tr>
<td>10/5/2015 – 10/9/2015</td>
<td>Intervention Week #3: First Fidelity Check – A research assistant observed a lesson taught by each of the teachers/paraeducators participating in the study. For teachers/paraeducators teaching students in treatment group 1 (Corrective Reading) the Corrective Reading Fidelity Observation Form was used. For teachers/paraeducators teaching students in treatment group 2 (Wilson) the Wilson Reading System Fidelity Observation Form was used. For teachers/paraeducators teaching students in the control group the University of Oregon’s Reading First Five-Minute Observation Form was used.</td>
</tr>
<tr>
<td>10/26/2015 – 10/30/2015</td>
<td>Intervention Week #6: First Fidelity Check – A research assistant observed a lesson taught by each of the teachers/paraeducators participating in the study. For teachers/paraeducators teaching students in treatment group 1 (Corrective Reading) the Corrective Reading Fidelity Observation Form was used. For teachers/paraeducators teaching students in treatment group 2 (Wilson) the Wilson Reading System Fidelity Observation Form was used. For teachers/paraeducators teaching students in the control group the University of Oregon’s Reading First Five-Minute Observation Form was used.</td>
</tr>
<tr>
<td>11/16/2015 – 11/20/2015</td>
<td>Intervention Week #9: First Fidelity Check – A research assistant observed a lesson taught by each of the teachers/paraeducators participating in the</td>
</tr>
</tbody>
</table>
study. For teachers/paraeducators teaching students in treatment group 1 (Corrective Reading) the Corrective Reading Fidelity Observation Form was used. For teachers/paraeducators teaching students in treatment group 2 (Wilson) the Wilson Reading System Fidelity Observation Form was used. For teachers/paraeducators teaching students in the control group the University of Oregon’s Reading First Five-Minute Observation Form was used.

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/7/2015 – 12/9/2015</td>
<td>Following completion of the intervention period, all students participating in the study underwent a post-test assessment of their reading achievement using the Measures of Academic Progress - Reading (MAP-R).</td>
</tr>
<tr>
<td>12/10/2015 – 12/18/2015</td>
<td>Teachers and paraeducators who taught reading during the study intervention period were asked to participate in an open-ended interview about their experiences with the reading curriculum that they had been using following signed consent, fully explaining the purposes of the research study, the procedures of the study, and how confidentiality of the study participants would be maintained, to gain a better understanding of their experiences implementing the reading curricula.</td>
</tr>
<tr>
<td>12/19/2015 – 1/10/2016</td>
<td>An analysis of the data collected was conducted.</td>
</tr>
</tbody>
</table>
Appendix G: Data Associated with Implementation Fidelity Checks

Table G1. Implementation Fidelity Checks

<table>
<thead>
<tr>
<th>Group</th>
<th>Week 3</th>
<th>Week 6</th>
<th>Week 9</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 3</td>
<td>Tx 1</td>
<td>96.7</td>
<td>96.7</td>
<td>96.7</td>
</tr>
<tr>
<td>Paraeducator 5</td>
<td>Tx 1</td>
<td>96.7</td>
<td>96.7</td>
<td>96.7</td>
</tr>
<tr>
<td>Paraeducator 6</td>
<td>Tx 1</td>
<td>96.7</td>
<td>96.7</td>
<td>96.7</td>
</tr>
<tr>
<td>Teacher 6</td>
<td>Tx 1</td>
<td>96.7</td>
<td>96.7</td>
<td>100</td>
</tr>
<tr>
<td>Teacher 7</td>
<td>Tx 1</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Teacher 1</td>
<td>Tx 2</td>
<td>97</td>
<td>100</td>
<td>97</td>
</tr>
<tr>
<td>Paraeducator 1</td>
<td>Tx 2</td>
<td>97</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Paraeducator 2</td>
<td>Tx 2</td>
<td>97</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>Teacher 4</td>
<td>Tx 2</td>
<td>97</td>
<td>97</td>
<td>100</td>
</tr>
<tr>
<td>Paraeducator 7</td>
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<td>97</td>
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<tr>
<td>Paraeducator 8</td>
<td>Tx 2</td>
<td>97</td>
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<tr>
<td>Teacher 2</td>
<td>Control</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Paraeducator 3</td>
<td>Control</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Paraeducator 4</td>
<td>Control</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Teacher 5</td>
<td>Control</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Paraeducator 9</td>
<td>Control</td>
<td>97.4</td>
<td>100</td>
<td>99.1</td>
</tr>
<tr>
<td>Paraeducator 10</td>
<td>Control</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Average treatment group 1: 97.6%
Average treatment group 2: 97.7%
Average control group: 99.9%
Average All Groups: 98.4%
Appendix H: Tables and Figures Associated with Assumption Checking for ANCOVA

Table H1. Data Associated with Covariate of Pre-Test Scores

<table>
<thead>
<tr>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>SE</th>
<th>Kurtosis</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>131</td>
<td>226</td>
<td>182.465</td>
<td>19.5555</td>
<td>-0.024</td>
<td>.260</td>
<td>-.069</td>
<td>.514</td>
</tr>
</tbody>
</table>

Fall_RIT (Pre-Test Scores)

Figure H1. Boxplot for Covariate
Table H2. Data Associated with Dependent Variable of Post-Test Scores

<table>
<thead>
<tr>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>SE</th>
<th>Kurtosis</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>135</td>
<td>239</td>
<td>186.140</td>
<td>20.5936</td>
<td>-.119</td>
<td>.260</td>
<td>-.197</td>
<td>.514</td>
</tr>
</tbody>
</table>

Wi_RIT (Post-Test Scores)

Figure H2. Boxplot for Dependent Variable
Figure H3. Estimated Marginal Means for Pre and Post-test Scores by Treatment Group
Figure H4. Estimated Marginal Means for Dependent Variable

Covariates appearing in the model are evaluated at the following values: RIT Fall 2015 = 182.465
### Table H3. Test of Between-Subject Effects for Dependent Variable

Dependent Variable: RIT Post-Test

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>30932.6831</td>
<td>5</td>
<td>6186.537</td>
<td>96.747</td>
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<tr>
<td>Intercept</td>
<td>285.235</td>
<td>1</td>
<td>285.235</td>
<td>4.461</td>
<td>.038</td>
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<tr>
<td>Tx_Group</td>
<td>371.533</td>
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<td>185.766</td>
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<td>.061</td>
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<tr>
<td>RIT Pre-Test</td>
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<td>1</td>
<td>11115.214</td>
<td>173.823</td>
<td>.000</td>
</tr>
<tr>
<td>Tx_Group* Pre-Test</td>
<td>398.559</td>
<td>2</td>
<td>199.279</td>
<td>3.116</td>
<td>.050</td>
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<tr>
<td>Error</td>
<td>5115.643</td>
<td>80</td>
<td>63.946</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3015770.000</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>36048.326</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. R Squared = .858 (Adjusted R Squared = .849)
References


Haager, D., & Vaughn, S. (2013). The common core state standards and reading:

Interpretations and implications for elementary students with learning disabilities. *Learning Disabilities Research and Practice, 28*(1), 5-16.


Pyle, N. (2012). Treatment integrity and treatment effects vary for the Corrective Reading Decoding program when implemented with middle school students with reading difficulties. *Evidence-Based Communication Assessment and Intervention, 6*(2), 108-112.


Stockard, J. (2010). Promoting reading achievement and countering the “fourth-grade slump”:


Turner, H. M. (2008). This systematic review empirically documents that the effectiveness of Orton-Gillingham and Orton-Gillingham-based reading instruction remains to be determined. *Evidence-Based Communication Assessment and Intervention, 2*(2), 67-69.


