

EFFECTIVENESS OF A MULTISENSORY, ORTON-GILLINGHAM INFLUENCED  
APPROACH TO READING INTERVENTION FOR HIGH SCHOOL STUDENTS  
WITH READING DISABILITY

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL  
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2005

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by

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To my family, especially my nephews Richard and Michael Ferguson.

## ACKNOWLEDGMENTS

Many people were instrumental in the completion of my degree. I first must acknowledge my supervisory committee members, who each contributed in their own way to my professional, personal, and academic growth.

Linda Lombardino taught me so much that it is difficult to pin-point just a few things. She has a never-ending supply of time, energy, and enthusiasm. Her dedication to all her students, to her career, and to the research community has inspired me to model my own career after hers.

Bonnie Johnson has a unique way of guiding my thinking; during our conversations and discussions she has encouraged me to rely on my own reasoning and problem-solving skills to become a more critical thinker. Her kind words have helped me in my personal life, as well.

Lori Altmann offered many invaluable suggestions on working with my research assistants and conducting my research. She is always willing to help. Because Dr. Altmann's area of specialty differs from mine, I learned how to explain my research in clear and practical terms.

As my outside committee member, Cynthia Griffin allowed me to tie my interests in special education to reading disabilities. Her faith in my ability to carry out a treatment study was instrumental in my choice of a dissertation project.

Debbie Butler, Idella King, Casey Mobley, and Addie Pons (the administrative and clinical staff at the University of Florida) helped me in many ways. Whenever I needed

anything (a question answered; something faxed, copied, or mailed; assistance dealing with payroll problems) they always had the answer. I will miss stopping in their offices to say hello and chat.

I would also like to thank Dr. Scott Griffiths for honoring me with an Alumni Fellowship that made my studies possible. I also thank Dr. Sam Brown, chairman of the Communication Sciences and Disorders Department; and Dr. Chris Sapienza, who was instrumental in bringing me to the University of Florida.

I would not have been able to complete my degree without completing my dissertation. First, I must thank Susan Barton, who developed the Barton Reading and Spelling System and who was willing to share her reading program with the University of Florida Speech and Hearing Clinic. I am very thankful I found a warm reception for my project from the staff and students at DeSoto Charter School, especially Mary Malo, the director. Mary made sure my reading tutors had a place to work and allowed us open use of her school. My dissertation would not have been possible without the support and cooperation of each and every person at DeSoto. Likewise, I was lucky enough to find 6 dedicated graduate clinicians who were willing to be reading tutors. Without the work and dedication of Erin Boyne, Dana Griffis, Erin Kux, Jennifer Rashkind, Sabrina Shephard, and Kathrine Wagner, I would not have been able to complete my dissertation. Finally, I must thank my research assistants, Lindsey Harper and Avigail Oren, who were instrumental in helping me collect data.

Finally, I must acknowledge my fellow students. In particular I am thankful for the special friendship I have with Claudia Morelli and David Efros whose constant encouragement and support have been invaluable to me. Gerianne Gilligan is an

inspiration and role model to me as a classmate, friend and professional. I am also thankful for the friendship and support of Cynthia Puranik, Judy Wingate, Cynthia Core, and Lori Love. I honestly do not think I could have made it this far without them. I am to have known and worked with Maisa Hajtas, Jaeock Kim, Peter Park, Nadia Abdulhaq and Lisa Pinissi. Finally, I must thank three special friends outside the University of Florida who are instrumental to my happiness. Tamara Martin, Kathy Chase, and Debra Bloomgarden contributed to my growth and confidence. I know they will continue to do so in the future.

I have enjoyed many years of education in my lifetime and I can honestly say that the 4 years I have spent at the University of Florida have by far been the most valuable to me. I believe I have grown as a person and a professional and look forward to a long and prosperous career as a professor.

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Abstract of Dissertation Presented to the Graduate School  
of the University of Florida in Partial Fulfillment of the  
Requirements for the Degree of Doctor of Philosophy

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By

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May 2005

Chair: Linda L. Lombardino

Major Department: Communication Sciences and Disorders

Our primary goal was to examine the effectiveness of a multisensory, Orton-Gillingham influenced approach to reading intervention for high school students with reading disability. We tested the effect of a packaged reading-intervention approach on the reading subskills of letter-word identification, spelling, word attack, sound awareness, speed of sight-word reading, and speed of phonemic decoding (nonsense words).

Participants were 18 high school students attending a charter school for language and reading difficulties. We chose 9 participants for the treatment group based on a cut-off score criterion; the remaining 9 students served as the control group. The independent variable was participation in the reading-intervention program.

The independent samples *t* test showed that the pretest scores for the control group were significantly higher than pretest scores for the treatment group. Results of the ANCOVA showed no significant differences between groups at posttest. When we controlled for pretest scores, participants in the reading-intervention group consistently made greater

gains than participants in the control group, although posttest scores remained higher for the control group. A *t*-test for nonindependent matched samples was significant ( $p < .05$ ) for treatment participants' posttest scores for *Word Attack*. Descriptive analysis showed that the participants in the treatment group more frequently demonstrated a greater than three month growth in posttest grade-equivalency scores compared to the participants in the control group. Correlation analysis also revealed that performance on the pretest, as measured in standard scores, was not a good predictor of starting point in the Barton Reading program, but was a better predictor of amount of progress made.

We developed recommendations and suggestions for further study. Remedial reading-intervention programs are not meant to replace daily literacy instruction. Therefore, it is important to consider how reading instruction is approached overall for struggling older readers. Finally, further study using more rigorous experimental design with randomized control groups is needed.

## CHAPTER 1 INTRODUCTION

### **Background of the Study**

Reading is a skill that serves us throughout life, yet it is a skill that many people take for granted. For most children, reading is acquired effortlessly as they progress through the early school years and it serves as the primary mechanism used to acquire knowledge throughout their education (Adams, 1990; Moats, 2000, Snow, Burns, & Griffin, 1998; Snowling & Bishop, 2000). Children’s literacy skills grow rapidly during the elementary school years. They begin with an understanding of the alphabetic principle of letter-sound correspondences and progress to understanding prefixes and suffixes, as they decode unfamiliar words (Burns, Griffin, & Snow, 1999). Children continue to refine their comprehension skills as they move from answering simple questions related to picture texts to identifying cause and effect in narrative and expository literature (Burns, Griffin, & Snow 1999). As children reach the end of elementary school, they are able to take part in oral presentations, read from nonfiction text, and “publish” their own original writing (Burns, Griffin, & Snow, 1999).

Reading in the adolescent years brings new demands for the reader. While adolescents have usually mastered the fundamentals of word analysis and recognition, they continue to learn about the Latin and Greek origins of words and expand their vocabularies as they become more sophisticated readers (Curtis, 2002). Adolescents bring their acquired knowledge and experience to learn from the text they read and acquire new ways to learn from text (Curtis, 2002). Students must be able to problem solve, read from

different perspectives, and reflect on and analyze reading material (Curtis, 2002). Adults continue to rely on their reading skills for keeping pace with advances in their profession, staying informed of current news, and engaging in reading for pleasure.

Clearly, reading is an activity and ability that evolves throughout the lifespan. Of specific interest in our study is the adolescent reader. The relationship between adolescents and their experience with reading can be conceptualized on a continuum. On one end are adolescents who enjoy reading and do so with ease, can identify their favorite authors, and engage in reading as a leisure activity. In the middle are those teenagers who do not voluntarily read for pleasure and only engage in reading as a necessity, yet are able to read fluently and accurately. On the other extreme end of the continuum are adolescents for whom reading is a constant struggle and a frustrating experience, so much so that reading is considered an area of disability (Curtis, 2002). Adolescent students arrive at this extreme end of the continuum through various routes.

Typically, students with reading difficulty have struggled academically throughout school, often just barely passing each grade level. Some of these students never received good reading instruction and experienced poor environmental conditions in childhood (Hart & Risley, 1995; Snow, Burns, & Griffin, 1998; Snowling & Bishop, 2000). Some have a specific learning disability in reading, often called dyslexia (Vellutino, Fletcher, Snowling, & Scanlon, 2004). Finally, there are those students whose difficulty with reading is part of a broader learning disability; these readers are sometimes referred to as language-learning disabled (Catts, Hogan, & Fey, 2003) or garden-variety poor readers (Gough & Tunmer, 1986; Stanovich, 1988). Even when a reading disability has been diagnosed early in a child's life and early intervention has been provided, the intervention

may not have targeted the underlying cause of the reading deficit (Apel & Swank, 1999; Lyon, 1998). Early struggles with the reading process that go unaddressed or are not successfully remediated often precipitate a negative attitude toward reading in the middle and high school years (Lyon, 1998; Stanovich, 1986).

Our study focused on students with dyslexia and students considered language-learning disabled or garden-variety poor readers. An individual with dyslexia or specific reading disability is clinically defined as one who has average intelligence, does not have general learning difficulties, and whose reading problems cannot be explained by outside factors such as poor instruction, lack of opportunity to learn, sensory acuity deficits, or neurological factors (Vellutino et al., 2004). When reading is defined as the output of decoding plus linguistic comprehension (Gough & Tunmer, 1986), individuals with dyslexia or specific reading disability are typically those whose language skills for comprehension are intact in spite of poor word reading (Shaywitz, 2003). Shaywitz (2003) referred to this as the paradox of dyslexia, good (often very good) reading comprehension skills but an unexpected weakness in reading single words.

However, extreme difficulty achieving basic reading skills is not exclusive to the cluster of characteristics called dyslexia. As Aaron, Joshi, and Williams (1999) note, not all reading disabilities are alike and there are those students whose difficulties manifest beyond written language and include difficulty with spoken language as well (e.g., comprehension, discourse, syntax, semantics). These students have been referred to as language-learning disabled (Catts, Hogan, & Fey, 2003) or garden-variety poor readers (Stanovich, 1988; Stanovich & Siegel, 1994). Regardless of the terminology used to describe the student who experiences exceptional difficulty with reading, there remains a

cohort of students who have weak phonological awareness or phonological coding skills characterized by deficient word identification, word attack, spelling, and reading in general (Vellutino et al., 2004). This has been associated with a phonological core model of reading disability (Morris et al., 1998; Stanovich, 1988, 1998; Stanovich & Siegel, 1994; Vellutino et al., 2004). Briefly stated, this means that children with reading disabilities have a poor representation in the reading centers of the brain of sound-letter correspondences (Vellutino et al., 2004).

Identifying the core of the problem of reading disability is the first step to designing effective treatment. For adolescents, early identification and prevention are no longer relevant issues. The focus of attention at this stage is on reading intervention and remediation. Typically, remedial reading programs are offered in addition to a student's regular education; they are meant to supplement the reading instruction that takes place during the school day. Multisensory instruction is one type of remedial intervention that has been used successfully with individuals of all ages (Guyer & Sabatino, 1989; Joshi, Dahlgren, & Boulware-Gooden, 2002; Oakland, Black, Stanford, Nussbaum, & Balise, 1998) and is the focus of our study.

Multisensory instruction has its roots in the Orton-Gillingham (O-G) Approach (Gillingham & Stillman, 1965) and is the basis of a number of remedial reading programs, such as Alphabetic Phonics, the Herman Approach, the Slingerland Approach, the Spalding Approach, and the Wilson Approach (Colony, 2001). In this context, "multisensory" refers to the use of the visual, auditory, and kinesthetic senses (VAT) in the remediation of reading disability. In 2001, The International Multisensory Structured Language Education Council (IMSLEC) published a compilation of clinical studies of

multisensory structured language instruction for students with reading disability. They specified both the content and strategies used in multisensory structured language programs.

The International Multisensory Structured Language Education Council recommends that instruction include content in phonology and phonological awareness, sound-symbol association, syllables, morphology, syntax, and semantics. Phonology is the study of sounds. Phonological awareness is an inclusive term that refers to all levels of awareness of the sound structure of words. Phonemic awareness is a specific term and an important aspect of phonological awareness that refers to the ability to notice, identify and manipulate phonemes (Shaywitz, 2003). Sound-syllable association is the awareness of the sounds in the English language and their correspondence to the letters that represent the sounds (McIntyre & Pickering, 2001). A syllable is a unit of oral or written language with one vowel sound (McIntyre & Pickering, 2001). Morphology is the study of how the smallest units of meaning are combined to form words. Structured language instruction must include the study of base words, roots, and affixes (McIntyre & Pickering, 2001). Finally, syntax includes grammar and the mechanics of language; and semantics is concerned with the meaning of a linguistic message (McIntyre & Pickering, 2001).

Multisensory structured language programs use instructional strategies that follow core principles described as 1) simultaneous and multisensory; 2) systematic and cumulative; 3) direct; 4) diagnostic teaching to automaticity; and 4) synthetic and analytic.

Simultaneous multisensory teaching employs the primary learning pathways in the brain (visual, auditory, kinesthetic, and tactile) simultaneously, to enhance memory and learning. Systematic instruction requires that instruction begin with the most basic elements of language and progress to the more complex elements. Each step builds on one previously learned and is constantly reviewed. Direct instruction means that each rule and concept is explicitly taught and not left to inference. Diagnostic teaching to automaticity refers to using instructional strategies that are based on each student's individual needs and teaching language rules and concepts to the point of automaticity. Synthetic phonics instruction presents parts of the word and requires the student to blend the sounds into a whole; analytic phonics instruction works from the whole word and teaches how the word can be broken into its component sounds.

### **Rationale and Purpose**

Adopting a remedial reading program for district-wide school use is a common practice. While these programs are most often founded on “proven” principles of reading instruction, little empirical research exists on the effectiveness of specific programs. The Florida Center for Reading Research (FCRR) website offers information on 19 intervention and remedial programs for students above third grade used in counties throughout Florida (FCRR, 2002-2003). However, as reported by the FCRR website, the research support for these programs varies and ranges from no empirical evidence to only one program with one efficacy study published in the *Annals of Dyslexia*. The program with a published study supporting its effectiveness was a multisensory approach called Phono-Graphix. Many of the intervention and remedial programs reviewed by FCRR on this website have undergone only a preliminary or beginning level of research and offer a similar minimal level of support for efficacy.

The primary goal of the current study was to report on the efficacy of a reading-intervention approach for high school students with reading disability. The researcher was interested in whether high school students with reading disability who receive an explicit and systematic multi-sensory, phonics-based, Orton-Gillingham influenced approach to reading intervention made clinically significant gains in their reading skills. The Barton Reading and Spelling System (Barton, 2000), is a new commercially available multisensory remedial reading program that meets the content and function criteria identified by the International Multisensory Structured Language Academic Counsel. It is an Orton-Gillingham influenced system designed for one-on-one tutoring of children, teenagers, and adults who struggle with reading, spelling, and writing, due to dyslexia or a learning disability. Despite the soundness of the principles upon which the Barton Reading and Spelling System is founded, there is limited empirical data supporting the effectiveness of the program as a remedial reading program. The specific reading skills of interest were letter-word identification, word attack, sound awareness, spelling, and reading fluency. A secondary purpose was to investigate student's individual patterns of performance after screening and brief, intensive treatment.

### **Research Questions**

**Research question 1:** Do high school students assigned to a multisensory reading-intervention group make greater improvement on posttest scores compared to students who do not receive such intervention on the following variables: 1) letter-word identification 2) word attack 3) spelling 4) sound awareness 5) speed of sight-word recognition 6) speed of nonsense-word decoding?

**Research question 2:** Do individual participants show significant differences from pretest-posttest scores for 1) letter-word identification; 2) word attack; 3) spelling; 4) sound awareness; 5) speed of sight-word recognition; and 6) speed of nonsense-word decoding?

**Research Question 3:** Does Basic Reading Skill predict 1) starting point for tutoring; and 2) number of lessons to complete a Barton level?

**Research question 4:** Do more participants in the reading-intervention group than participants in the control group achieve a greater than expected three month gain in grade-equivalent score from pretest to posttest for 1) letter-word identification; 2) word attack; 3) spelling; 4) sound awareness; 5) speed of sight-word recognition; and 6) speed of nonsense-word decoding?

### **Hypotheses**

The research questions were generated in response to several hypotheses

**Hypothesis 1:** Based on the phonological core model to reading, students with reading disability who are assigned to a reading-intervention program based on low pretest scores and who receive a multisensory, Orton-Gillingham influenced approach to intervention will make greater improvement on posttest scores when compared to a group of students who did not receive the intervention because of higher pretest scores on measures of reading skill.

**Hypothesis 2:** A student who participates in the reading-intervention program will achieve higher posttests scorers compared to his/her pretest scores as a result of a one-on-one multisensory treatment program.

**Hypothesis 3a:** A participant in the reading-intervention group who started with lower pretest standard scores on the dependent variable reading measures will perform

more poorly on the Barton pretest and start at a lower Barton book and lesson. In contrast, a participant in the reading-intervention group who achieved higher pretest standard scores on the dependent variable reading measures will progress farther on the Barton pretest, thus starting at a higher Barton book and lesson.

**Hypothesis 3b:** A participant in the reading-intervention group who shows more severe reading disabilities as defined by pretest standard scores will complete fewer books and lessons in the Barton Reading and Spelling System than a participant in the reading-intervention group who shows less severe reading disabilities as defined by the same pretest standard scores.

**Hypothesis 4:** A greater percentage of participants in the reading-intervention group as compared to participants in the control group will increase their grade equivalent scores by more than three months from pretest to posttest.

### **Significance**

Although estimates vary on the prevalence of reading disability, the numbers are alarming no matter how they are calculated. For example, Fletcher and Lyon (1998), reporting 1998 figures from the National Institute of Child Health & Human Development (NICHD), estimated the prevalence of reading disability at 20% of school-age children. In another report, based on data from the National Center for Educational Statistics, Lyon (2003) estimated that approximately 38% of fourth-grade students were reading below a basic level and predicted that they would continue to have reading difficulty without systematic and focused intervention. Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher (1996) reported that 74% of children who were poor readers in third grade remained poor readers in ninth grade.

In recent years, the combined influences of political, societal, and educational factors have focused attention on the reading skills of young children during their early school years and on the methods used to teach young children to read. In fact, in 1997 the National Reading Panel (NRP, 2000) was formed to assess the status of the research-based knowledge behind various methods for teaching children to read and to identify the necessary components of effective reading programs (Ehri et al., 2001). Similarly, with the passage of the No Child Left Behind Act of 2002 there has been an emphasis on fostering young children's pre-reading skills in an effort to prevent later reading difficulties.

An improvement in statewide reading achievement test scores for elementary school students in the State of Florida offers some evidence that these efforts may be paying off, at least for young children. For example, one Florida county recently reported that approximately 70% of third- and fourth-grade students scored at grade level or higher on the Florida Comprehensive Achievement Tests (FCAT) for 2004 (James, FCAT Scores, 2004). Average reading scores on the FCAT also increased from 2003 to 2004 for the elementary grades (James, 2004). Unfortunately, older children in middle and high school are not experiencing the same kinds of gains in their FCAT reading scores (James, 2004a, 2004b). Only about 50% of seventh- and eighth-grade students scored at grade level on the reading portion of the 2004 FCAT and this percentage was lower from the previous year.

Young children in the elementary grades may be faring better for several reasons. Based on extensive reviews of educational research studies, the NRP identified five key components of effective reading instruction: a) phonemic awareness, 2) phonics, 3)

fluency, 4) vocabulary, 5) text comprehension. It is likely that teachers are providing young children with more and systematic reading instruction that incorporates these components. Finally, consistent and reliable evidence shows that early difficulties in spoken language predict later difficulties with written language (i.e. reading) (Snowling, Adams, Bishop, & Stothard, 2001; Snowling & Bishop, 2000; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). Hence, the trend is for early identification and early intervention for reading disabilities with children who have a history of spoken language deficits. In spite of these educational strides, early identification and prevention of reading disabilities has little applicability to the older student who continues to struggle with reading. With this population, the focus of attention inevitably changes to that of remediation and the choice of a remedial reading program to best address the students' needs.

Considering the potential for emotional, societal, and monetary repercussions of reading disability, it is imperative that empirically based studies be conducted that investigate the outcome of students with reading disability who undergo a reading-intervention program.

There is some evidence that students who struggle with reading in middle and high school may be receiving more attention. For example, in a State of the Union Address on January 28, 2004, President Bush announced a proposal to create a \$100 million reading-intervention program for middle and high school students (Robelen & Bowman, 2004). Recently, the governor of the State of Florida announced a Middle Grades Reform Act requiring that a higher priority be placed on reading in schools where more than 25% of students test below grade level on the FCAT (James, 2004b). Clearly, there is a call for

empirically-supported reading-intervention programs that address the needs of older students with reading disability.

### **Limitations**

Our study had two main limitations: 1) the short duration of the reading intervention and 2) lack of randomization of subjects. The high school students who participated in this study have experienced a long history of reading disability. It's a certainty that it will take more than the 2 or 3 months that were available for the intervention to establish long-lasting gains in their reading skills. The other major limitation was the lack of randomization of subjects to the experimental and control groups. Given the professional and ethical responsibility to make the reading program available to all students who qualified, we decided to treat all the eligible students in the semester in which the reading program was available. Older students with reading disability have been shown to make significant progress in their reading skills after receiving remedial-reading intervention based on multisensory approaches that stress the foundations of written language structure (Moats, 2001, 2004; Torgesen et al., 2001).

## CHAPTER 2 REVIEW OF THE LITERATURE

Our purpose was to report on the efficacy of a multisensory reading-intervention approach for high school students with reading disability. First we briefly discuss the necessary components of skilled reading. The primary focus and remainder of the chapter is devoted to two areas. We reviewed studies related to the phonological core model of reading disabilities is provided. We described the multisensory approach to remedial reading intervention and discussed the research on multisensory reading-intervention approaches. The chapter ends with a brief discussion of the issues that are pertinent to older students with reading disabilities.

### **What Makes Reading Instruction Effective?**

In 1998, the National Research Council (NRC) “identified and summarized the research literature relevant to the critical skills, environments and early developmental interactions that are instrumental in the acquisition of beginning reading skills” (p.2) (Snow, Burns, & Griffin, 1998). Building on that work, the National Reading Panel (NRP) conducted an evidence-based analysis of the experimental and quasi-experimental research literature on how critical reading skills are most effectively taught (NRP, 2000). Their findings were reported in the *Report of the National Reading Panel* (2000).

The National Reading Panel (2000) identified five major areas that are keys to successful reading instruction: 1) alphabets, 2) fluency, 3) comprehension, 4) teacher education and reading instruction, and 5) computer technology and reading instruction. Alphabets includes instruction in phonemic awareness and phonics, fluency addresses

the ability to read aloud with accuracy, speed, and proper expression, and comprehension includes instruction in vocabulary, text comprehension, and comprehension strategies (NRP, 2000). Among these five key areas of instruction, phonological awareness has received the most attention (Ehri et al., 2001).

### **Phonological Core of Reading Disability**

There is now converging evidence that the core deficit in reading disability is at the level of phonological awareness and letter-sound decoding (Bus & Ijzendoorn; Ehri et al., 2001; Fletcher et al., 1994; Foorman et al., 1997; Morris et al., 1998; Scanlon & Vellutino, 1997; Shaywitz et al., 1999; Stanovich, 1988, 1993; Stanovich & Siegel, 1994; Torgesen, Wagner, & Rashotte, 1997; Vellutino, Fletcher, Snowling, & Scanlon, 2004). Shaywitz (2003) describes phonological awareness as an inclusive term that "...includes all levels of awareness of the sound structure of words. It also is used to refer to the earliest stages of developing an awareness of the parts of words, such as sensitivity to rhyme or noticing larger parts of words such as syllables" (p.144). Letter-sound decoding is the process of converting the written symbols on the page to the smallest unit of speech sounds called phonemes (Shaywitz, 2003).

In a recent summary of what has been learned about dyslexia in the past 4 decades, Vellutino et al. (2004) reviewed the support behind a number of theories that have been proposed as the underlying cause of dyslexia. Citing findings from the research literature, Vellutino et al. found that there is "...growing consensus that the most influential cause of difficulties in learning to read is the failure to acquire phonological awareness and skill in alphabetic coding" (p.12). More specifically, weak phonological coding has been identified as the central cause of reading disability in most impaired readers (Archer, Gleason, & Vachon, 2003; Ehri et al., 2001; Lyon, Shaywitz, & Shaywitz, 2003; Ramus

et al., 2003; Vellutino et al.). Phonological coding is "...the ability to use speech codes to represent information in the form of words and parts of words" (Vellutino et al. p.12).

### **Defining the Core Deficit in Reading Disability**

Stanovich (1988, 1993) and Stanovich and Siegel (1994) developed the Phonological-Core Variable-Difference Model to describe the cognitive characteristics of children with dyslexia. In the Phonological-Core Variable-Difference (PCVD) model, Stanovich (1988, 1993) and Stanovich and Siegel (1994) posit that all poor readers have a phonological deficit. Stanovich's (1988) model rests on the assumption of specificity. This model assumes that a child with dyslexia has a learning disability that is reasonably specific to reading and localized in the phonological core, and requires that the deficits displayed by the child with dyslexia not extend too far into other domains of cognitive functioning (Stanovich, 1988), such as pragmatic language skills and problem-solving skills. Stanovich (1988) went on to add that the disruption in the phonological core is relatively dissociated from intelligence. Accordingly, in defining dyslexia the International Dyslexia Association points out that dyslexia is a specific reading disability characterized by a specific deficit in the phonological component of language that is unexpected in relation to other cognitive abilities (Lyon, Shaywitz, & Shaywitz, 2003). The use of measures of cognitive ability to aid in identifying or diagnosing specific reading disability and the role of cognitive ability in the Phonological Core Variable Difference model warrants further discussion.

Stanovich (1988) and Stanovich and Siegel (1994) used the term *variable-difference* in the PCVD model to describe the performance contrasts between readers with and without an aptitude-achievement discrepancy outside the phonological domain. Such a distinction is often used to identify children for reading research studies (Fletcher

et al., 1994) Individuals are identified as having specific reading disability or dyslexia based on an unexpected gap between intelligence quotient and reading level, the latter being unexpectedly low given one's expected ability. In contrast, individuals are often identified as garden-variety poor readers for purposes of research studies when there is not a gap between reading achievement and intelligence quotient. Although this distinction in identifying participants as reading disabled has received much criticism in the reading research literature (Fletcher et al., 1994), it is frequently used by school districts to determine eligibility for services

While reading disability seems to be best characterized by impairment in the phonological core, there is evidence of variability around this core (Morris et al., 1998; Stanovich & Siegel, 1993; Vellutino et al., 2004). For example, in a large scale study using cluster analysis, Morris et al. (1998) identified seven subtypes of reading disability. While all subtypes shared impairments in phonological processing, two of the seven subtypes were characterized by impairment in cognitive skills as well; individuals in this subtype were categorized as garden-variety poor readers (Morris et al., 1998). The seven reading-disabled subtypes identified by Morris et al. (1998) consisted of the two subtypes with impaired cognitive ability reflected in deficient language skills, four with weaknesses in phonological awareness and variations in short-term memory and rapid naming skills, and one subtype with impaired verbal and nonverbal measures associated with rate and accuracy of oral reading. Morris et al. (1998) concluded that their results were consistent with the PCVD model proposed by Stanovich (1988, 1993).

The importance of the phonological core of reading and its central role in reading disability persists as disabled readers get older (Bruck, 1992; Shaywitz et al., 1999;

Wilson & Lesaux, 2001). In a longitudinal study, Shaywitz et al. (1999) reported on the outcome in adolescence of young children diagnosed as dyslexic. Three groups of subjects for the outcome study were selected from the large-scale Connecticut Longitudinal Study when they were in Grade 9 (Shaywitz et al., 1999). One group of children met the criteria for persistent reading disability in Grade 2 through Grade 6. These adolescents met either the discrepancy definition or low-achievement definition of reading disability for four of five years in Grade 2 through Grade 6. The other group did not meet either criteria and was divided into average and superior readers based on a standardized reading score. The 9<sup>th</sup> grade students were assessed on cognitive skills, including phonological awareness, academic skills, and intellectual skills. Shaywitz et al. (1999) found that the deficits in phonological coding that were present in the early school years for the group with persistent reading disability still characterized the older readers in adolescence.

Bruck (1992) corroborated the persistence of phonological processing deficits and dyslexia into adulthood. She studied two populations of dyslexics. The first sample included children between the ages of 8 and 16 years whose word recognition scores were substantially below their intelligence level. The second sample consisted of adults between the ages of 19 and 27 years who were diagnosed as dyslexic in childhood based on poor word recognition skills and whose word-recognition scores ranged from Grade 1 to Grade 12 as adults. Four control groups were selected from good readers in Grades 1 through 3 and from a sample of college students. These two clinical samples of individuals with dyslexia and the four control groups of normal readers were matched separately for age level and reading level and were tested on a battery of phonological

awareness skills. Bruck (1992) found that phoneme awareness did not develop as a function of age or reading level for children with dyslexia and that there was little development of this skill between childhood and adulthood.

### **Connecting the Phonological Core to Intervention**

Although a solid link between deficits in phonological awareness skills and reading disability has been established in the literature, intervention that targets phonological awareness skill alone is not sufficient in remediation of reading disability (Bus & Ijzendoorn, 1999; Ehri et al., 2001; Harm, McCandliss, & Seidenberg, 2003; McCandliss, Beck, Sandak, & Perfetti, 2003). An intervention study by McCandliss et al. (2003) illustrates this point.

McCandliss and his colleagues (2003) developed an intervention called Word-Building that taught children with deficient decoding skills how to attend to and manipulate each grapheme position within a word using lettered tiles. This was done through a procedure of progressive minimal pairing of words that differed only by one grapheme. Children in the 1st grade who had deficient decoding, word identification, and phonological awareness skills were randomly assigned to either the treatment group or the control group. Interestingly, pre-intervention assessment revealed that the children could decode the first letter in a pseudoword but not letters in the medial or final position. The children who received the Word-Building intervention made significant improvements on a formal word attack test and on a pseudoword decoding task, but not on their word identification skills. McCandliss et al. (2003) attributed this mixed finding to the nature of the word identification task which required reading irregular words that do not follow the rules of English. Thus, enhanced grapheme-phoneme decoding skills did not transfer to more accurate reading of irregular words.

In another study, Harm, McCandliss, and Seidenberg (2003) developed a simulated model of two reading interventions, one involving only phoneme manipulation and one involving phoneme-grapheme manipulation, in an effort to determine what made the Word-Building (McCandliss et al., 2003) intervention successful. Their reading-intervention simulation model was based on earlier work of Harm and Seidenberg (1999) whose simulated acquisition of phonological knowledge was based on a connectionist framework and explained through a series of computations involving orthographic, phonologic, and semantic information. Harm and Seidenberg (1999) postulated that words and nonwords are processed in the same way, by presentation of orthographic pattern input that initiates or activates weighted connections throughout an attractor network. They hypothesized that developmental dyslexia resulted from damage to the network. For a full account of the theoretical framework of the Connectionist Model and the attractor networks see Seidenberg & McClelland (1989) and Plaut, McClelland, Seidenberg, and Patterson (1996).

Harm, McCandliss, and Seidenberg (2003) proposed the mapping theory as an explanation for successful intervention and argued that phonological awareness activities needed to go beyond phoneme manipulation to attain effectiveness for children who have begun to read. Harm et al. (2003) believed that the key component to the success of the Word-Building intervention was teaching the child to build a new word with letter tiles by changing a single letter tile in the previous word in combination with reading the progressively changing word. This technique was thought to place pressure on the orthographic-to-phonological system to form mappings more sensitive to the internal components or parts of words (Harm et al. 2003). To validate the mapping theory, Harm

et al. applied the same word-building technique (McCandliss et al., 2003) to a computer simulated model. Five simulations were created: a normal simulation with intact phonological representations, an impaired simulation, and three simulations that were remediated early in reading instruction, after 10,000 reading trials (i.e., early in reading), and after 100,000 reading trials (i.e., later in reading). Harm et al. found that the word-building intervention that targeted the relationship between print and sound was successful at the onset of literacy training, early in reading, and later in reading.

The mapping hypothesis predicted that letter-sound mapping changes the orthographic-to-phonological mapping, making it more componential, and impacting the reading skills of older children with reading disability. Such children have already formed poor orthographic-to-phonological mappings and need to do more to change the phonological system by creating new orthographic-to-phonological mappings (Harm et al., 2003). Transforming one word into another word through simultaneous grapheme-phoneme manipulation is one way to create these new mappings.

If orthographic-to-phonological mapping, activated by word-building activities, can improve word reading ability beyond the time of early reading instruction, it is reasonable to expect that activating multiple senses will produce even stronger mappings in the reading system. Such is the premise of multisensory reading instruction which calls on visual, auditory, and tactile-kinesthetic modalities in remediation techniques.

### **Multisensory Approach**

The multisensory approach to remedial training for students with reading disability has its origins in the work of Samuel T. Orton, known as the “father of dyslexia” (Colony, 2001). Two of Orton’s colleagues, Bessie Stillman and Anna Gillingham, worked with Orton to develop the Orton-Gillingham-Stillman Approach (commonly

referred to as the O-G method) to reading intervention and today there are numerous multisensory intervention approaches that are modified versions the O-G method (Richardson, 2001). The multisensory approach is based on the integration of the visual, auditory, and tactile-kinesthetic sensory organs (Gillingham & Stillman, 1997). The student starts by learning individual sounds and then using the sounds to build words (Gillingham & Stillman, 1997). As the student builds words, he/she also builds close associations between what is seen in print (visual), what is heard (auditory), and what is felt orally as the sounds of the letters are produced (tactile sensations in the mouth) and the letters are printed (kinesthetic sensations in the large muscle movements) (Gillingham & Stillman, 1997).

In 2001, the International Multisensory Structured Language Education Council (IMSLEC) published its first compilation of research articles titled, *Clinical Studies of Multisensory Structured Language Education for Students with Dyslexia and Related Disorders* (McIntyre & Pickering, 2001). What distinguishes multisensory structured approaches to reading intervention from other approaches is the content (what is taught) and the principles of instruction (how it is taught) (McIntyre & Pickering, 2001). Table 2-1 and Table 2-2 provide a summary of the content and principles, respectively, of multisensory instruction.

Sound-symbol association must be taught in two directions, visual to auditory, where the student sees a letter and hears the sound that it makes, and auditory to visual, where the student hears a sound and identifies the corresponding letter. Syllable identification includes teaching six basic types of syllables according to the O-G approach, closed, vowel-consonant-e, open, consonant-le, r controlled, and diphthong.

Finally, instruction in morphology includes teaching how morphemes are combined to form words and identifying base words and affixes.

Table 2-1. Content of Multisensory Instruction (IMSLEC, 2001)

Content component	Definition
1. Phonology	Study of phonemes, the smallest unit of sound that can be recognized as being distinct from other sounds in a given language.
2. Phonological Awareness	Understanding of the internal linguistic structure of words
3. Sound-Symbol Association	Knowledge of the sounds of the English language and their correspondence to the letters which represent those sounds.
4. Syllable Identification	Ability to identify a syllable as a unit of oral or written language with one vowel sound.
5. Morphology	Study of morphemes, the smallest unit of meaning in a language.
6. Syntax	The set of principles that dictate the sequence and function of words in a sentence, including instruction in principles of grammar.
7. Semantics	The meaning conveyed by written and spoken language.

Table 2-2. Principles of Multisensory Instruction (IMSLEC, 2001)

Principle component	Definition/Explanation
1. Simultaneous Instruction	All learning pathways of the brain-visual/auditory and kinesthetic/tactile-are used to enhance learning and memory
2. Systematic	Organization of material must follow the logical order of the language, beginning with the most basic elements and proceeding to more difficult elements.
3. Cumulative	New steps are based on those already learned and old rules are constantly reviewed and woven into new teaching.
4. Direct Instruction	All concepts and rules are taught directly and to proficiency.
5. Diagnostic Teaching	Teaching is based on continuous assessment of the student's needs and progress.
6. Analytic Phonics	Students break a whole sentence into words or a word into its component letters or sounds.
7. Synthetic Phonics	Students learn how to blend individual words into a sentence and individual letters and sounds into a word.

### **Commercial Orton-Gillingham Approaches**

Students of Orton have developed multisensory reading interventions based on the Orton-Gillingham Method. Among the more well-known methods are the Slingerland Multisensory Approach, the Spalding Method, Alphabetic Phonics, the Herman Approach, and the Wilson Approach (McIntyre & Pickering, 2001). Each of these commercially available programs uses a multisensory explicit phonics approach that emphasizes visual and auditory feedback for sounds and tactile-kinesthetic input of letter formation (Alexander & Slinger-Constant, 2004). However, the specific content of each varies slightly program to program. For example, Alphabetic Phonics focuses only on the most probable spellings of each sound while Orton emphasized all possible spellings of speech sounds (Cox, 2001). Alphabetic Phonics includes benchmark measures tied to its curriculum; this allows the tutor to use criterion-referenced tests to assess student progress (Cox, 2001). The Herman Approach includes several unique tactile-kinesthetic exercises (Herman, 2001). In blind writing, students are blind-folded as they trace letters on the table to the beat of a metronome. Bimanual writing requires the student to write letters on the chalkboard with both hands simultaneously. The Slingerland Multisensory Approach is a classroom adaptation of the O-G Approach that can be used with any reading text (White, 2001). The Wilson Reading System is appropriate for older students, Grade 5 through adulthood and includes a specific sequence of 12 steps; each one must be mastered before moving on to the next step (Wilson, 2001). Although there are differences in the strategies and components of each of these programs, they all stress the importance of focusing on the strengths of the child, acknowledging his/her successes and building on these successes to produce confident and able readers.

### **Empirical Studies of Multisensory Approaches**

At a recent conference of the International Dyslexia Association (November 2004), Lyon stated that literacy instruction and literacy intervention programs should be based on converging scientific evidence and focus directly on the components identified by the NRP as being instrumental to reading, 1) phonemic awareness, 2) phonics, 3) vocabulary, 4) fluency, and 5) comprehension. According to Lyon (2004), a study is deemed to be scientific when 1) there are a clear set of testable questions; 2) methods are appropriate to answer questions and falsify competing hypotheses; 3) there is an explicit link between a theory and previous research; 4) data are examined systematically and with appropriate tools; and 5) data are available for review and criticism. In order for researchers to claim effectiveness for an intervention program and to generalize results to other populations, they must randomly assign participants (both students and teachers) to treatment and no treatment conditions.

Given limitations of various resources such as time, money, and personnel, the above criteria are hard to meet. It is important to recognize that valuable information can also be gained from quasi-experimental research designs, although results do not offer empirical evidence of treatment efficacy. In fact, many of the studies reported on by the International Multisensory Structured Language Education Council (2001) are quasi-experimental in design (Alexander & Slinger-Constant, 2004). Studies of reading interventions based on multisensory approaches that utilized both quasi-experimental and experimental design have been reported in peer-reviewed journals as well (Brooks & Weeks, 1998; Foorman et al., 1997; Guyer & Sabatino, 1989; Joshi, Dahlgren, & Boulware-Gooden, 2002; Oakland, Black, Stanford, Nussbaum, & Balise, 1998; Shaywitz et al., 2004; Thorpe & Borden, 1985; Torgesen, Wagner, & Rashotte, 1997).

A number of researchers have investigated the effect of using a multisensory teaching approach with children (Foorman et al., 1997; Joshi, Dahlgren, & Boulware-Gooden, 2002; Oakland, Black, Stanford, Nussbaum, & Balise, 1998; Shaywitz et al., 2004; Thorpe & Borden, 1985; Torgesen, Wagner, & Rashotte, 1997). Joshi et al. (2002), Oakland et al. (1998), and Foorman et al. (1997) implemented multisensory treatment approaches based on adaptations of Alphabetic Phonics (Cox, 1985).

Joshi, Dahlgren, and Boulware-Gooden (2002) compared the reading progress of 1st grade children who were taught reading skills through *Language Basics: Elementary*, a multisensory approach based on Alphabetic Phonics (Cox, 2001) and 1st grade children who were taught reading with a basal reading program. The children in this study were not identified as having a reading disability or being at risk for reading disability. Pre and post test measures were taken on the children's phonological awareness, word attack and reading comprehension. Joshi et al. (2002) found that the 1<sup>st</sup> grade children taught with the multisensory O-G-based approach made significant gains on post test measures of phonological awareness, word attack, and reading comprehension while the control group children made significant gains only on reading comprehension.

Joshi et al. (2002) attributed the superior performance of the treatment group to the systematic and explicit instruction in synthetic phonics taught in the multisensory approach. However, their study had several methodological flaws that limited their findings. First, the study took place in different classrooms in different schools; this introduced uncontrolled variables such as classroom dynamics, teacher experience, and administrative support. Second, the participants were not randomly chosen or assigned to a treatment or control group; however the specific method of participant selection and

group assignment was not explained. Finally, the children in this study were not identified as reading disabled nor considered at risk for reading disability. Therefore, effectiveness of treatment cannot be generalized to children with reading disability.

Oakland et al. (1998) commented on problems of weak experimental design in reading disability research in their study of the *Dyslexia Training Program* (DTP). The DTP, an adaptation of Alphabetic Phonics (Cox, 2001), is a remedial reading program that uses multisensory teaching to promote reading in students with reading disability. Oakland et al. (1998) investigated the effectiveness of the DTP in improving the reading and spelling achievement over a 2-year period of 4<sup>th</sup> grade students with reading disability.

Twenty-two students with dyslexia served as the treatment group and received reading instruction with the DTP; twenty-six students also identified as dyslexic served as the control group and received the reading instruction normally provided in their school. Diagnosis of dyslexia was based on a 15-point discrepancy between full scale IQ and word recognition. Oakland et al. (1998) measured gains on reading comprehension, word recognition, spelling, monosyllabic phonological decoding, and polysyllabic phonological decoding. Compared to the control group, the DTP group made significant progress over the two year period on reading comprehension, word recognition, and polysyllabic phonological decoding.

Several qualities of this study offer moderate empirical evidence of treatment effectiveness. First, the participants in the control and treatment groups were matched on intelligence, reading achievement, gender, age, grade, and socioeconomic status. However, participants were not randomly assigned to the treatment or control groups.

Rather, students identified as dyslexic by one clinic were designated the treatment group and students identified by another clinic were designated the control group. Second the treatment was sufficiently long (two years) to allow generalization to long-term application in school settings (Oakland et al., 1998). However, the researchers were not able to control for supplementary reading instruction outside the DTP or the quality of reading instruction provided in the regular classroom to the control group.

Foorman et al. (1997) investigated the effectiveness of a synthetic phonics program, an analytic phonics program, and a sight-word reading program for 114 children in Grade 2 and Grade 3 with reading disability. The reading interventions took place in a traditional public school classroom setting. The synthetic phonics intervention was modeled after Alphabetic Phonics (Cox, 2001). Children were previously identified by their school district as learning disabled and were further identified as reading disabled for the study if their combined word attack and word identification score was less than or equal to the 25<sup>th</sup> percentile. Across groups, participants were not matched for IQ score, initial decoding scores, socioeconomic status (SES), age, gender, or ethnicity and group make-up varied on these characteristics.

In the synthetic phonics program, letter-sound associations were taught directly through visual, auditory, and kinesthetic sensory input and followed a systematic approach that proceeded from simple to complex rules. In the analytic phonics approach, onset-rime analysis was the core skill taught; this intervention included discussion of word meaning, writing of sentences using the target rime, and choral reading. In the sight-word program, students were taught 150 words by pairing spoken words with printed words or pictures.

Foorman et al. (1997) found that the synthetic phonics group outperformed the analytic phonics group in phonological and orthographic processing and word reading. the sight-word group in phonological processing. However, when SES, ethnicity, gender, and VIQ were added to a growth-curve analytical model, the only treatment effect to remain significant was the superior performance of the synthetic phonics group compared to the sight-word group in phonological processing (Foorman et al., 1997). Teachers who participated in this study volunteered for one of the three treatment groups, thus group assignment was not random. Furthermore, results were confounded by demographic variables such as SES and verbal IQ. Finally, the length of the study may not have been long enough to realize major gains in young children with reading disability. This is a problem Oakland et al. (1998) cited and addressed in their study.

Continuing the theme of reading-intervention programs with children, Shaywitz et al. (2004) investigated the effects of a multisensory, phonologically-based reading program (experimental intervention) on the brain activation patterns of children with reading disability. Brain activation patterns of participants engaged in a letter-identification task were measured before and after intervention using functional magnetic resonance imaging (fMRI). Children were considered reading disabled if they had a standard score of 90 or below on either a test of word identification or word attack and on the average of both tests (Shaywitz et al., 2004). Over an eight-month period, children identified with reading disability received either an experimental intervention or a community intervention. Children with normal reading ability participated in a community control group. Children with reading disability in the community intervention received whatever intervention was commonly provided in their school setting, including

resource room, special education, or speech-language services. No child in the community intervention group did received a systematic, explicit, phonics-based intervention comparable to the one used in the experimental intervention (Shaywitz et al., 2004).

The experimental intervention included instruction on sound-symbol association, phoneme analysis and blending by manipulation of letter cards or tiles, dictated spelling words (students repeated the word before spelling it and were encouraged to stretch out the sounds of the word before spelling it), and oral reading of stories. The group receiving the experimental intervention made significant gains on their reading fluency compared to the community intervention group but not compared to the community control group. The fMRI results showed increased activation in left hemisphere regions for the experimental intervention group and the community control group immediately after intervention (Shaywitz et al., 2004). Shaywitz et al. (2004) concluded that the provision of an intensive phonologically-based reading intervention, that used multisensory techniques, brought about brain activation patterns in children with reading disability that resembled those of typical readers.

Unfortunately, like previous studies, some methodological weaknesses interfere with generalization of results. Children in this study were recruited from different populations. The children in the experimental intervention were recruited from a school district in one state. Children in the community intervention group and community control group were recruited from another state from referral sources such as pediatricians' offices and community organizations. Thus, participants were not randomly assigned to the treatment groups and control group. There were other

confounding variables as well. For example, because children attended school in different states, reading curricula in the classroom may have varied widely and could not be controlled. Also, it is not known what kind of, if any, extra-curricular reading activities children in the community control group participated in.

Despite the confounding variables noted in the study by Shaywitz et al. (2004), it is promising that fMRI results showed neurobiological changes in children who received the phonologically-based treatment one year after the treatment ended. In fact, similar findings of neural changes after phonological training in children as well as adults have been reported in the literature (Aylward et al., 2003; Eden et al., 2004; Simos et al., 2002). For example, Eden et al. (2004) used fMRI to take brain images of adults with dyslexia. Before intervention, the adults with dyslexia exhibited phonological and physiological (i.e., brain activity) deficits compared to adults that did not have dyslexia. One half of the adults with dyslexia received training in a phonological manipulation task. Following the intervention, the adults with dyslexia who received the phonological training demonstrated improvements in phonological processing and increased activity in the same left-hemisphere regions engaged by normal readers (i.e., parietal cortex). The non-tutored adults with dyslexia did not exhibit such changes.

Only a few studies have examined the effectiveness of multisensory approaches with older students with learning disability (Brooks & Weeks 1998; Guyer & Sabatino 1989). Brooks and Weeks (1998) compared the responses of adolescent students with different cognitive profiles on different strategies for teaching spelling. Students who had scores below the 20<sup>th</sup> percentile on a graded word spelling test but whose cognitive status was average or above were considered dyslexic. Students whose IQ scores were one

standard deviation below the mean were considered slow learners and were matched for age with the dyslexic students. The control group consisted of children with normal IQ scores who were matched on spelling age to the dyslexic participants. Participants were taught spelling words using one of three teaching methods, a phonics method, a visual/semantic teaching method, and a tracing method. Brooks and Weeks (1998) hypothesized that students with dyslexia would learn less well in a phonics-based method that was dependent on phonemic skills that characterize their weakness in phonological awareness. They predicted that the spelling of the students with dyslexia would improve more with the visual/semantic teaching method than the phonics method and the spelling of the slow-learners would improve more with the phonics method than the visual/semantic method.

In the phonics method, students listened as the teacher sounded out and pointed to each letter of a word. In the visual/semantic method, students examined printed words to find smaller words within the given word (e.g., *tramp* in *trampoline*). In the tracing method, students used their index finger to trace over the letters of a word as if writing the word. Intervention lasted a total of three weeks with each participant practicing one method per week. Before instruction with each method, teachers obtained a baseline measure of words spelled correctly. The spelling method was taught Tuesday-Thursday; on Friday the participants spelled their practice words with no teaching. Different words were used in each teaching method. Brooks and Weeks (1998) found that the students with dyslexia learned significantly more words with the visual/semantic method that required visualizing the word, recalling the composition of the word, and pointing to the smaller words while naming the words. Subjecting all participants to each of the

treatment conditions allowed Brooks and Weeks (1998) to investigate which group learned best under which condition. However, by exposing all participants to each condition, it is not possible to determine if it was the treatment itself or the order of treatments that made the difference in spelling skills. Also, the treatment was short in duration and it is possible that classroom teachers would not continue to differentiate spelling instruction for the dyslexic and slow-learners. Finally, further investigation is needed to determine if improved spelling skills transfers to other written language tasks such as word identification and word attack.

Citing a lack of literature addressing reading intervention with older reading disabled students, Guyer and Sabatino (1989) examined the improvement in reading skills of college students with learning disability assigned to one of three conditions. They were particularly interested in whether college students with learning disability who were exposed to a multisensory O-G approach would make more progress in reading compared to students who were taught with a nonphonetic approach or who received no intervention. Thirty college students were selected randomly from a college's tutorial program for students with learning disability. Students were considered learning disabled if they showed a discrepancy of more than one standard deviation between their ability and achievement scores on an IQ test.

The multisensory techniques used in the O-G approach included lessons in syllable division, breaking down words into component sounds and blending sounds into words, teaching specific decoding and encoding rules, and teaching reading, spelling, and handwriting simultaneously. Students in the nonphonetic approach followed a basic-skills reading series that focused on comprehension and literature appreciation and taught them

how to analyze stories for main idea and supporting information; however, no attention was given to word attack skills. Pre and post tests that assessed word recognition, spelling, and word attack were administered. Guyer and Sabatino (1989) found that the students who received instruction in the O-G multisensory approach achieved statistically significant gains in their reading scores compared to students in the other two conditions.

The random selection of participants from the tutorial program was a strength of this study. However, the researchers did not state how they assigned participants to treatment groups, thus making replication of the study difficult. It is encouraging that college students made positive gains on tests of word recognition, spelling, and word attack in the short five-week duration of the study. A longer intervention study would allow researchers more time to target issues particularly important to a college population such as heavy reading loads, advanced-level text and frequent written assignments, as well as investigating the long-term success of the intervention.

### **The Older Reading Disabled Student**

As the above discussion has illustrated, much is known about the effective components of reading instruction, the phonological core of reading disability, and successful techniques to reading intervention. However, as reported by the National Association of Educational Progress (2002), the average performance of 8<sup>th</sup> grade readers remained flat from 1998 to 2002 and declined for 12<sup>th</sup> graders. The same components of effective reading instruction identified by the NRP (2000) can be applied to reading instruction in the adolescent years, keeping in mind the educational demands of middle and high school and the history of reading failure experienced by older struggling readers (Kamil, 2003).

It has been almost twenty years since Stanovich (1986) described the downward spiral faced by older students with reading disability. This downward spiral starts early in the reading acquisition cycle, when deficiency in phonological awareness skills combines with a lack of exposure to print resulting in lack of reading practice for a young child (Stanovich, 1986). The downward spiral continues as the child brings poor fluency skills reflected in reduced automaticity and speed to reading material that is too difficult (Stanovich). Children who start off reading well develop good vocabularies, continue to read and build their vocabularies, and hence continue to enhance their reading skills. In contrast, children with inadequate vocabularies, reflecting inadequate exposure to print, read slowly, without enjoyment, and read less, leading to an impoverished vocabulary which further inhibits growth in reading. Stanovich (1986) refers to this frequently observed pattern as the Matthew Effect

These negative experiences may translate into negative attitudes toward self and school as well as negative patterns of behavior that develop after years of failure with reading; such attitudes and patterns can be difficult to change (Denti & Geurin, 2004). Clearly, teenagers who struggle with reading difficulty present different challenges than those posed by young children (Heck & Deshler, 2003).

### **Summary**

The review of the literature in this chapter has presented a case for reading intervention based on the O-G multisensory approach. Interventions based on this approach are thought to be particularly effective because they target the core component implicated in reading disability, phonological awareness and letter-sound decoding. However, many gaps exist in the literature supporting multisensory approaches. First, few research studies meet the strict criteria for scientific rigor in establishing empirical

support for specific interventions as identified by Lyon (2004). Vigorous empirical studies often do not lend themselves easily to the parameters of educational settings. Second, few well designed studies have examined the effectiveness of using a multisensory approach with older reading disabled students. The purpose of our study was to address these issues by carrying-out a well-designed reading intervention using a multisensory approach for high school students with reading disability

## CHAPTER 3 METHODS

The purpose of our study was to determine the effects of a multisensory reading-intervention approach on the reading skills of students with reading disability. We measured several areas of students' reading skills to determine their basic reading level. We measured reading skills for word identification, word decoding, spelling, sound awareness, and word identification and decoding of nonsense words under timed conditions. A systematically assigned control group design (Tuckman, 1999) was used to establish reading-intervention and control groups. Participants were assigned to the reading-intervention group based on low pre-test scores. Students who achieved higher pre-test scores were assigned to the control group and did not receive the treatment. The research methods presented in this section are addressed under the headings of instructional setting, recruitment and selection of participants and reading tutors, dependent and independent variables, instrumentation, reading program details and implementation, and treatment of the data.

### **Instructional Setting**

The reading-intervention program took place at a charter high school in Alachua County, Florida. The school is a public charter school for high school students with reading and language difficulties; as a charter school, no tuition or fees are required to attend the school. Grades 9 and 10 were enrolled in 2003 and Grade 11 was added in 2004. The reading and language difficulties of the students include word decoding, reading comprehension, oral expression, auditory processing, and written expression.

The charter school offers students a standard diploma; however, other options are available. The student/teacher ratio is low and class sizes are small. During the 2004-2005 school year, there were five faculty members and 30 enrolled students. In addition, two part-time speech-language pathologists and a part-time occupational therapist serve the school. The following is the mission statement of the school, as provided in the school's promotional brochure:

...High School is the first public charter high school in Alachua County specifically for reading and language challenged students. ...is dedicated to implementing innovative learning strategies designed to meet the individual talents and needs of all our students. The school is committed to assessing students on an individual basis by maintaining low student/teacher ratios, small classes, and by using assistive technologies. The school will work to help the student continue to make reading gains, and to build confidence and self esteem which are essential for success outside of school (charter school brochure, Appendix A).

### **Participant Recruitment**

The University of Florida Institutional Review Board (IRB-02) approval (UFIRB Protocol # 2003-U-844) (Appendix B) was received to recruit participants and conduct the research. At the end of August, 2004, the researcher presented an overview of this research study to the parents of the student at the charter school during the school's open house. The researcher explained the nature of the multisensory phonics approach, the duration of the reading intervention, and the time, days, and location of the program. Parents who expressed interest in the reading intervention were given a Parent Consent form to sign (Appendix C). Parents had the option of signing and returning the consent form at the open house or taking it home to consider and returning it to school with their child. Parents who took the consent form home were given two weeks in which to return the form and were told to have their child give the consent form to the school's director. Once the return deadline occurred, the director contacted the researcher and gave her the

consent forms. Using the described procedures, consent was obtained for twenty students to participate in the study.

All students at the charter school were potential participants if they returned a signed consent form. A student's enrollment at the charter school assumed the presence of a reading or language difficulty and an agreement to a behavioral contract if warranted by the school's director. Assessment to determine eligibility for the reading-intervention program took place over a one-week period at the charter school. The researcher administered all tests used to determine participant eligibility. All potential participants were given pure-tone hearing screenings to confirm normal hearing status.

Twenty students returned signed consent forms and were considered potential participants. Of these twenty students, 14 were classified according to Alachua County School's Exceptional Student Eligibility (ESE) as Specific Learning Disabled, two were classified as Other Health Impaired, three did not have an ESE classification, and one student had recently been declassified as Emotionally Handicapped, but possibly Learning Disabled. Six of the 14 students with Specific Learning Disability status were also classified as Speech-Language Impaired. Experimental and control group participants' ESE classifications are provided in Tables 3.1 and 3.2.

### **Reading Tutor Recruitment and Selection**

Reading tutors were recruited from first year graduate students in the Department of Communication Disorders and Sciences at the University of Florida (UF). In August of the 2004-2005 academic year, a UF Speech and Hearing Clinic orientation was held for all incoming graduate students. At this orientation, supervising Speech-Language Pathologists described their clinic placements, including this researcher's reading-intervention program/doctoral dissertation and the requirements to become a reading

tutor. Six first year graduate students chose the reading-intervention program as their first choice for their first placement and thus became the reading tutors (assuming they passed the Barton Tutor Screening, described below). All reading tutors were females; two had clinical experience at the undergraduate level, one was currently employed as an SLP in the Alachua County Schools, and three had no previous clinical experience. Tutor screening and training is described below under Program Implementation.

### **Operational Definition of Variables**

The primary hypothesis tested in this study is that high school students with reading disability who are assigned to a reading-intervention group based on low pretest reading scores and who receive a multisensory Orton-Gillingham influenced approach to reading intervention will make stronger improvements on posttest reading scores compared to a control group of students who do not receive intervention. The dependent variables were selected subskills of reading ability measured both pre-intervention and post-intervention by formal standardized tests. The independent variable was participation in an Orton-Gillingham influenced simultaneously multisensory explicit and systematic phonics approach.

### **Research Instrumentation**

Pretest and posttest measurement included The Woodcock Johnson III Achievement Test (WJ III-Ach, Woodcock, McGrew, & Mather, 2001) and the Test of Word Reading Efficiency (TOWRE, Wagner, Torgesen, & Rashotte, 1999). The WJ III-Ach was used to determine participant eligibility. To qualify as reading disabled for this study, students were required to demonstrate below average ability in single word spelling, single word reading, word attack, or phonemic awareness as determined by scores of one or more standard deviations below the mean (standard score of  $\leq 85$ ) on at

least two basic reading skills subtests of the WJ III-Ach, that included *Letter-Word Identification* which was used to measure word identification skills through letter identification and word pronunciation; *Spelling* which was used to measure skill in spelling spoken words correctly; *Word Attack* which was used to measure skill in applying phonic and structural analysis skills to the pronunciation of unfamiliar printed words, and *Sound Awareness* which was used to measure phonemic awareness skills and consisted of four parts, Rhyming, Deletion, Substitution, and Reversal.

The TOWRE was given to measure ability to pronounce both sight words (*Sight Word Efficiency* subtest) and nonwords (*Phonemic Decoding Efficiency* subtest) accurately and fluently in timed conditions.

### **Participant Selection**

The experimental group consisted of 9 students who qualified to participate in the after-school reading-intervention program. The control group consisted of nine students; six students who did not meet eligibility criteria based on the pretest scores and three students who meet pretest eligibility criteria but could not participate due to schedule conflicts.

Tables 3-1 and 3-2 describe students in the reading-intervention group and control group, including assigned participant number, gender, grade, chronological age at pre-test, and ESE classification. Identification numbers were assigned consecutively by grade level and alphabetically by surname within each grade level. Hence, the first student in Grade 9 with the first last name alphabetically was given identification number 1. The numbers continued consecutively and alphabetically through Grade nine and number 6; numbering continued in Grade 10 with identification number 7 assigned to the student whose last name occurred first alphabetically in that grade. Table 3-3 consists of mean

test scores of the experimental group and the control group on the pre-test assessment battery.

Table 3-1. Reading-intervention group characteristics

Id. #	7	10	11	12	13	14	16	18	20
Gender	M	M	F	M	F	F	F	M	F
Grade	10	10	10	10	10	10	10	11	11
CA (Years;Months)	15;11	15;4	16;4	15;11	15;5	15;2	16;2	17;5	16;7
ESE Class	SLD <sup>a</sup>	SLD	None	SLD SLI <sup>b</sup>	SLI	OHI <sup>c</sup>	SLD	SLD SLI	SLD

Table 3-2. Control group characteristics

Id. #	2	3	4	6	8	9	15	17	19
Gender	M	M	M	F	F	F	M	M	F
Grade	9	9	9	9	10	10	10	11	11
CA (Years;Months)	15;3	16;10	14;8	15;11	15.11	15;4	16;8	17;9	16;3
ESE Class	SLD	SLD SLI	SLD	SLD SLI	None	SLD SLI	SLD	SLD	None

Notes: Student # 1 and student #5 did not participate. <sup>a</sup>SLD = Specific Learning Disability (primary classification). <sup>b</sup>SLI = Speech Language Impaired (additional exceptionality). <sup>c</sup>OHI = Other Health Impaired (primary classification).

Table 3-3. Mean Pre-test scores.

	Experimental Group (N = 9)	Control Group (N = 9)
WJIII Achievement Test		
Letter-Word Identification	69.22	90.88
Spelling	64.11	90.88
Word Attack	76.77	89.22
Sound Awareness	74.66	90.33
Basic Reading Skills	74.11	90.44
TOWRE		
Sight Word Efficiency	45.55	82.44
Phonemic Decoding Efficiency	59.66	83.66

## Instructional Method

### The Barton Reading and Spelling System

The Barton Reading and Spelling System (BRSS) is an Orton-Gillingham influenced, simultaneously multisensory, explicit, and systematic phonics program

created by Susan Barton. The meaning of each of these components is given on the Barton website (Barton 2000).

The BRSS employs simultaneous multisensory instruction by appealing to the student's visual, auditory, tactile, and kinesthetic senses in the learning process. Tutors teach, and students practice, rules of written language one at a time until a rule is stable in both reading and spelling, then a new rule is introduced. Hence, this program uses direct, explicit instruction. The Barton program is systematic and cumulative in that tutors start by teaching very basic rules as a foundation of written language and build upon these rules until a student is able to apply these rules automatically and fluently when reading and spelling. Old rules are reviewed as new ones are taught. This systematic and cumulative process is meant to help a student understand that there is logic behind the rules of the English language. The Barton program employs both synthetic phonics, where a student builds words from individual sounds and letters, and analytic phonics, where a student learns how to break longer words into its components letters and sounds. Finally, tutors practice diagnostic teaching; they continuously assess a student's knowledge of the rules and ability to apply the rules. The tutor engages the student in a dialogue asking the student to explain why a particular rule affects how a word is spelled and pronounced. When a student makes a mistake, the tutor guides the student with dialogue to figure out where the mistake occurred and how to correct the mistake.

### **Levels of instruction**

The Barton Reading and Spelling System consists of ten levels presented in separate books, each of which is designed to teach different reading and spelling rules of the English language (Table 3-4). Each level is broken down into lessons and each lesson is further broken down into procedures. The protocol within a procedure alternates

between spelling and reading exercises, with the tutor either dictating words for the student to spell or building words with tiles for the student to read. All levels contains between ten and fourteen lessons with the exception of Level 1 and Level 2, which are both considerably shorter. Similarly, most lessons contain about fifteen procedures with the exception of the lessons in Level 1 and Level 2, which have fewer procedures. The levels are ordered sequentially and increase in difficulty. While some students may possess enough phonemic awareness to skip Level 1, Barton warns against skipping more than the first level. The level at which a student begins the Barton program is determined by a pre-test administered by the tutor.

Table 3-4. Barton System Levels

Barton Levels	Name of Level
1	Phonemic Awareness
2	Consonants and Short Vowels
3	Closed and Unit Syllables
4	Multi-Syllable Words and Vowel Teams
5	Prefixes and Suffixes
6	Six Reasons for Silent E
7	Vowel-R's
8	Advanced Vowel Teams
9	Influence of Foreign Languages
10	Latin Roots and Greek Combining Forms

### Teaching strategies

The tutor teaches reading and spelling rules using multisensory procedures. With the exception of Level 1, the procedures are repetitive from level to level and lesson to lesson, increase in difficulty within a level, and build upon the information taught in previous lessons. A description of the terms and steps used in the multisensory delivery is presented here.

**Step 1-Tutor dictates word.** The tutor gestures to herself with her hand each time she dictates a word to the student.

**Step 2-Student repeats word.** The tutor gestures with her hand to the student each time the student repeats a word.

**Step 3-Touch and say.** The student taps each tile, starting with the index finger, and says the sound represented by the tile. In the initial sessions, the tutor demonstrates this process for the student.

**Step 4-Tapping a vowel sound.** A specific procedure is used to tap the vowel sound. Using a two-syllable key word to represent the short vowel sound, the student begins by tapping the index finger on the table while saying the onset/vowel sound; next the student taps the middle finger on the table while saying the rime. This is repeated two times and the student ends by tapping out the vowel sound with the index finger three times. For example for the short vowel sound of *i* and the key word *itchy*, the student would start tapping with the index finger and say *i* tap with the middle finger and say *i tchy*, repeat this two times, and finish with tapping the *i* three times with the index finger- *i tchy, i tchy, i, i, i.*

**Step 5-Slowdown step.** The tutor makes a swooping motion with her dominant/writing hand towards the student as the student repeats the dictated word. The tutor starts the swoop at the student's left shoulder, brings her arm down toward the table in an arc, and moves her arm upward towards the student's right shoulder to finish the swoop.

**Step 6-Slowly blend the sounds.** The student runs his/her index finger along the table, below the tiles used to spell the word, in a half-circle/u shape while slowly saying the word on the tiles.

**Step 7-Say it fast like a word.** After the student has slowly blended the word, he/she draws the index finger in a line below the tiles and says the word using a normal speaking rate.

**Step 8-Finger spelling.** Starting with the thumb of the non-writing hand and moving from left to right, the student holds up one finger per sound to spell the word on his/her fingers.

### **Lesson Format**

A systematic teaching method is used throughout the Barton Reading and Spelling System. To introduce a new spelling, reading, or syllable division rule, the tutor builds words with tiles that illustrate the rule and guides the student through dialogue so the student believes he/she has discovered the rule on his/her own. Once a rule has been introduced, the tutor and student practices by building and reading a variety of words to which the rule applies. The tutor always asks the student if there are any sounds or letters the student needs help with. If the student is sure of his/her work, the student reads the word, phrase, or sentence to make sure all the words are correct. If the student does not pick up an error on his/her own, the tutor draws the student's attention to the word and asks the student to double-check his/her work on that particular word. The tutor never tells the student he/she is wrong or has made a mistake. Instead, the tutor accepts the responsibility for errors (*"Oh, I must have said that incorrectly, let me say it again,"*) and the tutor and student engage in a problem-solving exercise to find the error. When writing sentences, the tutor always asks the student if he/she remembered to start the sentence with a capital letter and ended the sentence with punctuation.

### **Levels, lessons, and procedures in the Barton Reading and Spelling System**

In our study, all participants completed Levels 1 and 2; all participants began Level 3, but only two participants (# 3 and # 13) completed Level 3. These two participants were just beginning Level 4 at the conclusion of the reading intervention. Only the lessons and procedures (Table 3-5) specific to these levels are presented.

**Level 1: Phonemic Awareness.** In the first level, the student is taught that each sound is represented by a single tile, that different color tiles designate consonants and vowels, and that by manipulating the tiles, the student can manipulate the sounds in a word or syllable to create new words and syllables.

**Level 1 Lessons and Procedures.** Level 1 consists of five lessons that begin with single syllable vowel (V)-consonant (C) combinations, including VC, CV, CVC, VCC, and CCV, and end with real words. Blank red tiles represent vowel sounds and blank blue tiles represent consonant sounds. The procedures begin simply, with the break apart procedure in which the tutor dictates a syllable such as *AK* (VC), the student repeats the word, says it slowly, pulls down one tile per sound, and then touches each tile while saying the corresponding sound. The break-apart procedure becomes progressively more difficult as additional steps are added to this base procedure. For example, in the break-replace procedure, after the student completes the touch and say, the tutor instructs the student to make a new syllable by changing one tile as designated by the tutor. The break-replace-remove procedure adds an additional step in which the tutor instructs the student to remove a designated tile after the student has completed the break-replace procedure. The student also practices comparing two words that differ in only one tile/sound. The tutor builds two words and uses the touch and say strategy for each sound until the student identifies the different sound/tile.

**Level 2: Consonants and Short Vowels.** In the second level of the Barton Reading and Spelling System, the tutor introduces twenty-one consonants of English, five vowel sounds, and five digraphs (two consonants that make one sound, such as *sh*). Lettered tiles are used instead of the blank tiles used in Level 1 while vowels and consonants continue to be represented by red and blue tiles respectively.

**Level 2 Lessons and Procedures.** There are five lessons in Level 2. In the first four lessons, one vowel sound and a group of consonants are introduced; only the short sound of the vowel is used. In Lesson 5, the tutor teaches the five digraphs and final vowel sound.

For the first lesson, the tutor teaches six consonants (*b, f, m, p, s, t*) and a short vowel sound (*a* as in *apple*). If the student does not know the sound the vowel makes, the tutor helps the student identify a key word to represent the vowel and illustrates this on a “Key Words” page. This exercise is also used to illustrate unfamiliar consonant sounds. After the vowel sound and consonants are introduced, the tutor either dictates a sound and the student points to the corresponding tile or the tutor lays out the tiles in front of the student and the student points to each tile and names the letter and the sound that the letter makes. Once the student demonstrates consistent knowledge of this set of consonants and the vowel sound, he/she progresses to reading and spelling real and nonsense words composed of Lesson 1 sounds only.

To facilitate reading, the tutor builds a word with the tiles. The student does touch and say for each sound and taps out the vowel sound if it is a difficult sound for the student. After tapping out the sounds, the student slowly blends the sounds together and then rapidly to create a real word. Students initially practice spelling procedures with

their fingers and the tiles. Following the tutor's dictation of a word, the student repeats the word and then says it very slowly. The student then represents each sound of the word on one of his/her fingers. Starting with the thumb of the non-writing hand, the student holds up one finger per sound, moving from left to right. After the student has spelled the dictated word with his/her fingers, the student spells the word with tiles by pulling down one tile per sound/finger. Once the student has become proficient at spelling words with his/her fingers and the tiles, the student progresses to spelling words on paper. Instead of pulling down a tile to represent each sound on his/her finger, the student writes down the letter that corresponds to the sound on his/her finger. The tutor always reminds the student to double-check his/her work to make sure that what is written on the paper or spelled with the tiles is, in fact, the word the student meant to spell.

Two procedures in Level 2 give the student practice reading real printed words and practice building his/her vocabulary. To practice reading real words, the tutor gives the student a list of printed words, consisting only of the sounds already learned and a 4" x 6" index card with a small hole cut in the middle to place around each word. The student reads down the list of words and uses the touch and say procedure if he/she comes across an unfamiliar word. To build vocabulary, the student reads a one-syllable word that can also be a prefix of a longer word. The student and tutor take turns thinking of longer words that build on the given syllable. For example, the student could read *tab* and then generate the words *tabular* and *tablet*.

In Level 2, Lesson 2, six new consonants (*c, g, h, l, n, r,*) and a new short vowel sound (*i*) are introduced. The tutor introduces several new procedures in Lesson 2 that are continued throughout all lessons at this level. The student begins each lesson with a

review of previously taught letters and their corresponding sounds. This review is followed by a phonemic awareness warm-up in which the tutor dictates a word and asks the student to say only the first sound, the last sound, or the middle sound of the word and to point to the corresponding letter tile. Each lesson comes with extra practice pages that are used to review the reading and spelling rules taught in the previous lesson. If the student completes the extra practice page for homework, the tutor reviews the student's work before going on to new material. If the tutor did not assign the extra practice as homework, the student has the opportunity to complete the page during the tutoring session.

In Level 2 lessons, the student begins reading phrases and sentences. In the Read Phrases procedure, the tutor teaches the student that sentences consist of phrases and that phrases convey certain information, such as *who*, *did what*, and *where*. In the Read Sentences procedure, the student uses the knowledge learned in the previous lesson to segment a sentence into the phrase categories just learned. The student then practices reading the sentence, pausing to indicate a phrase.

In Lesson 3, five consonants (*d, j, k, v, z*) and a short vowel (*o*) are taught. In Lesson 4, the tutor introduces four more consonants (*w, x, y, qu*) and one more short vowel (*u*). In Lesson 5, the final lesson of Level 2, five digraphs (*sh, th, wh, ch, and ck*) and the last short vowel sound (*e*) are taught.

**Level 3: Closed & Unit Syllables.** In Level 3, many new concepts are taught, including closed syllables, unit syllables, spelling rules, blends, and contractions. Students and tutors discuss the concept of a syllable and learn the rules of a closed syllable (only one vowel, the vowel makes its short sound, and is closed in at the end by a

consonant or blue tile). Students learn spelling rules that govern when to use the letter *k* vs. *c* to make the /k/ sound in the beginning of a word, when to use the letter *k* vs. *ck* at the end of a word to make the /k/ sound, when to use the letters *ch* vs. *tch* at the end of a word to make the *ch* sound, and when to double the final consonant of a one-syllable word. Students learn rules to apply to reading and spelling units (in unit syllables, the sounds are not to be broken apart and the vowel sound does not make its usual sound, for example the *i* in *ink* and *ing* sounds more like a long *e* than a short *i*). Each unit is represented on a single, orange-colored tile.

**Level 3 Lessons and Procedures.** New procedures are introduced in Level 3. The first new procedures address reading and spelling sight words. In the Read New Sight Word List procedure, the student is given a list of sight words to read. As the student reads the list of words, the tutor keeps track of the words the student reads incorrectly on the Sight Word Tracking List. The tutor prints the missed word on an index card and the student begins to accumulate a reading deck of missed sight words. The student is told to practice these words and the index cards are brought out in subsequent lessons. Once the student reads the missed sight word correctly for three lessons, the card is retired from the sight-word reading deck.

In Create Sight Word Spelling Cards, students are taught a new procedure to practice misspelled sight words. The tutor dictates the spelling sight words to the student and the student prints the words on lined notebook paper. The tutor stops dictating words at three misspellings and makes an index card for each misspelled word. The tutor teaches the student how to see and spell the word in his/her imagination, see and write the word on the table and see and write the word on paper. The tutor prints the missed word

on an index card and writes the difficult letter(s) in red ink for the student. The student begins by staring at the word to get a good picture of it and then visualizes the word with his/her eyes closed. After visualizing the word with his/her eyes closed, the student looks at a blank wall, visualizes the word on the wall, and spells the word aloud. The student next writes the word with his/her index finger as the pen on the desktop and finishes the procedure by saying each letter aloud and writing the letter on the paper to spell the word. The same procedure used to retire a misread sight word is used to retire a misspelled spelling sight word.

In Level 3, the student continues to spell single words using more advanced procedures than in Level 2 by spelling dictated phrases and sentences on paper. The final new procedure in Level 3, Read a Story, introduces the student to reading connected sentences. This procedure was modified in our study and the modified procedure was followed throughout the subsequent lessons and levels. As presented in the Barton System, each lesson includes four stories controlled for the spelling rules taught in the particular lesson; there are two basic level stories and two advanced level stories. The tutor uses her own discretion in choosing the appropriate story level for her student. As presented in the BRSS, the student has one of two options. After reading the story to him/herself, the student can either read the story aloud to the tutor or can retell the story in his/her own words. The tutor then asks the student comprehension questions based on the passage, regardless of the option chosen.

The researcher modified the Read a Story procedure in the following manner. The student first read the paragraph to him/herself and marked any unfamiliar or difficult words. After going over the difficult words with the tutor, the student read the story aloud

and the tutor listened for fluent and accurate reading. Sentences were broken down into phrases to practice smooth reading and misread words were reviewed for correct decoding. Finally, the student read the story again to him/herself and the tutor asked the student to identify the *who* or *what* of the story and the main idea.

In Lessons 1, 2, 3, and 4, the student practices reading and spelling words with blends at the beginning of a word, the end of a word, and the beginning and end of a word. Both two letter blends and three letter blends are used and the tutor teaches the student to distinguish between blends and digraphs (digraphs make one sound and are presented on the same tile while in a blend each letter retains its sound and is presented on a separate tile). In Lesson 5, a student is taught to double the final consonant in a closed one-syllable word when the word ends in *f, l, s, or z* (the FLOSS rule) and to understand the exceptions to the rule. In Lesson 6, the student is taught the “Kiss the Cat” rule which explains when to use *k* vs. *c* to make the *k* sound in the beginning of a word. In Lesson 7 the “Milk Truck” rule is introduced to explain when to use *k* vs. *ck* to make the *k* sound at the end of a one-syllable word. Similarly, in Lesson 9 the “Catch Lunch” rule is introduced to explain when to use *tch* vs. *ch* to make the *ch* sound at the end of a one-syllable word. Tutors provide the student with the exceptions to the spelling rules. In Lesson 10, the students are introduced to the concept of contractions; they learn general spelling rules that govern how to contract two words into a single word.

**Level 4: Multi-Syllable Words and Vowel Teams.** New spelling and reading rules are taught in Level 4. After the tutor and student review the concept of a closed syllable, the tutor introduces the open syllable. The student discovers that an open syllable means that there is no consonant closing a syllable in at the end and that the

vowel makes its long sound. The tutor also teaches the student rules for dividing multi-syllable words.

**Level 4 Lessons and Procedures.** In the beginning of Level 4, the tutor introduces a new step to the Read Phrases procedure by having the student create “add-on” phrases; these are phrases that add information to a sentence. Students no longer spell words and nonsense words on their fingers; however, they continue to spell with the tiles and on paper.

The first three lessons in Level 4 are devoted to teaching the concept of an open syllable and to syllable division rules. In Lesson 1, Open Syllables, the tutor teaches that in an open syllable there is only one vowel, the syllable is open at the end, meaning it is not closed by a blue consonant tile, and the vowel says its name (i.e., a long vowel sound). Students learn how to divide syllables in lessons two and three. In Lesson 2, Syllable Division Rule #1, the tutor first teaches that a word with two non-adjacent vowels will have two syllables, each vowel belonging in its own syllable. If there is one letter between the vowels, that letter is moved to the end of the word (e.g., *la-bel*). The student and tutor practice this syllable division rule by building words with the tiles and dividing the words into syllables. After the student divides the word into syllables, the tutor teaches the student how to check his/her work to make sure the division was done correctly. To check his/her work, the student reads the syllables to blend them into one unit. If this creates a real word, then the student is done; however, if it does not create a real word, then the student learns to move the letter the other way, to the front of the word.

A similar process is followed in Lesson 3, Syllable Division Rule #2. The tutor teaches the student how to divide a word when there are two letters between the vowels. In this case the student learns to split the two letters (e.g., *lad-der*), with the exception of digraphs and units, which are never split (e.g., *bi-shop*).

### **Tutor screening**

Tutors of the BRSS are trained through a series of instructional video tapes produced by Susan Barton. The introductory tapes describe the nature of reading disability and provide an example of what is taught in the program and how it is taught. The introductory tapes conclude with the Tutor and Student Screenings. Before a graduate clinician became a tutor, he/she had to pass the tutor screening and participate in tutor training sessions. Two research assistants, a high school senior and a UF undergraduate senior, also met this requirement. To pass the tutor screening, the clinicians and research assistants had to demonstrate a minimal level of phonological awareness by breaking words down into their smallest sounds, manipulating sounds in words, deleting sounds, and blending individual sounds into words. All clinicians and research assistants passed the screening.

Table 3-5. Procedures and Levels in the BRSS

Procedure	Level 1	Level 2	Level 3	Level 4
Break Apart	X			
Break Replace	X			
Compare 2 Words	X			
Break-Replace-Remove	X			
Blend 2 and 3 Sounds into Real Words	X			
Blend-Change-Change-Change	X			
Teach New Sound		X	X	X
Teach New Sound #2		X	X	X
Read Sounds on Tiles		X		

Table 3-5 Continued.

Procedure	Level	Level	Level	Level
	1	2	3	4
Spell Sounds with Tiles		X		
Read Real Words with Tiles		X		
Spell Real Words with Fingers, then Tiles		X	X	
Spell Real Words with Tiles				X
Read Nonsense Words with Tiles		X	X	X
Spell Nonsense Words with Fingers, then Tiles		X	X	
Spell Nonsense Words with Tiles				X
Read Words through Word Frame		X	X	X
Spell Words with Fingers, then on Paper		X	X	X
Read Longer Words Together		X		
Review Known Letters and Sounds		X	X	X
Review/Do Extra Practice Page		X	X	X
Phonemic Awareness Warm-up		X	X	X
Read Phrases		X	X	X
Read Sentences		X	X	X
Read Sight Words			X	X
Spell Sight Words			X	X
Spell Phrases on Paper			X	X
Spell Sentences on Paper			X	X
Read a Story			X	X

### **Tutor training**

A total of 9 training sessions and 27 training hours occurred. In the training tapes, Barton explains a spelling or reading rule then demonstrates the procedures used to teach the rule by role-playing with a demonstration student. After the demonstration, Barton encourages the viewer to stop the tape and practice the procedure with a partner; this protocol was followed in the tutor training. For the current study, the reading tutors and research assistants paired-up with each other to practice the procedures and took turns being the tutor and the student. The researcher observed the role-playing and provided

guidance when questions arose. The training tapes were always available to the tutors after the required training sessions were completed in the event that the tutors felt unsure of a procedure and/or wanted extra practice.

### **Student screening**

High school students who met the inclusionary criteria for participation also had to pass the Barton Student Screening before participating in the reading-intervention program. The screening consisted of three parts, Part A: Counting Words, Part B: Clapping Sentences, and Part C: Compare Three Isolated Sounds with Colored Squares.

In Part A: Counting Words, the tutor dictated a sentence and the student repeated it. As the student repeated the sentence, he/she counted the number of words in the sentence on his/her fingers. The tutor noted if the student counted the correct number of words the first time, counted the wrong number of words, or repeated the sentence in the wrong sequence. The tutor dictated three sentences, two sentences had seven words and one sentence had six words. A student was not allowed to miss any words in Part A: Counting Words to qualify for the Barton program. In Part B: Clapping Syllables, the tutor dictated a word and the student repeated the word and clapped the number of syllables in the word. There were a total of six words, four words had three syllables, one word had two syllables and one word had four syllables. A student was allowed a maximum of one wrong. Finally, in Part C: Compare Three Isolated Sounds with Colored Squares, the tutor dictated sounds and the student pulled down three colored squares to represent each of the sounds. The tutor noted if the student correctly sequenced the sounds the first time, correctly sequenced the sounds after the tutor repeated the sequence, or incorrectly sequenced the sounds. There were 15 three-letter sequences dictated. A student was

allowed to have a maximum of two sequences repeated and a maximum of two sequences wrong.

All students passed the screening and were thus eligible to participate in the reading program. The student screenings took place during the first student-tutor meeting at the charter school. The Student Screening Answer Sheet is provided in Appendix D.

### **Barton pretests**

To determine at which level the tutor should begin tutoring, the tutor first gave her student a pre-test (Barton recognizes that some older students may possess enough knowledge to skip the first two levels at least some lessons within the levels). Strict pass/fail criteria, as provided by Barton, were followed to determine a student's starting level. A compilation of the Barton Pretests for Books 1, 2, and 3 is provided in Appendix E.

The Level 1 pre-test contained four tasks: Task A: Break-Apart Nonsense Words; Task B: Break-Replace-Remove; Task C: Compare Two Words; and Task D: Blend 2 and 3 Sounds into Real Words. A student who completed all four tasks with 100% accuracy was deemed to have sufficient knowledge to skip Level 1 entirely. Before a student could move on to the next task, he/she had to meet pass criteria of zero or one error for that task. The pre-test was stopped when the student missed two or more items and tutoring began with the lesson that corresponded with the given task.

The Level 2 pre-test contained six tasks: Task A: Test of Letter Name and Sound Knowledge; Task B: Spelling Individual Sounds on Paper; Task C: Identifying First, Last, and Middle Sounds; Task D: Read These Words; Task E: Spelling Real and Nonsense Words on Paper; and Task F: Read these Sentences. Different pass/fail criteria were used for Level 2. Both Task A and Task B were given, regardless of the number of

errors a student made on Task A; the tutor continued with Task C only if a student made no errors on either Task A or B. If a student misread two consonants or two digraphs on Task D, Read These Words, the tutor began with Lesson 5 of Level 2. If a student misread one or more vowels and the vowels were *a, i, or o*, the tutor began with Lesson 3; if the vowels were *u or e* the tutor began with Lesson 4. If a student incorrectly spelled a consonant or vowel on Task E, tutoring began with Lesson 3; if a student incorrectly spelled only a digraph, tutoring began with Lesson 5. Finally, if a student made it to Task F, Read These Sentences, and made more than 3 mistakes, including re-readings, or read in a choppy manner, the tutor began with Lesson 5 in Level 2.

Based on the pre-testing protocol, 5 participants began tutoring at Level 1, Lesson 1, one participant began tutoring at Level 1, Lesson 3, two participants began at Level 2, Lesson 1, and one participant began at Level 2, Lesson 2.

### **After-school reading program**

Once the screenings and pre-tests were completed, the tutors were able to begin working with the participants. Each tutor was assigned at least one student and three tutors were assigned 2 students. Tutoring sessions took place at the charter school after school hours. Tutors and participants met 3 days a week, Monday, Wednesday, and Thursday, fifty minutes/session. The first session ran from 3:00 to 3:50. Tutors had two participants met with the second participant from 4:00 to 4:50. Students assembled in a classroom for a quiet study hall while they waited for their session or to be picked up by a parent. The charter school had two classrooms, an office, and a teacher workroom available to accommodate the tutors. There were two tutors/students per classroom, one tutor in the teacher workroom, and one tutor in the office. Tutors did not change rooms during the program in order to maintain a consistent environment for the student. The

researcher was always present in the charter school and rotated between classrooms to observe the tutor and her participants.

### **Data-Collection Procedures**

#### **Lesson Plans**

The printed books that accompany each level of the BRSS contain scripted dialogue for the tutor to follow in presenting the procedures and specific directions for carrying out the procedures. Each printed book contains all the material the tutor needs to carry-out a lesson including the stimulus words, phrases, sentences, and paragraphs, student pages for the student to read from, and material to use for extra practice or homework. However, the books do not provide the tutor with space to record the student's responses or performance for any procedure. Therefore separate lesson plans were made that allowed a tutor space to record her student's responses as correct or incorrect and to make comments about the student's progress. The explicit directions outlining each procedure were retained and every attempt was made to retain the suggested dialogue printed in the book. An example of the lesson plans for Book 2 Consonants and Short Vowels is provided in Appendix F.

#### **Tracking Sheets**

The researcher developed a tracking sheet that each tutor used at every session. The sheet allowed the tutor to record the participant number, the date, time of the session, the number of the session, and the beginning and ending procedure for each lesson. The tracking sheet is provided in Appendix G.

#### **Reading and Spelling Probes**

The Barton Reading and Spelling System does not provide the tutor with a quantitative way to measure adequate progress during the daily teaching of reading and

spelling rules. Therefore, the researcher created reading and spelling probes as a tool to quantify participants' knowledge of the rules taught before the tutor introduced new rules. The probes consisted of five sentences to spell and five sentences to read. Each sentence contained 2 probe words for a total of 20 items/five points each. The probe sentences were designed to measure the participant's knowledge of the material that was taught in the preceding lessons, but used different sentences than the participants were used to seeing in the Barton lessons. Tutors gave the probe sentences at the end of Level 2, and after Lesson 2 and Lesson 11 of subsequent levels. Test words for the probe sentences were taken from *Angling for Words* (Bowen, 1983). Pass criteria for both the spelling and reading probes was 80% correct, meaning a participant could miss up to two spelling word and two reading words. If a participant passed, he/she moved on to the next lesson. However, if a participant did not pass, he/she practiced the missed word(s) and was retested at the next session. The reading and spelling probes for Book 2 are located in Appendix H.

### **Inter-observer agreement**

Kazdin (1983) describes inter-observer agreement as the consistency between observers; "...it refers to the extent to which observers agree in their scoring of behavior" (p 48). Inter-observer agreement is important because it reflects whether the target behaviors, in this case the explicit instruction used by the tutors, are carried out clearly and completely (Kazdin, 1983). Two research assistants were trained in the BRSS as observers to make sure the tutors were carrying out the procedures according to the Barton protocol. The assistants participated in all tutor training sessions and were familiar with all Barton procedures. If the observers' assessments did not agree or if the

observers did not observe the required Barton procedures in the tutoring sessions, the tutors would undergo additional training.

The assistants observed one day a week, Monday, at the charter school. They observed one tutor and her assigned student from 3:00 to 3:50 and a different tutor and her assigned student from 4:00 to 4:50. Each assistant followed a list of ten multisensory procedures practiced in the BRSS, such as touch and say, the slow down step, and tapping out a sound, and recorded their observations independently of each other. The assistants made a check-mark on the list to indicate if a required or expected multisensory procedure occurred, if a multisensory procedure was required or expected but did not occur, or if the multisensory procedure was not required or expected in a given segment of the tutoring session. The inter-observer reliability sheet is provided as Appendix I.

A point-by-point agreement ratio was calculated to measure reliability. This ratio is appropriate when there are discrete opportunities for the behavior to occur (Kazdin, 1983). As described by Kazdin (1983), "...agreements of the observers on the specific trials are divided by the number of agreements plus disagreements and multiplied by 100 to form a percentage. Agreements can be defined as instances in which both observers record the same thing. Disagreements are defined as instances in which one observer recorded the behavior as occurring and the other did not (p54)." The following formula was used to compute point-by-point agreement for each session observed:  $\text{Point-by-Point Agreement} = A/A+D \times 100$ . Of the 14 sessions observed, there was 100% agreement six times, 90% agreement two times, 80% agreement four times, and 70% agreement 2 times ( $M = 88\%$ ).

### **Treatment of the Data**

Three statistical methods were used to analyze the data. First, independent samples *t* test was carried out on the mean pretest scores of the reading-intervention and control group participants. Next, analysis of covariance (ANCOVA) was carried out to measure whether the reading-intervention group showed a stronger improvement in posttest performance relative to their own pretest performance than did the control group (Cook & Campbell 1979; Tuckman, 1999). The pretest scores served as the covariate or control variable. Finally, to analyze within-group effect of the reading intervention, a dependent samples *t*-test (Kranzler & Moursund, 1999) was carried out using pretest and posttest scores for each reading-intervention group participant. Correlation analysis Tuckman, 1999) was used employed to determine the relationship between pretest score and starting point in the Barton System and number of sessions to complete a Barton System book. Descriptive methods using clustered column charts and line charts were employed for further examination of the reading-intervention and control participants' performance.

## CHAPTER 4 RESULTS

The primary goal of this study was to provide data to examine the effectiveness of a multisensory Orton-Gillingham-based approach to reading intervention for high school students with reading disability. We used a quasi-experimental design in which the control and reading-intervention groups were systematically assigned. Tuckman (1999) advocates the use of the quasi-experimental design in educational research for the researcher faced with practical limitations on participant selection, assignment, and condition manipulation. Quasi-experimental design is an option that allows the researcher to operate within the realities of the education setting (Tuckman, 1999).

The systematically assigned control group design (Tuckman, 1999) is one in which the researcher systematically selects and assigns the participants to the treatment group because they share some characteristics. In our study, participants were assigned to the reading-intervention group, a remedial reading program, because they scored at least one standard deviation below the mean on two or more subtests of the Woodcock Johnson III Achievement Tests (WJ III-Ach, Woodcock, McGrew, & Mather, 2001).

Six dependent variable measures were used for pretest and posttest analysis. Standard scores and grade-equivalent scores for four of the dependent measures were obtained from the WJ III-Ach and that test's Compuscore Program, version 2.0. Standard scores and grade-equivalent scores for the remaining two variables were obtained from the Test of Word Reading Efficiency (TOWRE, Wagner, Torgesen, & Rashotte, 1999) and that test's

technical manual. All scores used in the statistical analysis were norm-referenced standard scores based on the standard curve with a mean of 100 and a standard deviation of 15.

Analysis of covariance (ANCOVA), *t* test for independent samples, *t* test for nonindependent (matched) samples, and correlation were used to analyze the data. The *t* test for independent samples was used to compare pretest means between the reading-intervention and control groups to determine if the pretest difference between groups was statistically significant (Tuckman, 1999). ANCOVA was used to determine whether members of the reading-intervention group showed greater improvement from their pretest to posttest performance compared to members of the control group's pretest and posttest performance (Tuckman, 1999). According to Tuckman (1999) and Shavelson (1996) the analysis of covariance (ANCOVA) is the appropriate statistical method for this design. The covariate (the pretest) contains information about differences among subjects that is collected before the experiment is conducted. The covariate is used to remove systematic differences among subjects from the within-group error term (Shavelson, 1996).

The *t* test for nonindependent samples (or paired samples test in SPSS, version 11.0) was used to analyze whether an individual participant's posttest score for each reading subskill measure increased from its matched pretest score after receiving the reading-intervention program (Kranzler & Moursund, 1999). Because each individual's pretest score is matched with his/her posttest score, the two scores are not independent of each other. The difference between the two scores indicates if a participant's score on the posttest improved relative to his pretest score or if it declined relative to his pretest score. In SPSS, the posttest score was subtracted from the pretest score; therefore, a negative coefficient indicates the posttest score was higher than the pretest score. In order to

compare the performance of the individual participants in the reading-intervention group to the individual participants in the control group, the *t* test for nonindependent samples was run on both groups. Correlation was used to determine if the *Basic Reading Skills* score, a combined score of *Word Attack* and *Letter-Word Identification*, was a good predictor of starting book in the Barton Reading and Spelling System and a good predictor of number of lessons needed to complete Level 2 in the Barton System.

Finally, for descriptive analysis of the data, column charts were used as a visual display of each participant's progress through the lessons and books of the Barton Reading and Spelling Program and growth in grade equivalent scores was compared between reading-intervention and control groups. Column charts were created in Microsoft Excel 2002. Clustered columns were used to compare values across categories. The number of sessions it took each participant to complete a Barton book was plotted as the value on the y axis; participant number was plotted as the category across the x axis. Grade equivalent scores were calculated from The WJ III Achievement CompuScore Program and the TOWRE test manual. Findings for this study are presented below in response to each of the experimental questions.

**Research question 1:** Do high school students assigned to a multisensory reading-intervention group make greater improvement on posttest scores compared to students who did not receive such intervention on the following variables: 1) letter-word identification; 2) word attack; 3) spelling; 4) sound awareness; 5) speed of sight-word recognition; 6) speed of nonsense-word decoding?

The independent (input) variables were represented by control variables that needed to be neutralized from influencing the results (Tuckman, 1999). The control variables were

pretest scores on *Letter-Word Identification*, *Spelling*, *Word Attack*, and *Sound Awareness*, from the Woodcock Johnson III Tests of Achievement (WJ III Ach.) and on *Sight-word Efficiency* and *Phonemic Decoding Efficiency* from the Test of Word Reading Efficiency (TOWRE). The dependent (outcome) variables were posttest scores on these same tests. For the ANCOVA analysis, the fixed factors were the control and reading-intervention groups.

The *t*-test for independent samples (Table 4-1), showed that the pretest scores of the control group were significantly better than the pretest scores of the reading-intervention group on all dependent variables at  $p < .05$ .

Table 4-1. *t* test for independent samples at pretest for dependent variables

Pretest	t	df	p value (significant at $p < .05$ )*
WJ III Ach			
Letter-Word Id	-3.98	16	.001
Spelling	-5.32	16	.000
Word Attack	-3.44	16	.003
Sound Awareness	-2.41	16	.028
TOWRE			
Sight-word Efficiency	-3.05	16	.008
Phonemic Decoding Efficiency	-3.34	16	.004

\*all values were significant at  $p < .05$ .

Results of the ANCOVA (Table 4-2), which compared pretest to posttest performance across groups, revealed that there were no longer significant differences between the control group and the reading-intervention group on the dependent variables after reading intervention. Although the posttest scores of the control group were still higher than the posttest scores of the reading intervention group, the difference was no longer significant and adjusted posttest scores showed that the reading intervention group improved more than the control group. The difference in adjusted means, shown in the

*Adjusted Means* column of Table 4-2, ranged in standard scores from a low of .460 on *Phonemic Decoding Efficiency* (TOWRE), to a high of 3.605 on *Letter Word Identification* (WJ III Ach.). These data indicate that when pretest scores were adjusted for, the reading-intervention group improved more than the control group on the posttest by .460 and 3.605 standard score points respectively. The adjusted mean indicates the number of standard score points the reading-intervention group improved compared to the control group for each dependent variable (*Source* column).

Table 4-2. ANCOVA for dependent variables

Source	<i>df</i>	F	<i>p</i> value (significant at <i>p</i> <.05)	Adjusted Mean
WJ III Ach				
Letter-Word Id.	1	.674	.425	3.605
Spelling	1	.218	.648	3.251
Word Attack	1	.402	.536	2.737
Sound Awareness	1	.153	.702	2.840
TOWRE				
Sight-word Efficiency	1	.084	.776	2.759
Phonemic Decoding Efficiency	1	.008	9.29	.460

Line graphs (Figures 4-1 to 4-6) illustrate the progress of the reading-intervention group in closing the gap with the control group. A common trend seen in all the figures is a relatively flat or down-ward sloping line for the control group from pretest to posttest in contrast to an upward-sloping line for the reading-intervention group from pretest to posttest. The flat line indicates little movement in standard scores from pretest to posttest while the upward-sloping line indicates movement from low standard scores to higher standard scores. On several dependent variables the positive change in standard scores from pretest to posttest for the reading-intervention group was particularly striking. For example, the mean pretest score for *Word Attack* was approximately 20 points higher for the control group than the reading-intervention group but at posttest, the reading-intervention group

had closed the gap to about four points. A similar situation was seen in *Sound Awareness* where the reading-intervention group closed the gap from a 15 point difference at pretest to a six point difference at posttest.

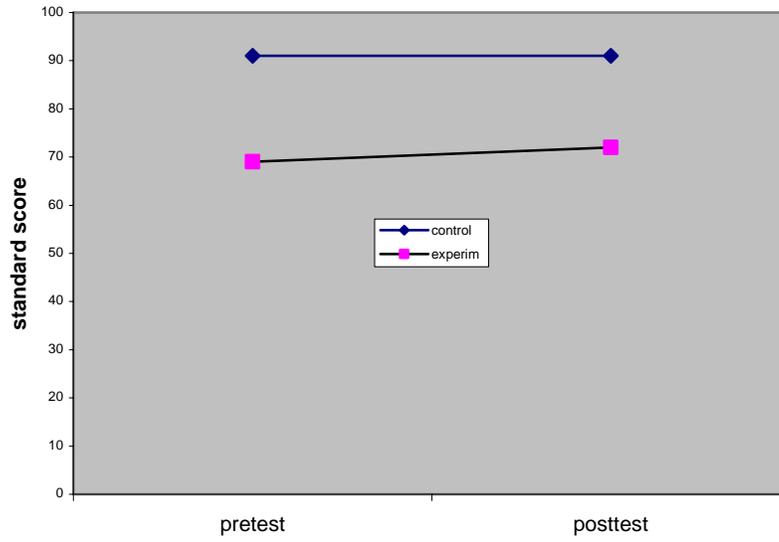


Figure 4-1. Difference in mean standard scores for *Letter-Word Id.*

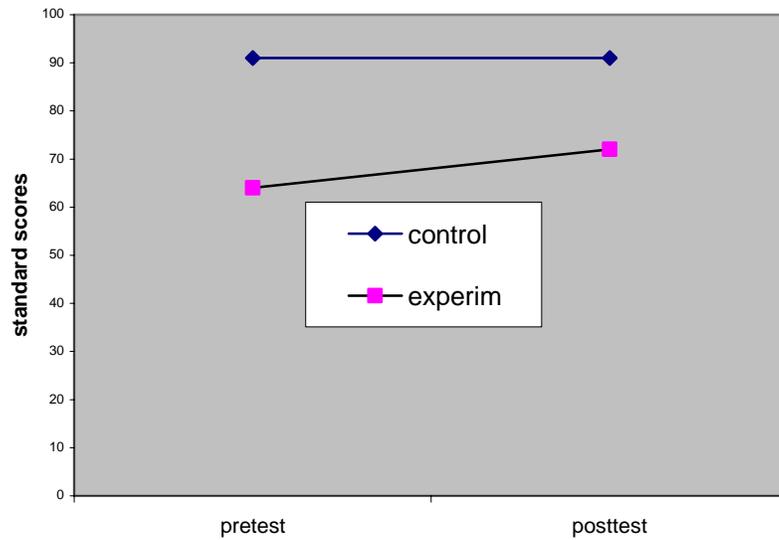


Figure 4-2. Difference in mean standard scores for *Spelling.*

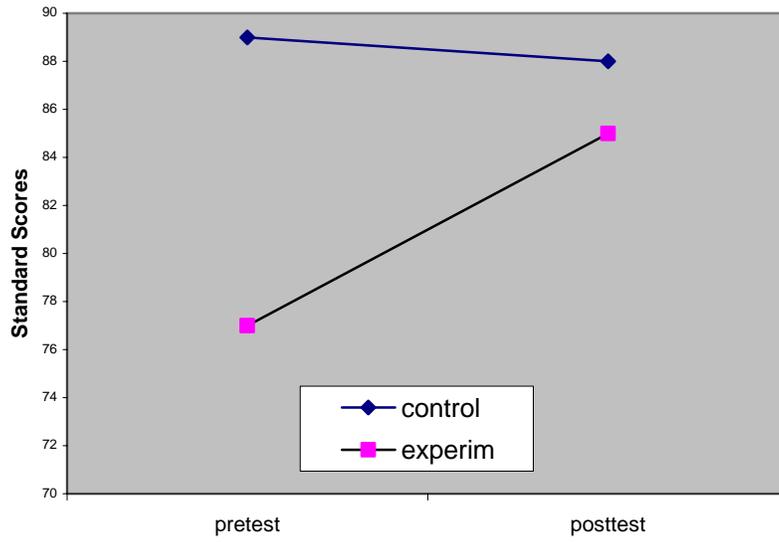


Figure 4-3. Difference in mean standard scores for *Word Attack*.

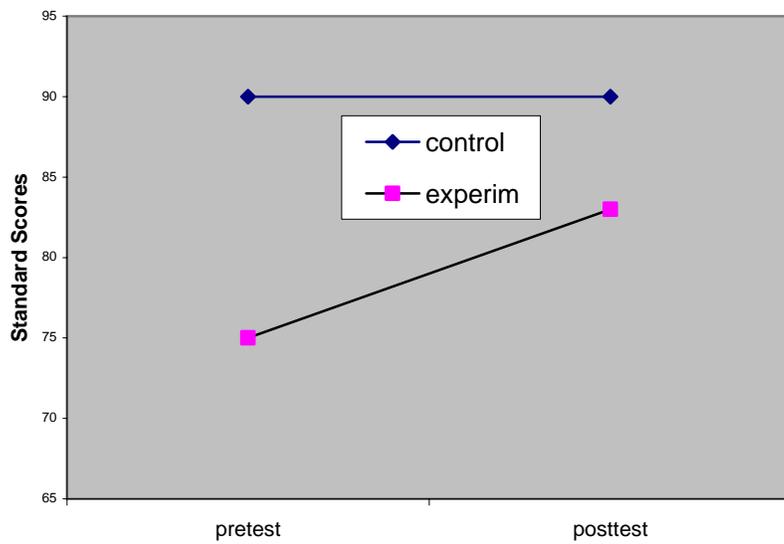


Figure 4-4. Difference in mean standard scores for *Sound Awareness*.

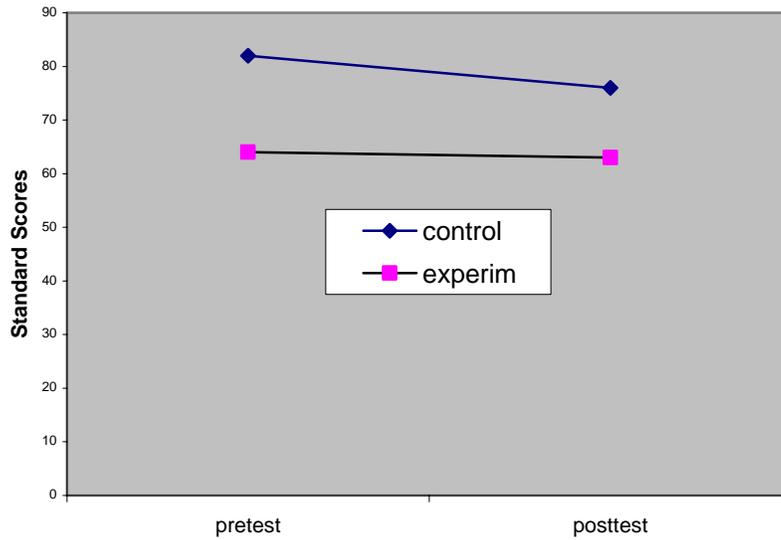


Figure 4-5. Difference in mean standard scores for *Sight-Word Efficiency*.

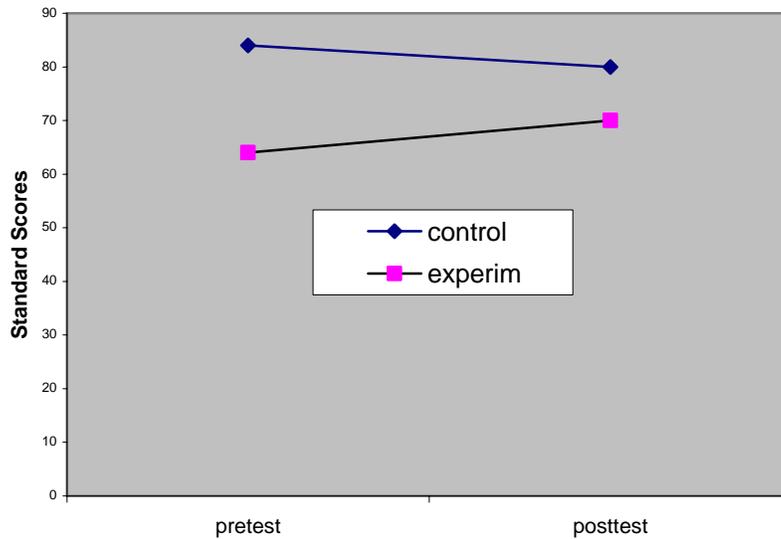


Figure 4-6. Difference in mean standard scores for *Phonemic Decoding Efficiency*.

**Hypothesis 1:** Based on the phonological core model to reading, it was hypothesized that students with reading disability who were assigned to a reading-intervention group based on low pretest scores and who received a multisensory, Orton-Gillingham influenced

approach to intervention would make greater improvement on posttest scores when compared to a group of students who did not receive such intervention because of higher pretest scores on measures of reading skill.

This hypothesis was supported. Results of the  $t$  test for independent samples confirmed that the control group performed significantly better than the reading-intervention group at pretest on the dependent variable reading measures. However, after the reading intervention, there was no longer a significant difference between the groups on the dependent variable reading measures with the standard scores of the reading-intervention group moving closer to those of the control group.

**Research Question 2:** Do individual participants show significant differences from pretest to posttest scores for 1) letter-word identification; 2) word attack; 3) spelling; 4) sound awareness; 5) speed of sight-word recognition; and 6) speed of nonsense-word decoding

Results of the  $t$  test for nonindependent matched samples revealed that the reading-intervention group performed significantly better at  $p < .05$  on the posttest compared to the pretest on *Word Attack* ( $t(9) = -5.943, p = .000$ ) and approached significance on *Spelling* ( $t(9) = -2.007, p = .080$ ). In contrast, the control group participants did not perform significantly better on any of the posttest reading measures at  $p < .05$ . In contrast, the control group participants performed significantly worse on the posttest on one measures of the TOWRE, *Sight-word Efficiency* ( $t(9) = 4.000, p = .004$ ). Results of the  $t$  test for nonindependent samples for the reading-intervention and controls groups are shown in tables 4-3 and 4-4

Table 4-3. Reading-intervention group: *t* test for nonindependent samples.

Pretest-Posttest Pair	Mean difference from pretest to posttest (negative coefficient indicates higher posttest score)	Standard Deviation	t	df	p < .05)
WJ III Achievement					
Letter-Word Identification.	-3.222	7.412	-1.304	9	.228
Spelling	-8.000	11.958	-2.007	9	.080
Word Attack	-7.889	3.98260	-5.943	9	.000 *
Sound Awareness	-8.111	17.047	-1.427	9	.191
TOWRE					
Sight-word Efficiency	1.222	21.568	.170	9	.869
Phonemic Decoding Efficiency	-2.889	10.833	-.800	9	.447

\* indicates significantly better posttest score at  $p < .05$  level.

Table 4-4. Control group: *t* test for nonindependent samples.

Pretest-Posttest Pair	Mean difference from pretest to posttest (negative coefficient indicates higher posttest score)	Standard Deviation	t	df	p < .05
WJ III Achievement					
Letter-Word Identification.	.000	5.172	.000	9	1.000
Spelling	-.111	3.444	-.097	9	.925
Word Attack	1.000	10.161	.295	9	.775
Sound Awareness	-.111	8.781	-.038	9	.971
TOWRE					
Sight-word Efficiency	6.000	4.500	4.00	9	.004**
Phonemic Decoding Efficiency	3.333	6.000	1.667	9	.134

\*\* indicates significantly worse posttest score at  $p < .05$

**Hypothesis 2:** It was hypothesized that a student who participated in the reading-intervention program would achieve higher posttest scores compared to their pretest scores as a result of a one-on-one multisensory reading-intervention program.

This hypothesis was supported. The participants in the reading-intervention group achieved a significantly higher posttest score on the dependent variable *Word Attack* and approached significance on the dependent variable *Spelling*. Although none of the other posttest measures were statistically significant, all posttest standard measures were higher than their matched pretest scores. In contrast, for participants in the control group, no

posttest scores were significantly higher while the *Sight-word Efficiency* posttest score was significantly lower than its matched pretest score, indicating significantly poorer performance.

**Research Question 3:** Does Basic Reading Skill predict 1) starting point for tutoring; and 2) number of lessons to complete a Barton level?

Correlation and descriptive analyses were used to address this question. First, the mean, median, mode and range for the reading-intervention group and control group for pretest and posttest standard measures were analyzed (Table 4-5 and Table 4-6). The scores varied widely in range at both pretest and posttest. For example, there was a 40 point spread in *Word Attack* at pretest for the reading-intervention group and a 38 point spread at posttest. Likewise, there was a 43 point spread for *Sound Awareness* at pretest for the control group and a 42 point spread at posttest. Such a wide range of scores may be attributed to a number of factors, including participants' comfort with the test taking situation, familiarity with the task, and ability to perform the task.

The highest mean score for the reading-intervention group at both pretest and posttest was for *Word Attack*. Although the standard score at posttest (84.67) was still one standard deviation below the mean, it is important to note this score increased from pretest by approximately eight standard score points (76.78). In contrast, there was little variation in mean standard scores from pretest to posttest for the control group. For example, the mean pretest score for Spelling was 90.88 and changed by only a fraction of a point at posttest (91.00). Finally, the lowest mean pretest scores for the reading-intervention group and control group at both pretest and posttest was *Sight-word Efficiency* and participants did not

fare much better on *Phonemic Decoding Efficiency*, reflecting the persistent difficulty students with reading disability frequently have with rapid naming.

Table 4-5. Reading-Intervention Group Mean, Median, Mode, Range at Pretest and Posttest

Test	Mean		Median		Mode		Range	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
WJ III								
Achievement								
Letter-Word Identification	69.22	72.44	72.00	80.00	47.00	82.00	47.00-86.00	46.00-96.00
Spelling	64.11	72.11	61.00	69.00	49.00	55.00	49.00-94.00	55.00-103.00
Word Attack	76.78	84.67	77.00	82.00	84.00	80.00	64.00-84.00	72.00-100.00
Sound Awareness	74.67	82.78	74.00	82.00	52.00	73.00	52.00-94.00	53.00-116.00
TOWRE								
Sight-word Efficiency	64.00	62.78	65.00	65.00	46.00	62.00	46.00-90.00	55.00-83.00
Phonemic Decoding Efficiency	67.44	70.33	66.00	66.00	66.00	55.00	55.00-95.00	55.00-91.00

Table 4-6. Control Group Mean, Median, Mode, and Range at Pretest and Posttest

Test	Mean		Median		Mode		Range	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
WJ III								
Achievement								
Letter-Word Identification	90.89	90.89	90.00	92.00	83.00	92.00	83.00-98.00	85.00-98.00
Spelling	90.88	91.00	93.00	90.00	88.00	82.00	81.00-100.00	82.00-100.00
Word Attack	89.22	88.22	87.00	87.00	97.00	83.00	77.00-103.00	81.00-104.00
Sound Awareness	90.33	90.44	84.00	89.00	105.00	76.00	71.00-114.00	76.00-118.00
TOWRE								
Sight-word Efficiency	82.44	76.44	86.00	81.00	86.00	83.00	65.00-92.00	56.00-87.00
Phonemic Decoding Efficiency	83.67	80.33	83.00	80.00	76.00	84.00	76.00-102.00	67.00-93.00

As described in Chapter 3, the Barton Book in which a participant began the tutoring program was based on the participant's performance on the Barton pretest, not on the participant's standardized pretest reading measures. Regardless of a participant's pretest

score on the dependent variable measures, little variation was observed on the starting book for the participants.

Results of correlation analysis (Spearman's rho) revealed that the *Basic Reading Skills* score was a better predictor of number of sessions taken to complete Level 2 ( $r_2(9) = -.66, p = .055$ ) than starting level in the Barton System ( $r_2(9) = -.45, p = .23$ ), however neither correlation was significant ( $p < .05$ ). Scatter plots (Figures 4-7 and 4-8) revealed low negative correlations between Basic Reading Skill score and Barton Level showing that as BRS standard score increased, number of lessons to complete a book decreased.

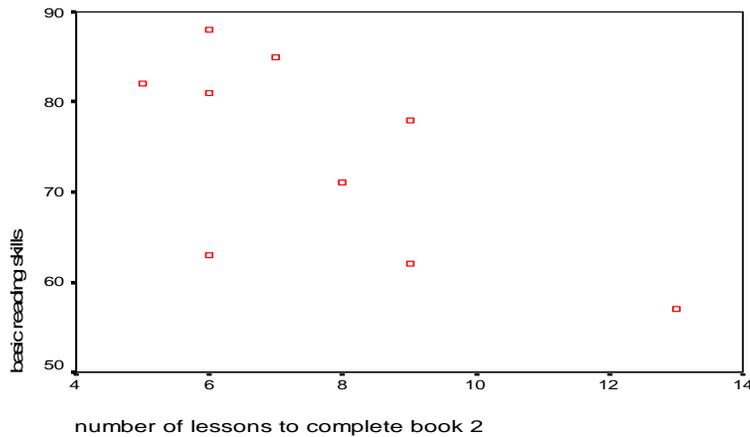


Figure 4-7. Book 2 number of lessons to complete & Basic Reading Skills

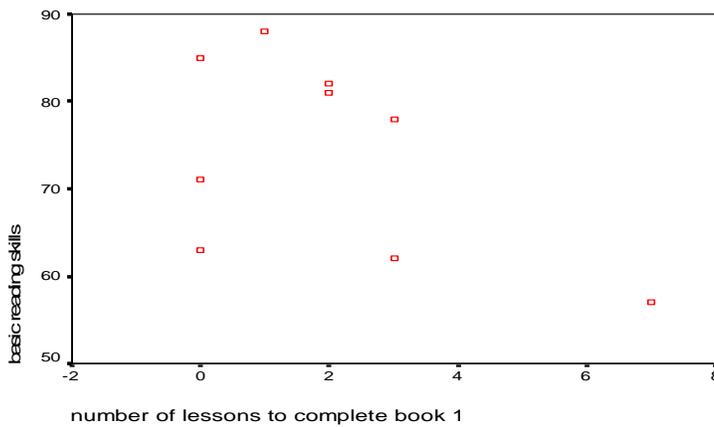


Figure 4-8. Book 1 Number of lessons to complete & Basic Reading Skills

Six participants began tutoring with Book 1, five at Lesson 1 and one at Lesson 4, and the remaining three participants began tutoring with Book 2, Lesson 1. The *Basic Reading Skill* (BRS) score was used to evaluate whether or not pretest standard scores could be used to predict starting point for tutoring. Four participants (20, 13, 11, and 16) had BRS standard scores in the low 80's (81, 82, 82, and 85, respectively). The remaining five participants had standard scores on the BRS composite that ranged from one and half (78) to almost three standard deviations below the mean (57). However, there was not a predictable correspondence between BRS score and starting point for tutoring. For example, Participant 11, who had a BRS standard score of 82, and Participant 18, who had a BRS standard score of 62, both started tutoring at Book 1, Lesson 1. Conversely, Participant 10, who had a BRS standard score of 63, and Participant 14, who had a BRS standard score of 71, both started tutoring in Book 2.

Bar graphs were created to show the rate of progress during reading intervention as measured by the number of sessions it took a participant to complete a Barton book (Figures 4-9 and 4-10). The total number of sessions conducted was 26 but attendance varied by participant and ranged from 25 sessions for Participant 18 to 14 sessions for Participant 16; the average number of sessions attended was 20. Because all participants completed Book 2, Consonants and Short Vowels, the investigator examined whether a pattern could be observed between pretest performance on standardized measures and progress during reading intervention, as measured by number of sessions to complete a Barton book. As shown in Figure 4.9, Participant 7 took the greatest number of sessions (13) to complete Book 2. This participant also received the lowest pretest scores on *Word Attack* and *Letter-Word Identification*. In comparison, Participant 11, who achieved the

highest pretest scores on *Spelling* and *Letter-Word Identification*, took the fewest number of sessions to complete Book 2. Figure 4.10 shows that Participants 14 and 18 required nine sessions, the next highest number of sessions after Participant 7, to complete Book 2. In a similar fashion, Participants 14 and 18 received the third and fourth lowest pretest standard scores, respectively, on *Word Attack*, the third and the worst pretest standard scores, respectively, on *Letter-Word Identification*, and the third and second worst pretest standard scores, respectively, on *Spelling*. Although Participant 20 and Participant 16 were among the students who had higher pretest standard scores, neither participant completed Book 3. Participant 16 attended the fewest sessions and Participant 20 attended the next-fewest and it is likely that poor attendance limited their progress.

**Hypothesis 3a:** It was hypothesized that the Basic Reading Skill score would predict a participant's starting book in the Barton Reading and Spelling System such that a participant in the reading-intervention group who started with lower pretest standard scores on the dependent variable reading measures would perform more poorly on the Barton pretest and start at a lower Barton book and lesson while a participant who achieved higher pretest standard scores on the dependent variable reading measures would progress farther on the Barton pretest and start at a higher Barton book.

The first hypothesis pertaining to Research Question 3 was not supported; the correlation between BRS and starting book was not significant and there was no consistency between participants' pretest standard scores on the dependent reading variables and their subsequent performance on the Barton pretest.

For example, Participant 7, who began tutoring with Book 1, Lesson 1, achieved the lowest pretest scores on the WJ III Ach, with standard scores ranging from one and a half

to three standard deviations below the mean on all subtests (lowest score-*Sound Awareness* standard score 52; highest score-*Reading Vocabulary* standard score 75).

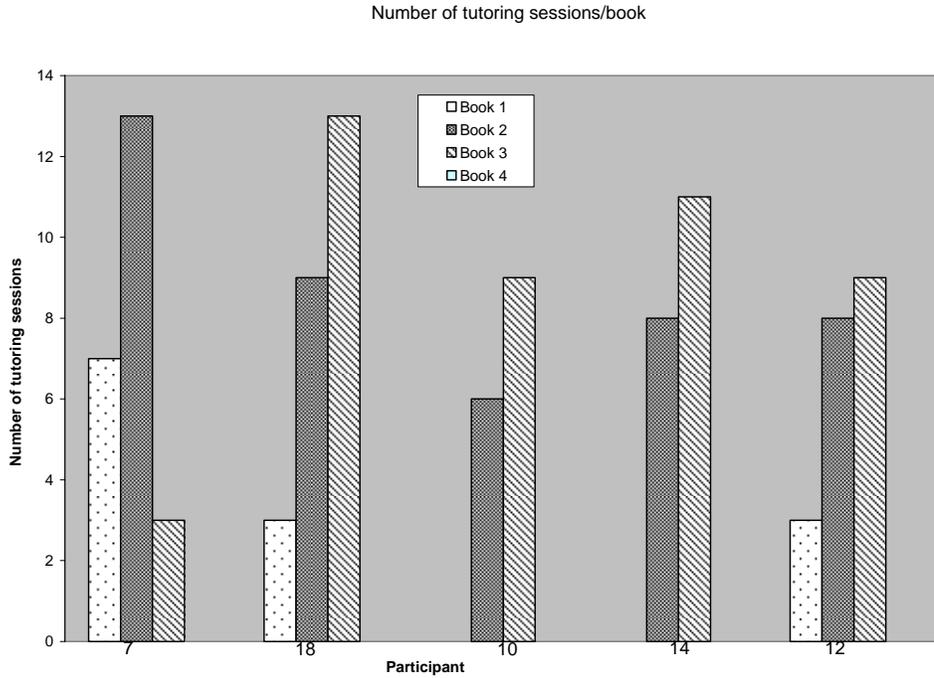


Figure 4-9. Progress of participants-lowest BRS pretest standard score 7, 18, 10, 14, 12

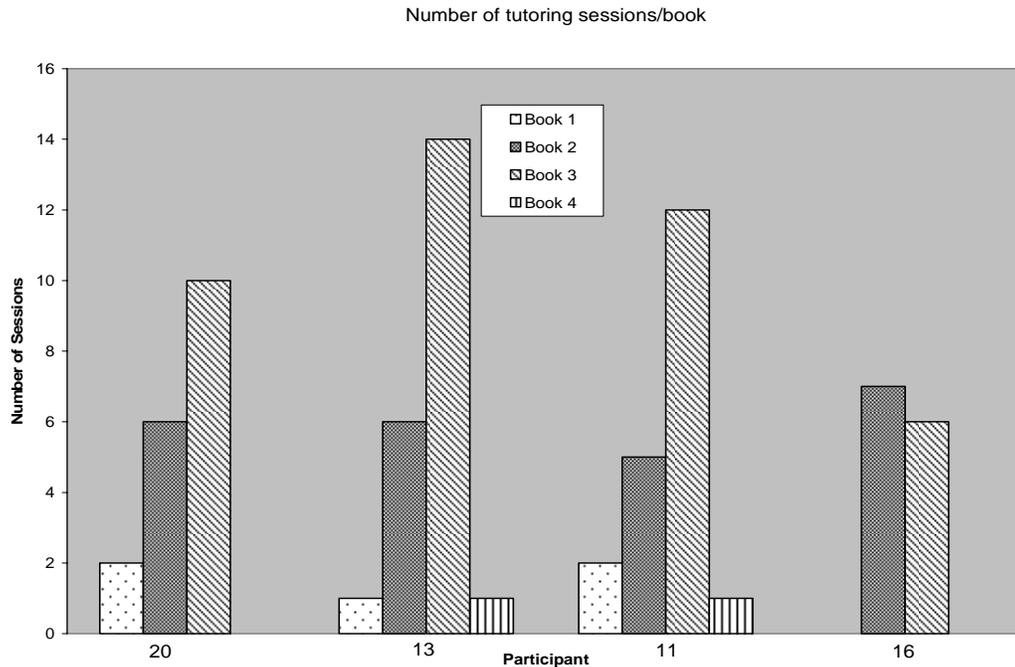


Figure 4-10. Progress of participants-highest BRS standard scores 20, 13, 11, and 16

However, Participant 11, who also began tutoring at Book 1, Lesson 1, achieved comparatively better scores on the pretest. This participant had two scores that were more than one and a half standard deviations below the mean on the pretest (*Word Attack* standard score 75; *Sound Awareness* standard score 77); all other scores were within one standard deviation of the mean. In contrast, Participant 10 started tutoring at Book 2, Lesson 1. However, this participant's pretest standard scores were similar in severity to Participant 7 who began tutoring at Book 1, Lesson 1 (lowest score-*Spelling* standard score 49; highest score-*Word Attack* standard score 70).

**Hypothesis 3b:** It was hypothesized that the BRS would predict number of sessions to complete a lesson in the Barton Reading and Spelling System such reading-intervention participants who show more severe reading disabilities as defined by pretest standard scores would make slower progress during reading intervention, as defined by the number of sessions taken to complete a book, than reading-intervention participants who showed less severe reading disabilities.

The second hypothesis pertaining to Research Question 3 had moderate support. The correlation between BRS and the number of sessions taken to complete Book 2 was near significant at  $p = .055$ . Participant 7, who achieved the lowest pretest standard score on *Letter-Word Identification* and *Word Attack* required the most sessions to complete Book 2. In comparison, Participant 11 moved through Book 2 more quickly than any other participant and also had the highest pretest scores on *Letter-Word Identification* and *Spelling*. Finally, Participants 14 and 18 consistently scored in the bottom third of the reading-intervention group on pretest scores and both required the second most number of sessions to complete Book 2.

**Research question 4:** Do more reading-intervention participants than control participants achieve a greater than expected three month gain in grade-equivalent score from pretest to posttest for 1) letter-word identification; 2) word attack; 3) spelling; 4) sound awareness; 5) speed of sight-word recognition; and 6) speed of nonsense-word decoding?

The percentage of each group that showed a greater than three month change in grade equivalent score from pretest to posttest was considered (Table 4-7). The data show that on four of the six dependent variables, a greater percentage of participants in the reading-intervention group increased their grade equivalent score by more than three months compared to participants in the control group. The three students who qualified for reading intervention but could not participate were among control group participants whose posttest grade equivalent scores increased by more than three months. However, this increase only held true for the WJ III Achievement test.

Table 4-7. Greater than 3-month increase in grade-equivalent score by percentage.

Dependent Variable	Reading- Intervention Group	Control Group
WJ III Achievement		
Letter-Word Identification	33%	44%
Spelling	66%	33%
Word Attack	100%	44%
Sound Awareness	44%	66%
TOWRE		
Sight-word Efficiency	33%	11%
Phonemic Decoding Efficiency	44%	22%

**Hypothesis 4:** It was hypothesized that a greater percentage of participants in the reading-intervention group as compared to the control group would increase their grade equivalent scores by more than three months from pretest to posttest. This hypothesis was

also supported. On four of the six dependent variables measured, a greater percentage of the participants in the reading-intervention group achieved posttest grade equivalent scores that were more than three months higher than their pretest grade equivalent scores.

Complete information on pretest and posttest raw scores, standard scores, percentiles, and grade equivalency for all dependent variable measures for both the reading-intervention participants and control participants is provided in Appendix J.

### **Summary of Findings**

A summary of the findings for the experimental questions is shown below.

#### Quantitative Findings

1. Independent samples *t* test found significant differences on mean pretest standard scores between the reading-intervention group and control group for all dependent variables. ANCOVA revealed no significant differences between groups at posttest. When the pretest scores were held constant, the reading-intervention group consistently improved their reading skills to a greater degree than the control group. The reading-intervention group made noticeable gains on closing the gap in reading skills with the reading-intervention group at posttest.

2. Dependent samples *t* test revealed a statistically significant improvement in *Word Attack* at posttest for the reading-intervention group and a near significant improvement in *Spelling*. In contrast, the control group performed significantly worse on *Sight-word Efficiency* at posttest.

#### Descriptive Findings

1. A correlation was not observed in the performance of reading-intervention participants on standardized pretest measures and starting point for tutoring.

2. A moderate correlation was observed in the performance of reading-intervention participants on standardized pretest measures and rate of progress during reading intervention.

3. More reading-intervention participants than control participants achieved a greater than expected three-month increase in grade equivalency score from pretest to posttest.

## CHAPTER 5 DISCUSSION

### **Overview of Findings**

This study explored the effectiveness of an Orton-Gillingham-influenced, multisensory, phonics intervention with high school students with reading disability. The Phonological-Core-Variable-Differences Model, first proposed by Stanovich in 1988, states that all poor readers have a processing deficit localized in the phonological core. A core deficit in phonological processing impairs a reader's ability to associate written letters with spoken sounds and disrupts the processing of phonological tasks such as blending, segmenting, and rearranging sounds (Downey, & Snyder, 2000). This deficit persists into adulthood (Bruck, 1992; Eden, et al., 2004; Pennington, Van Orden, Smith, Green, & Haith, 1990). Therefore it was hypothesized that a remedial reading program that provided explicit phonologically-based reading instruction using multiple sensory strategies would significantly improve the reading skills of students with reading disability. A quasi-experimental design was used to determine if members of the reading-intervention group showed a stronger improvement on posttest performance relative to their own pretest performance compared to members of the control group's pretest and posttest performance. Participants' reading subskills were measured on the following dependent variables: letter-word identification, spelling, word attack, sound awareness, speed of sight-word recognition, and speed of phonemic decoding for nonsense words.

A related goal of the study was to analyze whether an individual participant's posttest score for each reading subskill measure increased from its matched pretest score

following the reading intervention. Finally, correlation and descriptive analysis were employed to determine if performance, as measured by pretest standardized scores, predicted to Barton pretest results and progress through the reading-intervention program, and if more reading-intervention participants than control participants achieved an increase of more than three months in grade equivalent score as measured from time of pretest to time of posttest.

Analysis of Covariance (ANCOVA) supported the hypothesis that members of the reading-intervention group would show a stronger improvement than the control group on their posttest performance relative to their pretest performance for the dependent variables tested. Results of the independent samples *t* test revealed the control group had significantly better pretest scores on the dependent variables compared to the reading-intervention group. However at posttest, the differences between the control group and the reading-intervention group on the dependent variables were no longer significant. When results were adjusted for pretest scores, the reading-intervention group consistently showed greater improvement achieved higher scores. The difference in adjusted means ranged from a low of .460 on *Phonemic Decoding Efficiency (TOWRE.)*, (i.e., the reading-intervention group improved by only .460 standard score points more than the control group on the posttest) to a high of 3.605 on *Letter-Word Identification (WJ-III Ach.)*, (i.e., the reading-intervention group improved by more than 3.5 standard points than the control group on the posttest). Similar results were observed when a *t* test for nonindependent, matched samples was used to measure individual participant progress from pretest to posttest.

Results of the  $t$  test for nonindependent samples revealed that the reading-intervention group performed significantly better at  $p < .05$  on the posttest compared to the pretest on *Word Attack* ( $t(9) = -5.943, p = .000$ ) and approached significance for *Spelling* ( $t(9) = -2.007, p = .080$ ). No other values reached the significance level. In contrast, the control group participants failed to perform significantly better on any of the reading measures at  $p < .05$ . In fact, the control group participants performed significantly worse than the reading-intervention group participants on the TOWRE, *Sight Word Efficiency* ( $t(9) = 4.000, p = .004$ ) when posttest scores were compared to pretest scores. Correlation analysis offered moderate though not significant support of a predictive relationship between Basic Reading Skill score and number of sessions to complete Level 2 in the Barton System ( $r_2(9) = -.66, p = .055$ ) but did not support a predictive relationship between Basic Reading Skill score and starting book in the Barton System ( $r_2(9) = -.45, p = .23$ ). Results of the descriptive analysis also supported greater improvement in the reading-intervention group participants over control group participants. Our study took place over a three month span of time. Therefore, a three month increase in grade level equivalency was used as a benchmark for expected change in reading variable measures from time of pretest to time of posttest. On four of the six dependent variables, participants in the reading-intervention group out-gained participants in the control group on grade-equivalency. This finding was particularly striking on the *Word Attack* subtest where 100% of the participants in the reading-intervention group achieved a greater than three month improvement in grade equivalency compared to only 44% of the participants in the control group.

The findings of the current study compare favorably with other reading-intervention studies that have employed multisensory interventions. For example, Guyer and Sabatino (1989) found that college students with learning disability who were exposed to a multisensory, O-G approach made significant gains on word attack, word analysis, and spelling skills compared to students who did not receive such an approach. Participants in the current study who received a multisensory, O-G approach to reading intervention also improved their skills on these reading subskills. Brooks and Weeks (1998) found that students with dyslexia learned significantly more words with a visual/semantic method that required visualizing the word, recalling the composition of the word, and pointing to the smaller words while naming the words. The Barton System utilized a similar method in teaching sight-word spelling and analysis with the *t* test for nonindependent matched samples revealed posttest scores on the *Spelling* subtest neared significance for participants in the reading-intervention group.

### **Discussion of Research Findings**

Specific components of the Barton Reading and Spelling System may account for the better posttest scores achieved by the reading-intervention group participants compared to the control group participants. First, the Barton System consistently uses phonetically regular words and nonsense words to teach each spelling rule. Nonsense words follow the rules of English spelling but are not real words. For example, to teach a rule governing the spelling of the *k* sound (i.e., when to use *ck* vs. *k*), the tutor asks the student to practice the rule by reading regular and nonsense words, and by spelling regular words. This is consistent practice that the participants in the control group did not receive.

Thus when the pretest scores were adjusted, results of the ANCOVA showed that the participants in the reading-intervention group improved 3.605 standard score points more than the control group participants on *Letter-Word Identification* (WJ III Ach) at posttest. The *Letter Word Identification* subtest called on participants to read single words that increased in difficulty. A similar explanation would appear to account for the reading-intervention participants' growth in *Word Attack* (WJ III Ach). This subtest required the participants to read nonsense words, again, an exercise that the reading-intervention group participants practiced regularly. It is likely that participants in both the reading-intervention and control groups had little practice in reading nonsense words at pretest. However, because the Barton System routinely incorporates nonsense word reading into every lesson, the participants in the reading-intervention group were very familiar with this practice at posttest. Descriptive analysis further supported this finding. All participants in the reading-intervention group (100%) achieved a grade equivalent score at posttest on *Word Attack* that was more than three months higher than their pretest score. Only 44% of the participants in the control group achieved similar growth. Similarly, the near-significant improvement in *Spelling* (WJ III Ach) can be attributed to the emphasis on phonics and practice in spelling that the participants in the reading-intervention group received. Again, descriptive analysis supports this difference, with two thirds (66%) of the participants in the reading-intervention group experiencing a greater-than-three month gain in grade equivalent score from pretest to posttest compared to one third (33%) of the control group. Participants attending the charter school do not take spelling tests routinely nor do their classroom teachers regularly correct their spelling errors during daily work. In contrast, the reading-intervention group participants

practiced spelling words at every reading-intervention session and the tutors used a guided discovery process to help the participants detect any spelling errors.

A final component of the Barton Reading and Spelling System that may have influenced posttest improvement is consistent practice in reading and spelling sight words. Sight words “don’t follow the rules.” They are irregular words that do not follow patterns and cannot be sounded out (Shaywitz, 2003). Thus children with reading disability often have great difficulty reading and spelling sight words. A common way to practice reading sight words more quickly and efficiently is to read the words on flash cards until they are known automatically. This method is used in the Barton Reading and Spelling System. While participants in the reading-intervention group did not make significant gains in this skill, participants in the control group performed significantly worse at posttesting on the *Sight Word Efficiency* subtest (TOWRE) than at pretesting. It is unlikely that many older students with reading disability work on their ability to read sight words efficiently on their own accord. However, participants in the reading-intervention group received sight-word practice at every session, allowing them to at least maintain what skill they have in this area.

### **Beyond Phonological Awareness Training**

The use of a multisensory approach with high school students with reading disability that provides direct, systematic, and explicit instruction in phonological awareness makes sense conceptually and has at least moderate support in the literature (Curtis & Longo, 1999; Moats, 2004; Oakland et al., 1998). A remedial approach to reading improvement, founded on the premise that English is a rule-based language and that these rules can be systematically and explicitly taught, should be an effective venue for improving the reading skills of individuals with reading disability. The Barton

Reading and Spelling System, used in our study, is one such remedial program. Furthermore, as the name multisensory implies, these approaches build and reinforce learning pathways through visual, auditory, and tactile-kinesthetic input, thereby increasing the probability that connections will form between the centers in the brain that process information needed for efficient reading.

Harm, McCandliss, and Seidenberg (2003) proposed a mapping theory that fits well with multisensory instruction and explicit teaching of spelling rules, similar to the approach used in the Barton System. Using a computer simulated model, Harm et al. (2003) demonstrated that the machine learned more words when phonological awareness training was combined with sound-letter correspondence in spelling tasks than when phonological awareness was taught in isolation. The researchers hypothesized that by extending instruction to letter-sound spelling exercises, the simulated model was mapping new pathways of learning in the brain. A key component of the Barton Reading and Spelling System is its systematic use of both decoding and encoding exercises to teach and practice reading and spelling rules. The Barton System systematically includes spelling procedures in every lesson so the student is continually reinforcing what he/she is reading with corresponding lessons in spelling. By using visual input to read a word and tactile-kinesthetic input to spell a word (with tiles or on paper), multiple senses and multiple learning pathways are activated in the learner.

Prior to the mapping theory developed by Harm, McCandliss, and Seidenberg (2003), Hatcher, Hulme, and Ellis (1994) suggested that the phonological linkage hypothesis might account for variable successes experienced by participants in several phonological awareness training studies. According to the phonological linkage

hypothesis, "...training in phonological skills in isolation from reading and spelling skills may be much less effective than training that forms explicit links between children's underlying phonological skills and their experiences in learning to read" (p.42). Hatcher et al. (1994) showed that a group of reading impaired children who participated in a reading with phonological treatment group made the most progress in reading. The lessons in the Barton Reading and Spelling System follow such a philosophy. After a student is taught a spelling rule, he/she systematically and explicitly practices the new rule through reading and spelling exercises at the word level, phrase level, sentence level, and short paragraph level. Considering the research findings of Harm, McCandliss, and Seidenberg (2003) and Hatcher, Hulme, and Ellis (1994) that promotes combining phonological awareness training with both letter-sound mapping and spelling, and incorporating this training in broader reading contexts, the Barton System is based on a solid theoretical framework. Therefore, it is important to look at the components of the Barton program to explore its components in the broader context of adolescents who struggle with reading.

### **Critical Components of the Barton Reading and Spelling System**

#### **Barton Pretest**

The lesson on which a reading-intervention participant begins tutoring in the Barton System is determined by the participant's performance on a pretest devised by Barton, rather than by the participant's performance on the standardized pretest assessment battery. This procedure of the Barton System could interfere with progress for maximizing growth during short reading-intervention programs.

As previously described in Chapter 3, the first three books of the Barton system provide pretests that assess the reading and spelling skills to be taught in the

corresponding books. The pretest progresses in difficulty in the same way the procedures and lessons progress; therefore, a student who reaches the maximum number of allowable mistakes early on in a pretest begins tutoring in the early, easier lessons of the book. A participant is permitted only two or three errors before meeting Barton's criterion for failing the pretest. All participants in our study began tutoring in either Book 1 or Book 2. However, it became apparent during the reading-intervention program that the Barton pretests were not a good indication of skill level for most of the participants. The following example illustrates this point.

Participant 13 was one of the more advanced students in the reading-intervention group in terms of pretest standardized scores, but her Barton pretest results required that she begin tutoring on Book 1 of the Barton System. Participant 13 met the pass criterion for Pretest A of Book 1, *Break Apart Nonsense Words*, but she did not meet the pass criterion for Pretest B of Book 1, *Break-Replace-Remove*. The pass criterion to move from Pretest B to Pretest C was one or no errors. Because Participant 13 missed two items on Pretest B, she was required to begin tutoring at Book 1, Lesson 3. In Book 1, the tutor alternately built consonant-vowel combinations for the participant to decode or dictated consonant-vowel combinations for the participant to build with the tiles. Participant 14 had an extensive history with multisensory instruction and quickly moved through an entire lesson each time she was tutored. She immediately picked up the spelling rules taught and passed the reading and spelling probes with 100% accuracy on the first trial. Of all the nine reading-intervention participants, she and Participant 11 progressed the furthest in treatment, to Book 4, Lesson 1.

When the reading intervention ended, Participant 13 commented that she was just getting to the point where she felt like she was learning something. While this comment does reflect the short length of the reading-intervention program, it also illustrates the problem of the low placement level prescribed by the Barton program. Participant 14's experience in the Barton System reading-intervention program may have been more beneficial and efficient if she had been able to bypass the basic, introductory lessons of Book 1 and Book 2 (vowel and consonant sounds) and progress to material more meaningful to a high school student.

In contrast to Participant 13, Participant 7 had the most depressed pretest standardized scores of all the participants. Similar to Participant 13, Participant 7's Barton pretest placed him at Book 1. However he began at the first lesson in Book 1 while Participant 13 began at the third lesson. Clearly, this participant did not have the reading skills necessary to by-pass any of the early books of the Barton System. These two brief participant profiles present quite a disparate picture. One participant, who had a strong background in multisensory, systematic and explicit phonics training, moved quickly and easily through the program and felt she was just beginning to get to meaningful reading and spelling rules after 22 sessions. The other participant, with no prior history of multisensory, systematic, and explicit phonics training struggled with each and every rule taught, and was just beginning to feel comfortable with tutoring after 22 sessions. Therefore, the Barton pretest criterion for starting a book may be too conservative in some cases, but appropriate in others. There should be a mechanism in the Barton Reading and Spelling System to adjust for such wide differences. Possible solutions include 1) increasing the number of errors that a student is permitted to make on

each pretest procedure, 2) testing a wider array of reading and spelling skills and then doing an item analysis to see where a student is having most difficulty, and 3) extending the assessment period and length of reading intervention.

### **Stimulus Materials**

Barton recommends the Barton Reading and Spelling be used for children through adults. However, the words and stories used in the lessons in Book 1 through Book 4 were words in a young child's vocabulary. For example, in Book 2, Consonants and Short Vowels, the spelling words included *fig*, *ran*, and *sip* and the sentence *the rat bit the fig*. The short stories introduced in Book 3 held little appeal to the older students. Although supplemental stories that are more advanced in text are available from Barton, she stresses that these stories are only to be used by students who have completed all the lessons in Book 3. One participant continually complained that she felt the material was too easy for her and the stories were "stupid". Material that appeals to younger children and that may be enjoyed for its silliness, does not hold the same appeal to older students who have struggled for years with reading. This point has not been lost on researchers and educators interested in older students with reading disability (see, Curtis & Longo, 1999; Ivey, & Baker, 2004; Moats, 2001, 2004).

### **Meaningful Remedial Reading Programs for Older Students**

Salinger (2003) recently asked how the five major components of reading acquisition, identified by the National Reading Panel (2000), translate into instruction for older, struggling students. The National Reading Panel identified these components as phonemic awareness, phonics, fluency, vocabulary, and comprehension. Salinger (2003) points out that older students with reading disability who receive reading intervention often receive the same kind of instruction they have already had, focusing at the

microlevel of phonemic awareness and phonics skills. On the contrary, older students who struggle with reading need to receive instruction on the five components of reading that is appropriate to the literacy tasks they encounter in their daily academic and personal lives (Salinger, 2003). The Barton Reading and Spelling System addresses many crucial need of older students, but not at the beginning levels. Later books cover important rules for prefixes and suffixes and Greek and Latin roots. However, in most cases, students must first be tutored in the earliest books that teach phonemic awareness and consonant and vowel sounds. For a student with a long history of reading failure, covering such basic level material may only add to his/her frustration. Ivey and Baker (2004) state that phonemic awareness training and phonics instruction will neither help students in older grades read better nor read more frequently. However, they concede that it does make sense for older students who continue to struggle to read the words they encounter to receive age-appropriate instruction in word recognition and spelling.

The issue of age-appropriate content addresses an important point. The reading-intervention participants in our study made errors on very basic phonemic awareness tasks on the Barton pretests and consistently made errors producing and writing vowel sounds and reading sight words. Although the participants demonstrated different levels of proficiency in their reading skills during the lessons, they all made errors and it is expected that all participants would have experienced increased difficulty as the material became more challenging. Thus, older students in remedial reading programs must have a solid basis of phonological awareness skills on which to build as they address more difficult reading and spelling materials. The problem is making phonological awareness instruction sensitive to the needs, personalities, and intellectual levels of older students. A

program developed by Mary Curtis and Ann Marie Longo (1999) addressed this very issue for teens with reading problems.

Curtis and Longo (1999) developed a reading program at the Boys Town Reading Center (Omaha, Nebraska), a laboratory school with research goals to develop research-based programs and to disseminate these programs to schools around the nation. Curtis and Longo (1999) shared seven components of effective reading instruction upon which their program is based. One component is age-appropriate teaching materials and techniques. Similar to this researcher's observation of the Barton System, Curtis and Longo acknowledge that teaching older students to read is difficult because many of the methods and materials available are designed for younger students and often appear childish to them. Even materials that "look" appropriate for older students may be written at too low a level to produce meaningful growth for older students. This was a problem with the Barton System.

Barton uses videotapes to demonstrate the procedures used to carry out the reading and spelling rules. These videotapes feature one adult role-playing the part of an impaired reader and one adult playing the part of the tutor. This left a false impression with the graduate clinicians/tutors in this study that their adolescent students would enjoy the simple words, the silly sentences and the corresponding stories. Instead, the tutors were often faced with students who thought the material was insulting. Curtis and Longo (1999) offer several suggestions in addressing this problem. For example, to teach the most impaired readers the long vowel sound for *o*, they suggest using words whose meanings are known but which cannot be read, such as *cockroach* and *charcoal*. This rule in the Barton System was taught using simple words such as *boat* and *oat*.

A second critical component of the Boys Town Reading program (Curtis & Longo, 1999) is its focus on appropriate knowledge and skills necessary for moving a student to the next stage of literacy development. For example, instruction for a student reading at the lowest level would focus on word analysis skills while instruction for a student reading at an intermediate level would focus on acquisition of new words, ideas, and concepts and the opportunity to read text that contains this new information. Adherence to the Barton System pretest did not allow for the use of more advanced words. Thus, Participant 7, the student functioning at the lowest level began instruction at the same level as Participant 13, a student functioning at an intermediate level of literacy instruction.

Although the Barton System falls short on these two critical components, it does satisfactorily address other components of effective instruction identified by Curtis and Longo (1999). The Barton System is based on valid and reliable theory (Henry, 1998; McIntyre & Pickering, 2001) and research (Felton, 1993; Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Henry, 1998; McIntyre & Pickering, 2001). Instruction is structured and planned, learning takes place in stages, and the teachers or tutors are trained. The final critical component identified by Curtis and Longo (1999) in the Boys Town Reading Program addresses replication of results with the end goal being a comprehensive reading program that works for teens throughout the country. Presently, both the Barton Reading and Spelling System and the Boys Town Reading Program have only preliminary replication evidence (Barton, 2000; Curtis & Longo, 1999).

Other efforts to develop literacy programs for struggling adolescent readers are underway. Recently, researchers and practitioners who work with adolescents with

reading challenges held two workshops on adolescent literacy (The Partnership for Reading, 2002). *Practice Models for Adolescent Literacy Success*, the second of two workshops, culminated in a summary of four reading models being implemented across the country. Three of the four models, *Corrective Reading*, *Language!*, and *Strategic Reading*, are remedial reading programs while one system, *Strategic Instruction Model*, is a school-wide approach used in core curriculum content classes.

Both *Corrective Reading* and *Language!* stress systematic and explicit instruction and include instruction in various phoneme-level phonological awareness skills, including phonemic awareness, phoneme-grapheme correspondence, decoding, and encoding (*Strategic Reading* only addresses reading comprehension). The Barton Reading and Spelling System also includes systematic and explicit instruction at this level. However, the difference between the Barton System and the models studied by The Partnership for Reading (2002) lies in the scope of the instruction. For both *Corrective Reading* and *Language!*, training in phonological awareness skill is only part of a more comprehensive approach to instruction that includes comprehension skills, writing skills, and reasoning skills.

When considering the scope of the Barton Reading and Spelling System, it is important to keep in mind that it is a remedial reading program and, as such, it is meant to provide in-depth instruction in one area of reading instruction-phonological awareness. Nevertheless, the impact of reading disability for older students typically is not isolated to the decoding of text but rather affects all areas of their academics, including vocabulary knowledge, reading comprehension and writing conventions. Therefore, the more

encompassing a remedial reading program is, the more benefit it will be to the older student with reading disability.

### **Limitations and Future Directions**

Alexander and Slinger-Constant (2004) noted that many of the studies supporting multisensory education are quasi-experimental in design and lacking in either control groups or randomly assigned groups. Many multisensory remedial reading programs are carried out in schools and must operate under the confines of the educational system. Lack of resources in time, money, and personnel contribute to studies that use small sample sizes and are of short duration. These factors combine to produce findings that cannot be generalized to larger populations. Our study was no exception.

This study was limited by the small number of participants. A larger sample size would be less sensitive to factors such as unequal number of reading-intervention sessions within the reading-intervention group, prior history of similar reading intervention, and reading-intervention participants' grade-levels. Another limitation of this study was the short duration of the reading intervention. Several students were just beginning to reach material that was challenging and motivating to them when the study ended; other students were showing consistent and steady progress on developing phonological awareness skills at the end of the reading intervention. Approximately two weeks of intervention time were lost due to two hurricanes. Furthermore, because the graduate clinicians change externship placements every semester, reading intervention was limited to the university's fall semester schedule. Continuing reading intervention into the spring semester would have required recruiting and training new tutors and research assistants and would have introduced threats to the reliability of the data. Also, reading disability in this study was based on only one pretest assessment at one point in

time. It is possible that a wider assessment battery would have turned up different results and resulted in a different participant pool. For example, an IQ-achievement discrepancy formula, often utilized in reading research studies to identify participants as reading disabled, was not used in the current study. If it had, it is likely that Participant 7 and Participant 18 would have been excluded from the study. Background history on these students indicated that they were more globally impaired academically and were likely garden-variety poor readers with depressed IQ scores.

Lack of generalization of the research findings to other students with reading disability or to the effectiveness of the Barton Reading and Spelling System is the main obstacle presented by the research design used in this study. Nevertheless, the improvement in reading skills that students experienced when participating in the current Orton-Gillingham influenced, multisensory, systematic and explicit phonics program cannot be ignored and underscores that tutoring older students with reading disability is a worthwhile effort. Therefore, future directions for research in the area of older students with reading disability should study larger sample sizes and for longer durations. It would be interesting to see if students who are tutored on reading and spelling skills applicable to the material they encounter in the classroom, such as words with affixes or Greek and Latin derived roots, experience greater ease in reading age-level texts. The Barton Reading and Spelling System has many valuable components. The addition of words and stories more appropriate to older students would make it more appealing to a larger audience. Large-scale, well-designed research on the prevention of reading failure and early intervention for at-risk children has resulted in tremendous strides in reducing the

number of young children who cannot read. Now is the time to make a concerted effort to remediate struggling adolescents who suffer from reading disability.

### **Clinical Implications**

Older students with reading disabilities have experienced many years of frustration and failure with reading. Thus, clinicians interested in helping such students face a difficult task on two fronts. First, clinicians will likely be met with a student who is not motivated to practice reading and spelling exercises and who has a negative attitude about reading in general and intervention in particular. Second, older students with reading disability need to work with material that is interesting and age-appropriate in content. Packaged reading-intervention programs, such as the Barton Reading and Spelling Program are meant to appeal to a wide range of ages; thus, it may be necessary to individualize the material so older students are more motivated to take on the challenge of remedial reading strategies

Although remedial reading programs are not meant to be a student's main source of reading instruction, such programs will have greater impact if they are broad in scope. A remedial reading program that is sufficiently broad would include work on reading comprehension, vocabulary expansion, and reading fluency as well as phonological awareness and spelling. The gains shown in this study underscore 1) it is never too late to help the struggling reader improve his/her reading skills and 2) there needs to be a national effort in our educational system to address the needs of older students who struggle with reading. A recent brain-imaging study by Eden et al. (2004) underscores the point that it is never too late to help the older struggling reader. Eden et al. found that adults with developmental dyslexia who received phonological awareness training made significant improvement in phonological processing and nonword reading and that this

improvement was accompanied by increased activity in the left parietal cortex, similar to what is observed in typical adult readers. Thus even adults with a long history of reading disability can achieve changes in brain function that resemble a more normal pattern.

### **Conclusions**

This study provided moderate support for an Orton-Gillingham influenced multisensory explicit and systematic phonics-based approach to reading intervention for a group of high school students with reading disability. Results of independent sample *t* tests revealed that the control group had significantly higher pretest scores on all dependent variables. Results of posttest analysis using Analysis of Covariance revealed that the difference between the control group and the reading-intervention group on the dependent variables was no longer statistically significant. Participants in the reading-intervention group did improve their reading skills. When means were adjusted for pretest scores, participants in the reading-intervention group improved approximately three standard points more than the control group on *Letter-Word Identification*, *Spelling*, *Word Attack*, *Sound Awareness*, and *Sight Word Efficiency*. Results of a nonindependent, matched samples *t* test, showed significant improvement for the reading-intervention group participants on the *Word Attack* subtest compared to the participants in the control group. In addition, improvement neared significance on *Spelling* for the reading-intervention group. Finally, descriptive analysis of the data revealed that on four of the six reading subskill tests, participants in the reading-intervention group out-gained the participants in the control group on grade-equivalent scores.

APPENDIX A  
DESOTO CHARTER SCHOOL MISSION STATEMENT

**For information and to  
apply to DeSoto**

Please contact the school for more information, to visit, to have your student shadow, or to request an application packet.

PO Box 358604  
Gainesville, FL 32635-8604  
Phone: (352) 495-3326  
Fax: (352) 495-3327  
Email:  
desotocharter@hotmail.com  
[www.desotocharter.com](http://www.desotocharter.com)

*at Alachua Comm. Ach.  
14533 SW 170 St.  
Alachua, FL 32618*

If you believe in the benefits of an education a school such as DeSoto provides in the lives of learning disabled students, please consider making a financial contribution. This would support our academic goal of attracting and keeping caring and dedicated teachers who will offer an incomparable learning experience.

*EXPLORE  
YOUR  
POTENTIAL!*



*Scientia potestas est*

# DeSoto High School

**Gainesville**

A public charter high school for students with reading and language challenges.

*No tuition*

**352-495-3326**

[www.desotocharter.com](http://www.desotocharter.com)

A

Figure A-1. DeSoto High School brochure. A) Front. B) Back.

## Who do we serve?

DeSoto High School serves high school students with reading and language difficulties, including:

- word decoding
- reading comprehension
- oral expression
- auditory processing
- written expression

Our students are bright kids who learn differently.

In 2004-2005 we are enrolling 9<sup>th</sup>, 10<sup>th</sup> and 11<sup>th</sup> grades. In 2005-2006 12<sup>th</sup> grade will be added.

## General Information

- Our classes have a low student: teacher ratio, and **small classes**.
- Lunch is available for purchase.
- Reduced/free lunch is available for qualified applicants.
- There is a school uniform and dress code.
- No transportation is provided.
- There is a Behavior Contract.

## Mission

DeSoto High School is the first public charter high school in Alachua County specifically for reading and language challenged students.

DeSoto is dedicated to implementing innovative learning strategies designed to meet the individual talents and needs of all our students. The school is committed to assessing students on an individual basis by maintaining low student/teacher ratios, small classes, and by using assistive technologies. The school will work to help the student continue to make reading gains, and to build confidence and self esteem which are essential for success outside of school.

## Academics

DeSoto students take the same courses offered at any Alachua County high school.

DeSoto High School offers:

- **standard 24 credit diploma**
- Sunshine State standard curriculum, with support in reading and writing
- **innovative assistive technologies**

Our teachers are certified by the state of Florida, as well as ESE certified.

DeSoto also employs teacher aides, two speech pathologists, a part-time ESE teacher, and a part-time occupational therapist.

## Parent Support

Parent participation is welcomed, and appreciated! The school and home will work closely to promote the child's progress and success in school, and subsequently in life. Parents are required to volunteer.

B

Figure A-1 Continued.

APPENDIX B  
INSTITUTIONAL REVIEW BOARD (IRB) PROTOCOL

1. **TITLE OF PROTOCOL:** Outreach program for students with reading disability
2. **PRINCIPAL INVESTIGATOR(s):** SallyAnn Giess, MA, CCC-SLP, University of Florida, Department of Communication Sciences and Disorders, 435 Dauer Hall, PO Box 117420, Gainesville, FL 32611-7420, Tel.: (352) 392-2113 ext. 293, Fax: (352) 846-0243, E-mail: [sguess@csd.ufl.edu](mailto:sguess@csd.ufl.edu)
3. **SUPERVISOR:** Linda J. Lombardino, Ph.D., 347 Dauer Hall, PO Box 117420, Gainesville, FL. 32611-7420, (352) 392-2113 ext. 285, [llombard@csd.ufl.edu](mailto:llombard@csd.ufl.edu), Fax: (352) 846-0243
4. **DATES OF PROPOSED PROTOCOL:** *From April 2004 to May 2005*
5. **SOURCE OF FUNDING FOR THE PROTOCOL:** Scottish Rite Foundation of Florida; University of Florida Speech and Hearing Clinic.

**6. SCIENTIFIC PURPOSE OF THE INVESTIGATION:**

The purpose of this investigation is to determine the effectiveness of a scientifically based reading intervention program in improving the reading skills of students identified with language and reading difficulties in grades 9-11. Despite efforts of educators and other professionals to improve reading scores of students, some students continue to struggle with the reading process; this difficulty is unexpected as these students are often of normal intelligence and have been exposed to instructional methods that are effective with other students.

The first step of this investigation will be to identify those students who continue to perform below grade level in reading and who have been identified as having a reading disability, or are considered reading challenged. Along with the increased awareness in society of reading disabilities have come improved efforts at prevention, assessment, identification, and treatment of reading disabilities. However, despite these efforts there remain a certain number of students who unfortunately either “fall through the cracks” and were not identified in their early school years as having a reading disability or have not responded to previous remediation efforts, eventually reaching middle and even high school with below average reading skills. Because these students are nearing the end of their public school education, it is especially important that intervention programs based on empirically supported methods are available for and implemented with these students. Thus, the first part of this investigation will require the identification of students who continue to struggle with the reading process and are now considered reading disabled or

reading challenged. Once students with reading disability or challenge have been identified, this investigation will focus on the effectiveness of the Barton Reading and Spelling System in improving the reading skills of this cohort. The Barton Reading and Spelling System is based on the Orton-Gillingham approach to remediation of reading problems. The scientific purpose of this investigation is to implement the Barton program and provide data showing the efficacy of using this program.

## **7. DESCRIBE THE RESEARCH METHODOLOGY IN *NON-TECHNICAL* LANGUAGE.**

Students identified by their teachers as having a reading disability or reading challenge will be assessed with a battery of standardized tests, including the Test of Auditory Awareness Skills (TAAS; Rosner, 1979), the Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1998), and the Wide Range Achievement Test-3 (WRAT-3; Wilkinson, 1993). The TAAS tests oral word analysis skills with phonetic deletion items. Test takers are given words orally and asked to delete a beginning sound, an ending sound, or a part of a blend. The WRMT-R assesses basic reading skills and reading comprehension skills. Finally, the WRAT-3 assesses single word reading and single word spelling skills (see tests in the appendix). Students who fail this screening will be asked to participate in the Barton reading intervention program. **Students will be matched on pre-assessment measures; one half of the pair will be randomly assigned to the treatment group and the other half will be randomly assigned to a control group. The students in the experimental group will receive the intervention in the fall (2004). Students in the control group will receive the intervention in the spring (2005).** The program is expected to run either after school hours or at a time acceptable to school faculty and students' parents, and will not interfere with regular classroom activities. The investigator and her assistants will work with students three-four times per week, approximately 50 minutes per session.

The Barton System is multi-sensory in nature, meaning it utilizes the visual, auditory, and tactile-kinesthetic sensory modes; it is phonics based and presents material in a sequential, systematic fashion. The investigators will use the Barton program to teach students' phonological awareness skills, consonant and vowel sounds, syllable types, and syllable division.

The primary investigator is a licensed Speech-Language Pathologist (SLP) who will train a second year graduate student, or senior undergraduate student in the Department of Communicative Sciences and Disorders to assist her in intervention as well as data collection. Data will be collected during each session. The investigators will keep charts of the lessons taught and students' performance pre and post intervention. Weekly progress will be measured by tests provided with the Barton program and weekly probes will measure student progress using curriculum-based materials. The investigators will record the students' daily progress within each session as well. Materials may include letter tiles, worksheets, and other items that are provided with the Barton program.

Student identification will be kept confidential and names or other identifying information will not be used in any reports generated from this study. Students may occasionally be audio taped and/or videotaped in order to record information. This material will be destroyed at the end of the research investigation. A random number will identify students. This number will be placed in a computer database; the data will be kept on a zip disk or compact disk, not on the computer hard drive or on the UF computer network.

## **8. POTENTIAL BENEFITS AND ANTICIPATED RISK.**

There are no expected risks of physical, psychological, or economic harm to the participants. However, students are expected to benefit from the investigation by improving their reading skills. The teachers of all participants will be given a description of the steps needed to continue a student's reading instruction.

## **9. DESCRIBE HOW PARTICIPANTS WILL BE RECRUITED, THE NUMBER AND AGE OF THE PARTICIPANTS, AND PROPOSED COMPENSATION (if any):**

Participants will be recruited from a public high school in Alachua County such as Lofton and Desoto high school, a public charter school specifically for reading and language disabled or challenged students. The first part of this research will require identification of children with reading disability or reading challenge. The investigators will ask teachers to identify the lowest 10-15% of the students in their classes on skills fundamental to the reading process. The participants will be in 9<sup>th</sup>-11<sup>th</sup> grade and will range in age from 15-17 years. No compensation will be provided to teachers, students, or students' parents for participating in this study.

## **10. DESCRIBE THE INFORMED CONSENT PROCESS. INCLUDE A COPY OF THE INFORMED CONSENT DOCUMENT**

Parents of each potential participant will receive an informed consent document describing the purpose of the study and the requirements of the participant. Classroom teachers will first identify those students who are performing in the bottom 10-15 % of their class and will distribute the consent form to parents of these students. This identification and consent process will take place before the investigators are made aware of the potential participants. The document will contain information regarding the confidentiality of those involved and statements citing that this is a completely voluntary role with the right to withdraw without penalty. Students whose parents have agreed to participate by signing and returning the informed consent document (attached) will then be made known to the investigators. A participant will potentially be part of the study pending the signing and return of the informed consent document.

A student assent script will be used prior to each assessment and intervention session to assure that the student is participating voluntarily (attached).

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Principal Investigator/Date

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Supervisor/Date

I approve this protocol for submission to the UFIRB:

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Dept. Chair/Center Director Date

APPENDIX C  
INFORMED CONSENT

Informed Consent Letter for Parents or Guardians



April 2004

Dear Parent/Guardian,

I am a doctoral student in Communication Sciences and Disorders at the University of Florida, conducting research under the supervision of Dr. Linda Lombardino, a professor of communication processes and disorders. We are interested in providing some students with extra reading instruction by using a reading intervention program to improve the reading skills of students who are identified as reading challenged. Students will be engaged in activities that have them look at letters, listen to the sounds letters make, and write or trace letters while thinking about the movement their arm or hand is making (multi-sensory activities).

The purpose of our present study is to determine if a program developed by Susan Barton called the *Barton Reading and Spelling System* is effective in improving reading skills of students with reading disabilities. The Barton system is designed to add to the reading instruction that your child is already receiving in the classroom. This project may benefit your child's literacy skills and provide important insights into teaching strategies for other students. We are contacting you because you have told your child's teacher that you are interested in this project and consent to having your child participate.

Your child will first be given an assessment that tests oral word analysis skills, single word reading, nonsense word reading, passage comprehension, and single word spelling. Assessment is expected to take 30 to 45 minutes. If your child does not perform at grade level on this test and if your child's teacher feels that your child will benefit from our instruction, your child can participate in our program. **You will be contacted with a**

**follow-up letter about the results of the assessment and whether your child qualifies for the instructional program and has been asked to participate. Half the students who qualify for the program will participate in the fall (2004); if your child does not participate in the fall, the therapy will be available to him/her in the spring.** The Barton System is multi-sensory in nature, meaning it uses visual, auditory, and tactile-kinesthetic information during reading instruction. It is also phonics based, meaning it focuses on the sounds that letters make, and presents material in a sequential, systematic fashion. We will use the Barton program to teach students' *phonological awareness skills, consonant and vowel sounds, syllable types, and syllable division*. Phonological awareness refers to the ability to focus on and manipulate individual sounds in spoken words.

We will work with your child 4 times a week at school for 50-60 minutes at a time. We will be doing this for up to 24 weeks. **Lessons may take place during regular school hours, but your child will not be asked to miss important classroom instruction time.** Either a trained graduate clinician or I will be present during all sessions to help your child and to provide encouragement.

We also ask that you allow us to audio and/or video record your child's sessions and take notes during sessions to record progress. Tapes and written records will be available only to my graduate clinical assistant, my supervisor, and me. These will be numerically coded and will not be marked with your child's name. All individual records will be destroyed once the study has ended.

You and your child have the right to withdraw consent for your child's participation at any time without consequence. There are no known risks in participating. No compensation is offered. If you have any questions about this research protocol, please contact me, SallyAnn Giess at (352) 392-2113, ext 293 or Dr. Lombardino at (352) 392-2113, ext 285. Questions or concerns about your child's rights as a research participant may be directed to the UFIRB Office, University of Florida, Box 112250 Gainesville, FL 32611, (352) 392-0433.

Your child's identity will be kept confidential to the extent provided by law. No real names, initials, or other identifying information will be used during spoken or written presentation of study results. Participation or non-participation in this study will not affect your child's grades or placement in programs.

I have read the procedure described above and I have received a copy of this form.

I voluntarily agree to allow my child \_\_\_\_\_, to participate in the study involving use of the Barton program to improve literacy skills.

Parent-Guardian

\_\_\_\_\_  
Date:

Principal Investigator

\_\_\_\_\_  
Date:

Supervisor/Investigator

\_\_\_\_\_  
Date:

Cc: Parent/Guardian  
File

### Student Assent Script

The following is a script that will be used prior to each session to ensure that the student knows of his involvement and that he/she may choose not to participate if he/she does not want to.

**Investigator: We are going to do some activities with sounds and words. During these activities you will be looking at and listening to different sounds and words. If you don't want to do this, that is okay. You may still do all the other activities you normally do at school.**

**Do you want to do the activities with me?**

If the student indicates **yes**, the investigator will begin the session.

If the student indicates **no**, the investigator will say:

**That's okay. Maybe I will come back later to see if you want to do these activities.**

When the investigator returns, the same script will be used.

APPENDIX D  
STUDENT SCREENING ANSWER SHEET

**STUDENT SCREENING ANSWER SHEET**

Materials Needed:

Envelope included with the video that contains squares of colored paper

**A: Counting Words**

	<i>Correct the First Time</i>	<i>Wrong Number of Words</i>	<i>Wrong Sequence</i>
The cat ran up the big tree. (7)			
I am very good at counting words. (7)			
The wild animal was eating spaghetti. (6)			

Number Wrong in Section A = \_\_\_\_\_ Maximum Wrong = 0

**B: Clapping Syllables**

	<i>Right</i>	<i>Wrong</i>
Forgiven (3)		
Teacher (2)		
Video (3)		
Thanksgiving (3)		
Alligator (4)		
Syllable (3)		

Number Wrong in Section B = \_\_\_\_\_ Maximum Wrong = 1

Figure D-1. Student Screening Answer Sheet A) Page 1. B) Page 2.

C: Compare Three Isolated Sounds with Colored Squares

	<i>Right the first time</i>	<i>After it was repeated, he got it right</i>	<i>Wrong</i>
<i>/m/ /p/ /n/</i>			
<i>/l/ /r/ /k/</i>			
<i>/i/ /a/ /i/</i>			
<i>/u/ /a/ /a/</i>			
<i>/m/ /v/ /m/</i>			
<i>/o/ /a/ /u/</i>			
<i>/f/ /v/ /v/</i>			
<i>/sh/ /ch/ /sh/</i>			
<i>/ch/ /j/ /sh/</i>			
<i>/i/ /e/ /i/</i>			
<i>/b/ /b/ /d/</i>			
<i>/f/ /th/ /s/</i>			
<i>/s/ /sh/ /s/</i>			
<i>/o/ /i/ /e/</i>			
<i>/m/ /n/ /n/</i>			

Number Repeated = \_\_\_\_\_ Maximum Repeated = 2

Number Wrong = \_\_\_\_\_ Maximum Wrong = 2

Figure D-1. Continued.

APPENDIX E  
BARTON PRETESTS FOR BOOKS 1-3 (ADAPTED FROM BARTON 2000)

**Pre-tests compiled from books 1 to 3 to determine where to begin tutoring students.**

**Book 1 Pre-test for phonemic awareness**

Give pretest to determine starting point for older students. If student makes no mistakes on Tasks A, B, and C, then tutor gives the next task. If student makes more than one mistake, stop the pretest. If student makes no mistakes on Tasks A, B, and C, then give the next task. If student completes all five pretest steps with 100% accuracy, then he has sufficient knowledge to skip Book 1 entirely.

**Pre/Posttest A: Break Apart Nonsense Words**

**Directions/Demonstration:** Tutor first explains task by telling student that they will break words into sounds. The first word tutor dictates is SNI; tutor then asks student to repeat that word and say it again very slowly. After student says word slowly, tutor asks him how many sounds he heard in that word. Tutor then asks student to pull down tiles, do touch and say, and then wash off the tiles. Tutor dictates word; student repeats word, says it slowly, and identifies number of sounds he heard in word, pulls down different colored tiles and puts them in a row. Student does touch say for each sound to correspond with each tile. When student is done, he pushes the tiles back into the pile and tutor dictates next word. If student misses two or more words, stop the pretest and begin lessons at the lowest lesson number circled. If student misses zero or one item, go on to Task B.

**Answer Sheet for A**

Dictated Word	Student correctly breaks word into sounds	Lesson
NACH		2
OK		1
USP		3
PIP		2
GLA		4
OPT		3
THA		1
SHRO		4
TOB		2
IM		1
SKA		1
ILT		3
BO		1
TRI		4
SHAD		2

**Score:** \_\_\_\_\_

**Pre/Posttest B: Break-Replace-Remove**

**Directions/Demonstration:** Tutor explains task by telling student that he will break a word and then tutor will change a sound. Some of the words have two sounds and others have three sounds. Tutor dictates first word: SKA and asks student to repeat it, say it again very slowly, and pull down the tiles. Tutor then asks student to do touch and say and student touches first tile and says first sound, and so on for each sound/tile. Tutor reminds student to watch her carefully and tutor changes the last tile while saying, **“I am going to change this tile to /o/.”** Tutor tells the student he has to do touch and say for each sound to figure out the new word. Next, tutor tells student to slowly blend the sounds together into a word and then say it fast like a word. Next, tutor takes out first tile and tells student, **“I’m going to take out this tile. Touch and say the sounds that are left.”** Student touches first tile and says sound, and so on for each sound and tile. Tutor tells student to blend the sounds slowly and then say it fast like a word. If student misses two or more words, stop pretest- begin lessons at lowest lesson number circled. If student misses zero or one, go on to Task C. Score as correct if student correctly breaks, replaces, and removes.

**Answer Sheet for B**

Dictated word	Student breaks word into sounds	Student correctly replaces tile for new tile	Student correctly does touch & say with tile removed	Lesson
VAK-VOK-VO				2
DA-LA-A				1
IMP-ISP-IP				3
UJ-UK-U				1
BLO-BLI-BI				4

**Score:** \_\_\_\_\_

**Pre/Posttest C: Compare Two Words**

**Directions/Demonstration:** Tutor tells student that now they will compare two words. The tutor lays out three tiles in a row, and then builds another row beneath it using exactly the same colored tiles. Tutor tells student the first word is SPA and asks student to repeat that word, say it slowly, and touch and say using the first row of tiles. Tutor gives the next word-SPI and asks student to repeat that word, say it slowly, and then do touch and say using the second row of tiles. Tutor says, “The first word was SPA, this word is SPI; touch and say until you find the sounds that are different.” Student touches and says first word, then second word and tutor asks him which sounds are different (the last sounds). Tutor tells student to go ahead and change the last tile in the new word to show that it is different. Student changes the last tile in the second row and then washes off those tiles.

**Tutor says: The first word is XX1. The second word is XX2. XX1, XX2. Touch and say until you find the sound that is different.** If student misses two or more words, stop the pretest and begin lessons at the lowest lesson number circled. If student misses zero or one, go on to Task D. Score as correct if student correctly identifies different sound and changes tile.

### Answer Sheet for C

Tutor builds two rows	Student Identifies Different Sound	Student Changes Correct Tile	Lesson
UD			1
UCH			
KOV			2
TOV			
BA			1
KA			
UNT			3
UST			
GRO			4
GRA			

Score: \_\_\_\_\_

### Pre/Posttest D: Blend 2 and 3 Sounds into Real Words

**Directions/Demonstration:** Tutor explains that now she will give student some sounds to blend together into real words. Tutor demonstrates by pulling down two different color tiles. Tutor touches each tile while saying, **“This tile says .., this tile says... Now you touch and say those sounds.”** Student touches the first tile while saying.., then touches second tile while saying... Tutor tells student to slowly blend them together and then say it fast like a word. For test, tutor will touch and say each sound; student will touch and say each sound and blend sounds into a word. To score as correct, student must correctly blend and recognize the real word. If student misses two or more words, stop the pretest here and begin tutoring at the lowest lesson number that is circled. If student misses zero or one item, go on to Task E.

### Answer Sheet for D

Dictated Sounds	Student correctly blends sounds into real word	Student recognizes real word	Lesson
A T = AT			5
H A V = HAVE			5
N O K = KNOCK			5
F U J = FUDGE			5
M A CH = MATCH			5
TH I N = THIN			5
E N D = END			5
L A M = LAMB			5

**Book 2 Pretest for Consonants and Short Vowels**

If a student had made any mistakes on Tasks A and B, STOP the pretest and begin tutoring with the lowest lesson number circled. If student makes no mistakes on Tasks A and B, then tutor gives the next task. If student completes all 6 pretest steps with 100% accuracy, then he has sufficient knowledge to skip Book 2 entirely.

**Pre/Posttest A: Test of Letter Name and Sound Knowledge.** (Go on to B even if student makes errors)

**Answer Sheet for A**

Key words for Letters/Sounds	Student correctly names letter +/- Record Answer	Student correctly makes the sound +/- Record Answer	Lesson
B tab			1
C mac and face			2
D sad			3
F cliff			1
G tug and huge			2
H hat			2
J jam			3
K milk			3
L hill			2
M am			1
N fan			2
P tap			1
QU quit			4
R her			2
S miss and was			2
T rat			1
V give			4
W wit			4
X fox			4
Y yes			4
Z fuzz			3
A apple			1
E Eddy			5
I itchy			2
O olive			3
U upper			4
TH thin			5
SH ship			5
CH chin			5
Wh whistle			5
CK pick			5
<b>score</b> _____			

### Pre/Posttest B: Spelling Individual Sounds on Paper

**Directions:** Tutor dictates sound to student; student repeats sound, says the name of the letter, or letters, that make that sound, and then writes down the answer on paper. Insist that student writes in lower case letters. Student must say both the name of the letter that makes sound and correctly write down the letter. If student was incorrect on any item stop the pretest and start the student at the lowest lesson number of his incorrect answers on both Answer Sheet A and B. Only go on to Pretest C if student got 100% correct.

#### Answer Sheet for Task B

Dictated Sound (Lesson)	Student correctly says name of letter that makes sound	Student correctly "spells" sound on paper.	Lesson	Dictated Sound (Lesson)	Names letter that makes sound	Spells sound on paper	Lesson
	+/-	+/-			+/-	+/-	
/n/			2	/qu/			4
/p/			1	/m/			1
/k/ C, K, CK			2	/j/ J ("jay") or soft "g"			3
/ch/			5	/l/			2
/g/			2	/r/			2
/t/			1	/y/			4
/v/			4	/a/			1
/f/			1	/o/			3
/th/			5	/u/			4
/d/			3	/i/			2
/b/			1	/e/			5
/z/ Z, S			3	/e/			5
/w/			4	/i/			2
/wh/			5	/u/			4
/sh/			5	/e/			5
/s/ S, C			2	/a/			1
/h/			2	/o/			3
/x/			4	/u/			4
/o/			3	/a/			1

Score \_\_\_\_\_

### Pre/Posttest C: Identifying First, Last, Middle Sounds

**Directions:** Tutor tells the student she is going to say a nonsense word and that the student will repeat it. Tutor demonstrates with first word: CHUP. Student repeats this word. Tutor asks student what the first sound in the word is and how he would spell that sound. Tutor records this answer on answer sheet and dictates the rest of the words. Tutor repeats this process, but asks the student to tell her the last sound in the word and how he would spell that sound. Tutor records answer and dictates the rest of the words. Finally, tutor tells student to follow the same steps, but this time to tell her the middle sound of the word and how to spell that sound. The tutor records the answer and dictates the rest of the words. To pass item, student must correctly say requested sound and name the letter(s).

If the student was incorrect on any item, stop the pretest. If the student makes more than three errors, start at Lesson 2; otherwise, look at the mistakes on the answer sheet and start at the lowest indicated lesson.

### Answer Sheet for Task C

Sound	Student says requested sound	Student identifies letter(s)	Lesson
<b>First</b>			
CHUP	/ch/		5
THED	/th/		5
WHOV	/wh/		5
SHAM	/sh/		5
QUIM	/qu/		5
<b>Last</b>			
LISS	/s/		1
YUCH	/ch/		5
GAN	/n/		2
MOX	/x/		4
SUFF	/f/		1
<b>Middle</b>			
CHAM	/a/		1
MOG	/o/		3
PEZ	/e/		5
THUN	/u/		4
TIB	/i/		2

Score \_\_\_\_\_

### Pre/Posttest D: Read These Words

**Directions:** Student reads words down column of page. Score as correct if student reads the word correctly. If student reads the word incorrectly, guesses at the word, or has to try it two or three times, score as incorrect. If student misreads one or two consonants or digraphs, start on Lesson 5. If student misreads one or more vowels, and the vowels are A, I, or O, start on Lesson 3. If he misreads a U or an E, start on Lesson 4.

### Answer Sheet for Task D

Word	Student correctly reads word (incorrect, guesses, or several tries = -)
------	---

wed
thin
tag
peck
shush
check
dock
Mel
shin

**Answer Sheet for Task D-CONTINUED**

Word                      Student correctly reads word (incorrect, guesses, or several tries = -)

buck  
whim  
wax  
quick  
yet  
shud  
chep  
vock  
neth  
bish  
jeck  
quish

**Score** \_\_\_\_\_

**Pre/Posttest E: Spelling Real and Nonsense Words on Paper:**

Directions: Tutor tells student that he will now be spelling words. Tutor says a word, asks student to repeat it, and then write the word down on a piece of paper. The tutor records each spelling as correct or incorrect on the answer sheet. If the student was incorrect on more than one word, stop the pretest. If the student incorrectly spelled a consonant or a vowel, start at Lesson 3. If the student incorrectly spelled only a digraph, start at lesson 5.

Answer Sheet for Task E

Dictated Word      Correctly  
                                 Spelled (must refer to student's  
                                 answer sheet)

path  
whip  
shot  
chin  
Ned  
chez  
thub  
hov  
quesh  
whid  
dach

**Score** \_\_\_\_\_

**Pre/Posttest F: Read These Sentences**

**Directions:** Student reads sentences. If student reads flawlessly, go to Book 3 pretest. If student makes more than 3 mistakes, including re-readings, or reads in a choppy manner, start at Lesson 5.

**Answer sheet for Task F**

Sentence to read

Record errors and make notes on fluency

1. Rex and Ed met Beth.
2. Fat Chad sat with a thud.
3. A duck got sick in the bath tub.
4. Thin Ken did dash on the path.
5. A red hen got wet at the dock.
6. Rick did yell at Deb.
7. Peg got sock on the ship.
8. A vet got a fish at the dock.
9. Sam and Ted met Meg at a bash.

Score \_\_\_\_\_

**Book 3: Pretest for Closed Syllables**

(Barton warns that this should only be given as a pretest to students who successfully completed the Book 2 pretest and therefore, did not do any lessons in Book 2. If the student successfully completed all the pretests, then he should skip to Book 4.

**Pretest A: Read Real and Nonsense Words using the Word Frame**

**Directions:** The tutor tells the student that she would like the student to read real and nonsense words taught during the lessons in Book 3. The tutor gives the student the Read These Real Words page and asks the student to read them using the Word Frame. The student reads each word out loud. The tutor records the response as correct or incorrect on the answer sheet. The tutor repeats this process with the Read These Nonsense Words page. If there was more than one real word, or more than two nonsense words that the student does not know, or if this task was difficult for him, do not skip this book. However, do give the spelling section of the pretest and start at the lowest lesson number of any incorrect answer.

**Answer Sheet for Task A**

Real Word to Read	+/-	Record Student's response	Lesson
shaft			1
whisk			1
flush			2
grab			2
twist			3
blend			3
quench			4
splash			4

**Answer Sheet for Task A-CONTINUED**

<b>Real Word to Read</b>	<b>+/-</b>	<b>Record Student's response</b>	<b>Lesson</b>
squall		5	
frizz		5	
strict		6	
crept		6	
Scotch		9	
thatch		9	
shrink		8	
string		8	
wouldn't		10	
who's		10	
stroll		11	
grind		11	
scold		11	

**Score** \_\_\_\_\_

<b>Nonsense Word to Read</b>	<b>+/-</b>	<b>Record Student's response</b>	<b>Lesson</b>
shump		1	
quent		1	
slock		2	
prem		2	
crint		3	
plosp		3	
strunt		4	
clucnh		4	
strall		5	
droff		5	
cith		6	
cem		6	
metch		9	
planch		9	
spong		8	
quink		8	
choll		11	
jind		11	
thold		11	
zolt		11	
shild		11	

**Score** \_\_\_\_\_

**Pretest B: Spell Real and Nonsense Words**

**Directions:** Tutor tells student that now she would like him to spell words. Tutor gives the student a piece of paper and a pencil and brings out the Spelling Answer Sheet. Tutor dictates a word; the student repeats the word and writes it down. The tutor records the student's responses as correct or incorrect on the answer sheet. If there was more than one real word, or more than two nonsense words that the student could not spell correctly, stop the pretest and start the student at the lowest lesson number of any incorrect answer.

**Answer Sheet: Task B**

<b>Real Word to Spell</b>	<b>+/-</b>	<b>Lesson</b>	<b>Nonsense Word to Spell</b>	<b>+/-</b>	<b>Lesson</b>
theft		1	nust		1
smash		2	greb		2
swift		3	brant		3
throb		4	spret		4
French		4	vunch		4
gruff		5	triss		5
skit		6	keb		6
scoff		6	clid		6
whisk		7	gask		7
bulk		7	pling		8
hatch		9	kench		9
belch		9	zost		11
they'll		10			
we're		10			
colt		11			
stroll		11			

**Score** \_\_\_\_\_

**Pretest C: Read Sight Words**

**Directions:** Tutor tells student that she would like him to read sight words, words that don't follow the rules. Tutor brings out the Read These Sight Words page and give it to student. The tutor pulls out the Reading Sight Words Answer Sheet. As student reads each word aloud down each column, the tutor records his responses as correct or incorrect on the answer sheet. If the student reads any sight word incorrectly, the tutor should make note of it and the student's sight word reading deck list.

**Answer Sheet Task C**

<b>Sight Word to Read</b>	<b>+/-</b>	<b>Record Student's Response</b>	<b>Lesson (?)</b>
was			1
what			1
his			1
said			1
are			1

**Answer Sheet Task C-CONTINUED**

<b>Sight Word to</b>	<b>+/-</b>	<b>Record Student's Response</b>	<b>Lesson (?)</b>
<b>Read</b>			
from			1
goes			3
does			3
Mrs.			3
want			3
were			3
says			3
some			3
your			3
been			8
where			8
many			8
done			8
should			8
there			8
again			8

**Score** \_\_\_\_\_

**Pretest D: Spell Phrases**

**Directions:** Tutor tells student that now he will write some phrases. Tutor gives student a piece of paper and a pencil. Tutor brings out the spelling phrases answer sheet. The tutor dictates a phrase and student read the phrase and writes it down. The tutor records the answers as correct or incorrect on the answer sheet. If more than two words are misspelled, stop the pretest and start the student on the lowest lesson where misspelled words occurred.

**Answer Sheet Task D**

<b>Phrase to Spell</b>	<b>Record Answer</b>	<b>Record Misspelled Words</b>	<b>Lesson</b>
crush the gift			2
a swift clam			3
crisp shrimp			4
chill the tall grass			5
cut the kilt			6
lock the latch			7 & 9
the tall punk stunk			8
shouldn't miss the			10
long flick			
can't find the bolt			11
<b>Score</b> _____	<b>(# of words misspelled)</b>		

**Task E: Read Sentences**

**Directions:** The tutor gives the student the Read These Sentences page and asks the student to read each sentence out loud. The tutor records the answers on the Reading Sentences Answer Sheet. If student reads fluently and flawlessly, he is ready for Book 4. If the student makes more than one mistake when reading, start at the number of the lesson indicated.

**Answer Sheet Task E (record answer below sentence)**

1. Kent did jump and yell when he lost the raft.
2. Fran will drop the trash in the truck.
3. A twig did drift past the thrift shop in a blast of wind.
4. A big branch struck Brent on the rump, and he did flinch.
5. The skiff has many fish but does not smell bad.
6. The cast had a script for the skit.
7. The Dutch mask will shock Nick.
8. Hank hung up a sock which stunk.
9. Who's the cross gal with Bill?
10. She'll scold the wild child.

**Pretest F: Spelling Sentences**

**Directions:** Tutor gives student a piece of paper and a pencil and dictates a sentence to student. The student repeats the sentence and writes it down. If more than two words are misspelled, stop the pretest and start the student at the lowest lesson where misspelled words occurred.

**Task F Answer Sheet****Sentence to Spell/Record Students Misspelled Words**

1. Kick that track to the left. (Lesson 7)
2. The champ stuck a pink sock in the sock. (Lesson 8)
3. Do not flinch when you scratch. (Lesson 9)
4. Couldn't Ross grill the fresh fish? (Lesson 10)
5. I can't find the roll with the mold on it. (Lesson 11).

APPENDIX F  
BOOK 2 LESSON PLANS, CONSONANTS AND SHORT VOWELS (ADAPTED  
FROM BARTON 2000)

Barton Reading and Spelling System  
An Orton-Gillingham Influenced  
Simultaneously Multisensory  
Explicit and Systematic  
Phonics Program

*Level 2*  
**Consonants & Short Vowels**

Lesson Plans

Give adult students pretest first. Only teach key words of consonants if student does not know the sound the consonant makes.

**Lesson 1: 1 VOWEL, 6 CONSONANTS**

**Lesson 1: Procedure D: Teach New Vowel Sound (/a/, short a {ă})**

Tutor shows student the A letter tile and asks student to name the letter. Tutor explains that it is a vowel and every word and every syllable must have a vowel. Tutor explains that one vowel may make several sounds, but right now student will be learning short vowel sound for /a/. Tutor can do visualization exercise to help student think of key word for short /a/ sound as in apple. Tutor teaches student how to tap key word for vowel sound. Tutor taps right index finger while saying /a/, then taps middle finger while saying /ple/. Student repeats tapping for apple using index and middle finger. Tutor stresses that whenever student sees letter /a/, he should make the short /a/ sound, as in apple. Tutor taps a/ple, a/ple, then a, a, a. Student repeats this, using index finger for /a/.

**Lesson 1: Procedure E: Teach 6 Consonants**

Tutor pulls down tiles for six new consonants, one at a time: M, P, T, S, F, B. Student says name of letter and then sound that letter makes (tutor must make sure student does not insert schwa sound when making sound of letter, e.g., mmmm, not muh). If student does not know sound that letter makes, student writes letter down on Keyword page and thinks of and draws a picture for to remind him of sound.

\*b/p confusion: Teach balloons/pigs trick if necessary.

**Lesson 1: Procedure F: Read Sounds on Tiles**

Tutor places tiles in front of student and first points to the A tile. Tutor asks student to tell her why the A is a different color and then asks student to tap vowel for her. Student taps and says apple, apple, /a/, /a/, /a/. Tutor then points to each of the other 6 consonant tiles and asks student to name letter and then make its sound.

Targeted letter/tile	student correctly names letter	student makes correct sound associated with letter
A		short /a/, ă
P		/p/
T		/t/
S		/s/
F		/f/
B		/b/
M		/m/

**Lesson 1: Procedure G: Spell Sounds with Tiles.**

Tutor makes the sound; student repeats the sound and points to tile

Dictated Sound	Student points to tile
/t/	
/p/	
/s/	
/b/	
/f/	
/m/	
/a/	

**Lesson 1: Procedure H: Read Real Words with Tiles**

Tutor builds first word with tile. Student taps vowel sound. Tutor demonstrates touch and say for each letter by using her index finger to touch and say each sound. Student does touch and say for each sound. Next, tutor explains how to slowly blend sounds by dragging her finger underneath the word while running the sounds together. Student does slow blending. Next, tutor demonstrates how to say it fast like a word and student follows. Finally, tutor changes word by replacing one tile with a new tile and student repeats touch and say and slow blending of word

Tutor builds words	Student correctly does touch and say	Student correctly blends sounds
MAT		
MAP		
PAM		
PAT		
SAT		
SAM		

**Lesson 1: Procedure I: Spell Real Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor demonstrates for student: Tutor says word, student repeats word once and then again very slowly. Tutor uses fingers of non-writing hand to break word into sounds; she raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Student follows. Tutor tells student to pull down a tile for each finger while making the sound. Finally tutor teaches student how to double check by slowly blending the tiles together and then saying them fast like a word.

Dictated Word	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word
SAP			
MAT			
PAM			
PAT			
TAP			
FAT			

**Lesson 1: Procedure J: Read Nonsense Words with Tiles**

Tutor builds nonsense word; student taps vowel once, does touch and say, slowly blends, and then says it fast like a word

Tutor builds word	Student taps vowel	Student does touch and say	Student correctly blends into word
FAM			
SAB			
BAP			
SAF			
FAP			

**Lesson 1: Procedure K: Spell Nonsense Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to pull down a tile for each finger while making the sound. Student double checks by slowly blending the tiles together and then saying it fast like a word.

Dictated Word	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word
FAB			
MAF			
FAP			
PAB			

**Lesson 1: Procedure L: Read Words through Word Frame**

Student puts word frame around each word and reads the word.

Word	Correctly Read	Word	Correctly read	Word	Correctly Read
mat		mam		taf	
bam		fat		fab	
map		tap		saf	
sam		tam		bap	

**Lesson 1: Procedure M: Spell Words with Fingers, then Paper.**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to make each sound and tell her what letter he needs. Student makes each sound while writing it down on paper. As a last step, student double-checks what he wrote by blending the sounds together and then saying it fast like a word.

Dictated Word	Student correctly breaks word into sounds	Student correctly spells word out loud	Student correctly spells word on paper
Real			
TAB			
PAT			
BAM			
PAP			
BAT			
Nonsense			
FAS			
MAB			
BAF			
SAB			
BAP			

**Lesson 1: Procedure N: Read Longer Words Together**

Student reads first syllable of longer word. Tutor thinks of one longer word that begins with that syllable. Student tries to think of other longer words that begin with that syllable.

Root Syllable/Nonsense Word	Student correctly reads	Student generates at least two longer words
fab		
pat		
tab		
bap		
am		
as		
mat		
fam		
fas		
ab		

**Lesson 2: 1 Vowel, 6 Consonants**

Short vowel /i/, as in itchy (key word), C, G, H, L, N, R

**Lesson 2: Procedure A: Review Known Letters and Sounds**

Tutor sets out letter tiles from last lesson: /a/, b, f, m, p, s, and t. Tutor asks student to identify the vowel and tap the vowel's keyword and then points to each consonant tile and asks student to name letter and its sound.

Review letter/Sound	Student correctly names letter	Student correctly says sound
a		
b		
f		
m		
p		
s		
t		

**Lesson 2: Procedure B: Review/Do Extra Practice Page**

**Lesson 2: Procedure C: Phonemic Awareness Warm-up**

Tutor says word; student repeats word and says just the first sound or last sound and points to the letter that makes the sound.

Dictated Word/First Sound	Student identifies correct sound	Student points to correct tile	Dictated Word/Last Sound	Student identifies correct sound	Student points to correct tile
TAF			FAB		
SAB			TAS		
FAP			FAM		
TAS			PAF		

**Lesson 2: Procedure D: Teach New Vowel Sound**

Tutor brings out I tile to teach short /i/ {ī}. Tutor teaches that most common sound I makes is short ī as in itchy. Tutor can help student visualize story in head to create key word for /i/. Tutor demonstrates tapping for key word: taps right index finger while saying /i/, then taps middle finger while saying /chy/. Student taps itchy twice and then taps /i/ three times.

**Lesson 2: Procedure E: Teach 6 New Consonants**

Tutor pulls down tiles for six new consonants, one at a time: G, L, R, C, H, N. Student says name of letter and then sound that letter makes (tutor must make sure student does not insert schwa sound when making sound of letter, e.g., nnnn not nuh ). If student does not know sound that letter makes, student writes letter down on Keyword page and thinks of and draws a picture for to remind him of sound. Tutor brings down tiles for new consonants one by one and ask student to name letter and then the sound that letter makes. (If necessary, teach trick to distinguish m/n)

**LESSON 2: Procedure F: Read Sounds on Tiles**

Tutor places tiles in front of student and first points to the vowel tiles. Tutor asks student to tell her why they are a different color and then asks student to tape vowels for her. Student taps and says apple, apple, /a/, /a/, /a/, or itchy, itchy, /i/ /i/, /i/. Tutor then points to each of the other consonant tiles and asks student to name letter and then make its sound (Tutor should mix order of consonants with those from lesson one and two)

Letters-New	Student names letter	Student makes correct sound for letter	Letters-Review	Student names letter	Student makes correct sound for letter
I		/i/ {ī}(itchy)	A		/a/ {ă}(apple)
G		/g/ (goat)	P		/p/
L		/l/	T		/t/
R		/r/	F		/f/
C		/c/ (cat)	S		/s/
H		/h/	B		/b/
N		/n/	M		/m/

**LESSON 2: Procedure G: Spell Sounds with Tiles**

Tutor dictates sounds; student repeats and points to tile that makes sound.

Dictated Sound	Student correctly points to tile (identify key word for vowel)	Dictated Sound	Student correctly points to tile (identify key word for vowel)
h		g	
l		s	
c		r	
b		n	
p		f	
m		t	
a		i	

**Lesson 2: Procedure H: Read Real Words with Tiles**

Tutor builds first word with tile. Student taps vowel sound. Tutor demonstrates touch and say for each letter by using her index finger to touch and say each sound. Student does touch and say for each sound. Next, tutor explains how to slowly blend sounds by dragging her finger underneath the word while running the sounds together. Student does slow blending. Next, tutor demonstrates how to say it fast like a word and student follows. Finally, tutor changes word by replacing one tile with a new tile and student repeats touch and say and slow blending of word

Tutor builds words	Student correctly does touch and say	Student correctly blends sounds	Tutor builds words	Student correctly does touch and say	Student correctly blends sounds
SIP			CAM		
SAP			RAM		
NAP			RAG		
NIP			RIG		
TIP			PIG		
TAP			BIG		
CAP			BAG		

**Lesson 2: Procedure I: Spell Real Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor demonstrates for student: Tutor says word, student repeats word once and then again very slowly. Tutor uses fingers of non-writing hand to break word into sounds; she raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Student follows. Tutor tells student to pull down a tile for each finger while making the sound. Finally tutor teaches student how to double check by slowly blending the tiles together and then saying them fast like a word. Next, tutor tells student to change just one tile to make new word (Tutor names tile and tells student new word)

Dictated Word Pairs	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word	Student correctly changes tile for new word
RIP-RAP				
LAP-LIP				
HIT-HAT-HAM				
RIB-FIB				
BAG-BIG				

**LESSON 2: Procedure J: Read Nonsense Words with Tiles**

Tutor builds words with tiles; student figures out vowel first and taps vowel when it changes. Student does touch and say for each tile, then slowly blends sounds together and then says it fast like a word

Tutor builds word	Student taps vowel	Student does touch and say	Student correctly blends into word
RIN			
LAN			
PIM			
FAC			
BAP			
NIB			
HIG			

**Lesson 2: Procedure K: Spell Nonsense Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to pull down a tile for each finger while making the sound. Student double checks by slowly blending the tiles together and then saying it fast like a word.

Dictated Word	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word
NAF			
LIS			
GAM			
RAF			
HIN			

**Lesson 2: Procedure L: Read Words through Word Frame**

Student puts word frame around each word and reads the word.

Word	Correctly Read	Word	Correctly read	Word	Correctly Read
cab		bin		mip	
pig		am		saf	
rim		pin		hif	
ban		rat		bap	
tag		lip		gip	
gap		at		lat	
nag		hit		rin	

**Lesson 2: Procedure M: Spell Words with Fingers, then Paper**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to make each sound and tell her what letter he needs. Student makes each sound while writing it down on paper. As a last step, student double-checks what he wrote by blending the sounds together and then saying it fast like a word.

Dictated Word	Student correctly breaks word into sounds	Student correctly spells word out loud	Student correctly spells word on paper
Real			
LAB			
FIG			
RAN			
SIP			
PAL			
Nonsense			
FAB			
BIM			
GAT			
LIS			

**LESSON 2: Procedure N: Read Phrases**

Student reads phrases and creates sentences

<b>Who Phrase</b>	Correctly Reads/Creates +/-	<b>Where Phrase</b>	Correctly Reads/Creates +/-
A big cat		in a cab	
A pig		at bat	
Tim		in a big pan	
A rat		in a lap	
A ham		at a cab	
Pat		in a pit	
<b>Did What Phrase</b>		<b>Create own sentences</b>	
bit a fig		<b>Add-on Phrases</b>	N/A
rip a rag			
hit Hal			
ran			
fit			
sat			
<b>Create own sentences</b>			
		<b>Create own sentences</b>	

**Lesson 2: Procedure O: Read Sentences**

Student reads first sentence to self and then reads sentence aloud to tutor. Student identifies number of phrases in sentence, marks phrases, and re-reads with phrasing.

Student reads sentence	Student marks phrasing +/-				Student re-reads with phrasing
	WHO	DID	WHERE	ADD-ON	
1. Tim sat.					
2. Pat ran.					
3. A rat bit a fig.					
4. A ham fit in a big pan.					
5. A pig ran in a pit.					
6. A big cat sat in a lap.					
7. Tim lit a bag in a pit.					
8. Pat sat in a cab.					
9. A big cat ran at a bad rat.					
10. A pig ran at Tim.					

**Lesson 2: Procedure P: Read Longer Words Together**

Student reads first syllable of longer word. Tutor thinks of one longer word that begins with that syllable. Student tries to think of other longer words that begin with that syllable.

Root Syllable/Nonsense Word	Student correctly reads	Student generates at least two longer words
hab		
lib		
fac		
his		
han		
lin		
cam		
lan		
fig		
pal		
rab		

**LESSON 3: 1 VOWEL, 5 CONSONANTS**

New Tiles: O, D, J, K, V, Z

Known Letter Tiles: A, B, C, F, G, H, I, L, M, N, P, R, S, T.

**Lesson 3: Procedure A: Review known Letters and Sounds**

Tutor sets out letter tiles used in last lesson for review: A, B, C, F, G, H, I, L, M, N, P, R, S, T.

Tutor asks student to identify vowels and to tap key word for each sound. Tutor points to each of the other consonant tiles and asks student to name sound of each letter.

Review letter/Sound	Student correctly names letter	Student correctly says sound	Review letter/Sound	Student correctly names letter	Student correctly says sound
a			l		
i			m		
b			n		
c			p		
f			r		
g			s		
h			t		

**Lesson 3: Procedure B: Review/Do Extra Practice Page**

**Lesson 3: Procedure C: Phonemic Awareness Warm-up**

Tutor says word; student repeats word and says just the first sound, last sound, or vowel sound and points to the letter that makes the sound.

Dictated Word	Student identifies correct sound	Student points to correct tile	Dictated Word	Student identifies correct sound	Student points to correct tile	Dictated Word	Student identifies correct sound	Student points to correct tile
HAP			TIG			TIF		
RIT			HIN			CAS		
GAF			FAC			HIG		
NIM			HAP			LAN		
LIF			LIS			MIB		

**Lesson 3: Procedure D: Teach New Vowel Sound**

Tutor brings out O tile to teach short /o/ {õ}. Tutor teaches that most common sound O makes is short õ as in olive. Tutor can help student visualize story in head to create key word for /o/. Tutor demonstrates tapping for key word: taps right index finger while saying /o/, then taps middle finger while saying /liv/. Student taps olive twice and then taps /o/ three times.

**Lesson 3: Procedure E: Teach 5 New Consonants**

Tutor pulls down tiles for six new consonants, one at a time: K, V, J, D, Z. Student says name of letter and then sound that letter makes (tutor must make sure student does not insert schwa sound when making sound of letter, e.g., k::: not kuh ). If student does not know sound that letter makes, student writes letter down on Keyword page and thinks of and draws a picture to remind him of sound. Tutor brings down tiles for new consonants one by one and ask student to name letter and then the sound that letter makes.

**LESSON 3: Procedure F: Read Sounds on Tiles**

Tutor places tiles in front of student and first points to the vowel tiles. Tutor asks student to tell her why they are a different color and then asks student to tape vowels for her. Student taps and says apple, apple, /a/, /a/, /a/, or itchy, itchy, /i/ /i/, /i/, or olive, olive, /o/, /o/, /o/. Tutor then points to each of the other consonant tiles and asks student to name letter and then make its sound (Tutor should mix order of consonants with those from lesson one and two)

Letters-Review	Student names letter	Student makes correct sound for letter	Letters-Review	Student names letter	Student makes correct sound for letter
I		/i/ {ī} (itchy)	A		/a/ {ă} (apple)
G		/g/ (goat)	P		/p/
L		/l/	T		/t/
R		/r/	F		/f/
C		/c/ (cat)	S		/s/
H		/h/	B		/b/
N		/n/	M		/m/
Letters/New					
O		/o/ {ō} (olive)			
D		/d/			
K		/k/			
J		/j/			
V		/v/			

**LESSON 3: Procedure G: Spell Sounds with Tiles**

Tutor dictates sounds; student repeats and points to tile that makes sound.

Dictated Sound	Student correctly points to tile (identify key word for vowel)	Dictated Sound	Student correctly points to tile (identify key word for vowel)
v		r	
z		n	
m		b	
p		k (accept either C or K tile)	
d		o	
l		i	
j		a	

**Lesson 3: Procedure H: Read Real Words with Tiles**

Tutor builds first word with tile. Student taps vowel sound. Tutor demonstrates touch and say for each letter by using her index finger to touch and say each sound. Student does touch and say for each sound. Next, tutor explains how to slowly blend sounds by dragging her finger underneath the word while running the sounds together. Student does slow blending. Next, tutor demonstrates how to say it fast like a word and student follows. Finally, tutor changes word by replacing one tile with a new tile and student repeats touch and say and slow blending of word

Tutor builds words	Student correctly does touch and say	Student correctly blends sounds	Tutor builds words	Student correctly does touch and say	Student correctly blends sounds
ZAP			KIN		
ZIP			FIN		
LIP			FIG		
LOP			DIG		
LOT			JIG		
JOT			RIG		
ROT			RAG		
ROD			RAN		
RID			VAN		
KID			VAT		
KIT					

**Lesson 3: Procedure I: Spell Real Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor demonstrates for student: Tutor says word, student repeats word once and then again very slowly. Tutor uses fingers of non-writing hand to break word into sounds; she raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Student follows. Tutor tells student to pull down a tile for each finger while making the sound. Finally tutor teaches student how to double check by slowly blending the tiles together and then saying them fast like a word. Next, tutor tells student to change just one tile to make new word (Tutor names tile and tells student new word)

Dictated Word Pairs	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word	Student correctly changes tile for new word
ZAP-ZIP				
LOG-LAG				
DOG-BOG				
VAN-VAT				
TOP-TAP-TIP-TIM				

**LESSON 3: Procedure J: Read Nonsense Words with Tiles**

Tutor builds words with tiles; student figures out vowel first and taps vowel when it changes. Student does touch and say for each tile, then slowly blends sounds together and then says it fast like a word

Tutor builds word	Student taps vowel	Student does touch and say	Student correctly blends into word
TOZ			
LOD			
VAB			
ROJ			
KIZ			

**Lesson 3: Procedure K: Spell Nonsense Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to pull down a tile for each finger while making the sound. Student double checks by slowly blending the tiles together and then saying it fast like a word.

Dictated Word	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word
FAZ			
VOT			
JIV			
NOZ			
DOP			

**Lesson 3: Procedure L: Read Words through Word Frame**

Student puts word frame around each word and reads the word.

Word	Correctly Read	Word	Correctly read	Word	Correctly Read
jam		not		fov	
lid		dig		bod	
dim		Liz		siv	
bog		cob		jad	
cop		kid		zon	
dip		vat		kiz	
mob		bid		jat	

**Lesson 3: Procedure M: Spell Words with Fingers, then Paper**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to make each sound and tell her what letter he needs. Student makes each sound while writing it down on paper. As a last step, student double-checks what he wrote by blending the sounds together and then saying it fast like a word.

Dictated Word	Student correctly breaks word into sounds	Student correctly spells word out loud	Student correctly spells word on paper
Real			
NOD			
ROB			
TOM			
JAB			
ZIP			
Nonsense			
NAV			
ZIB			
TOV			
JOD			
GAF			

**LESSON 3: Procedure N: Read Phrases**

Student reads phrases and creates sentences

<b>Who Phrase</b>	Correctly Reads/Creates +/-	<b>Where Phrase</b>	Correctly Reads/Creates +/-
Mom		in the fog	
A lad		at a hog	
Rob		at Ann	
A van		on a big log	
A bad dog		in a cab	
A hot ham		in a pot	
<b>Did What Phrase</b>		<b>Create own sentences</b>	
got a hat		<b>Add-on Phrases</b>	N/A
can jog			
bit a lad			
ran			
can fit			
sat			
<b>Create own sentences</b>			
		<b>Create own sentences</b>	

**Lesson 3: Procedure O: Read Sentences**

Student reads first sentence to self and then reads sentence aloud to tutor. Student identifies number of phrases in sentence, marks phrases, and re-reads with phrasing.

Student reads sentence	Student marks phrasing +/-				Student re-reads with phrasing
	WHO	DID WHAT	WHERE	ADD-ON	
1. Mom got a hat.					
2. A bad dog bit a lad.					
3. Rob can jog in the fog.					
4. A lad ran at a hog.					
5. A hot ham can fit in a pot.					
6. A bad dog ran at Ann.					
7. Mom can fit in a cab.					
8. Rob sat on a big log.					
9. A van can fit on a big log.					
10. A bad dog sat on Ann.					

**Lesson 3: Procedure P: Read Longer Words Together**

Student reads first syllable of longer word. Tutor thinks of one longer word that begins with that syllable. Student tries to think of other longer words that begin with that syllable.

Root Syllable/Nonsense Word	Student correctly reads	Student generates at least two longer words
lob		
van		
gob		
nav		
vam		
pov		
zip		
doc		
cop		
rob		

**LESSON 4: 1 VOWEL, 4 CONSONANTS**

New Tiles: U, W, X, Y, QU

Known Letter Tiles: A, B, C, F, G, H, I, L, M, N, P, R, S, T, O, D, J, K, V, Z.

Teach QU: U always comes after a Q; U acts as a bodyguard, not a vowel after Q.

**Lesson 4: Procedure A: Review known Letters and Sounds**

Tutor sets out letter tiles used in last lesson for review: A, B, C, D, F, G, H, I, J, K, L, M, N, O, P, R, S, T, V, Z.

Tutor asks student to identify vowels and to tap key word for each sound. Tutor points to each of the other consonant tiles and asks student to name sound of each letter.

Review letter/Sound	Student correctly names letter	Student correctly says sound	Review letter/Sound	Student correctly names letter	Student correctly says sound
a			l		
i			m		
o			n		
b			p		
c			r		
f			s		
g			t		
h			z		
j			d		
k			v		

**Lesson 4: Procedure B: Review/Do Extra Practice Page****Lesson 4: Procedure C: Phonemic Awareness Warm-up**

Tutor says word; student repeats word and says just the first sound, last sound, or vowel sound and points to the letter that makes the sound.

Dictate Word	Student identifies correct sound	Student points to correct tile	Dictated Word	Student identifies correct sound	Student points to correct tile	Dictated Word	Student id's correct sound	Student points to correct tile
GOV			BOZ				DOF	
VOT			PIJ				RAV	
ZIG			FOD				LIJ	
JOM			FAC				ZOT	
CAZ			NOV				HIF	

**Lesson 4: Procedure D: Teach New Vowel Sound**

Tutor brings out U tile to teach short /u/ {ũ}. Tutor teaches that most common sound U makes is short ũ as in upper. Tutor can help student visualize story in head to create key word for /u/. Tutor demonstrates tapping for key word: taps right index finger while saying /u/, then taps middle finger while saying /per/. Student taps upper twice and then taps /u/ three times.

**Lesson 4: Procedure E: Teach 4 New Consonants**

Tutor pulls down tiles for six new consonants, one at a time: X, W, Y, QU. Student says name of letter and then sound that letter makes (tutor must make sure student does not insert schwa sound when making sound of letter). If student does not know sound that letter makes, student writes letter down on Keyword page and thinks of and draws a picture to remind him of sound. Tutor brings down tiles for new consonants one by one and ask student to name letter and then the sound that letter makes.

**LESSON 4: Procedure F: Read Sounds on Tiles**

Tutor places tiles in front of student and first points to the vowel tiles. Tutor asks student to tell her why they are a different color and then asks student to tape vowels for her. Student taps and says apple, apple, /a/, /a/, /a/, itchy, itchy, /i/ /i/, /i/, olive, olive, /o/, /o/, /o/, upper, upper, /u/, /u/, /u/. Tutor then points to each of the other consonant tiles and asks student to name letter and then make its sound (Tutor should mix order of consonants with those from lesson one and two)

Letters-Review	Student names letter	Student makes correct sound for letter	Letters-Review	Student names letter	Student makes correct sound for letter
I		/i/ {ī} (itchy)	A		/a/ {ǎ} (apple)
G		/g/ (goat)	P		/p/
L		/l/	T		/t/
R		/r/	F		/f/
C		/c/ (cat)	S		/s/
H		/h/	B		/b/
N		/n/	M		/m/
O		/o/ {ō} (olive)	Letters/New		
D		/d/	U		/u/ {ū} (upper)
K		/k/	X		/eks/
J		/j/	W		/w/
V		/v/	Y		/y/ (yellow)
			QU		kw

**LESSON 4: Procedure G: Spell Sounds with Tiles**

Tutor dictates sounds; student repeats and points to tile that makes sound.

Dictated Sound	Student correctly points to tile (identify key word for vowel)	Dictated Sound	Student correctly points to tile (identify key word for vowel)	Dictated Sound	Student correctly points to tile (identify key word for vowel)
w		d		o	
v		j			
qu		p			
y		g			
b		u			
x		i			
z		a			

**Lesson 4: Procedure H: Read Real Words with Tiles**

Tutor builds first word with tile. Student taps vowel sound. Tutor demonstrates touch and say for each letter by using her index finger to touch and say each sound. Student does touch and say for each sound. Next, tutor explains how to slowly blend sounds by dragging her finger underneath the word while running the sounds together. Student does slow blending. Next, tutor demonstrates how to say it fast like a word and student follows. Finally, tutor changes word by replacing one tile with a new tile and student repeats touch and say and slow blending of word

Tutor builds words	Student correctly does touch and say	Student correctly blends sounds	Tutor builds words	Student correctly does touch and say	Student correctly blends sounds
YUM			WAG		
YAM			WIG		
TAM			MIG		
TAX			MIX		
WAX			MAX		
			FAX		
tux					
tub			quit		
sub			quiz		
sob			quip		

**Lesson 4: Procedure I: Spell Real Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor demonstrates for student: Tutor says word, student repeats word once and then again very slowly. Tutor uses fingers of non-writing hand to break word into sounds; she raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Student follows. Tutor tells student to pull down a tile for each finger while making the sound. Finally tutor teaches student how to double check by slowly blending the tiles together and then saying them fast like a word. Next, tutor tells student to change just one tile to make new word (Tutor names tile and tells student new word)

Dictated Word Pairs	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word	Student correctly changes tile for new word
RUT-RAT				
QUIZ-QUIT				
PUN-PIN-PAN-DAN				
FIX-FOX-LOX				
YAP-YUP-YIP-SIP				

**LESSON 4: Procedure J: Read Nonsense Words with Tiles**

Tutor builds words with tiles; student figures out vowel first and taps vowel when it changes. Student does touch and say for each tile, then slowly blends sounds together and then says it fast like a word

Tutor builds word	Student taps vowel	Student does touch and say	Student correctly blends into word
WIB			
YAT			
QUOP			
NUX			
HUD			

**Lesson 4: Procedure K: Spell Nonsense Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to pull down a tile for each finger while making the sound. Student double checks by slowly blending the tiles together and then saying it fast like a word.

Dictated Word	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word
WUP			
QUIB			
YOY			
ZIM			
NAX			

**Lesson 4: Procedure L: Read Words through Word Frame**

Student puts word frame around each word and reads the word.

Word	Correctly Read	Word	Correctly read	Word	Correctly Read
but		quit		sug	
cub		wag		jix	
gum		ox		wab	
tux		win		yut	
job		up		fup	
us		cut		quoj	
wax		yum		nud	

**Lesson 4: Procedure M: Spell Words with Fingers, then Paper**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to make each sound and tell her what letter he needs. Student makes each sound while writing it down on paper. As a last step, student double-checks what he wrote by blending the sounds together and then saying it fast like a word.

Dictated Word	Student correctly breaks word into sounds	Student correctly spells word out loud	Student correctly spells word on paper
Real			
WIN			
GUT			
YUM			
LAX			
WIG			
Nonsense			
PUD			
NAX			
WOG			
ZUB			
JIX			

**LESSON 4: Procedure N: Read Phrases**

Student reads phrases and creates sentences

<b>Who Phrase</b>	Correctly Reads/Creates +/-	<b>Where Phrase</b>	Correctly Reads/Creates +/-
Gus		in a hot tub	
A fun pup		at the pub	
Max		on the bus	
Bud		in the mud	
A bad dog		in the hot sun	
A big cub		on a rug	
<b>Did What Phrase</b>		<b>Create own sentences</b>	
dug a pit		<b>Add-on Phrases</b>	N/A
had a quiz			
quit			
cut a lip			
had fun			
did yap			
<b>Create own sentences</b>			
		<b>Create own sentences</b>	

**Lesson 4: Procedure O: Read Sentences**

Student reads first sentence to self and then reads sentence aloud to tutor. Student identifies number of phrases in sentence, marks phrases, and re-reads with phrasing.

Student reads sentence	Student marks phrasing +/-				Student re-reads with phrasing
	WHO	DID WHAT	WHERE	ADD-ON	
1. Gus had a quiz.					
2. A fun pup dug a pit.					
3. Max quit at the pub.					
4. Bud had fun in a hot tub.					
5. A big cub had fun in the mud.					
6. Max cut a lip in the hot sun.					
7. A fun pup did yap on the bus.					
8. Gus had a quiz in the hot sun.					
9. A fox had fun on a rug.					
10. A big cub did run in the mud.					

**Lesson 4: Procedure P: Read Longer Words Together**

Student reads first syllable of longer word. Tutor thinks of one longer word that begins with that syllable. Student tries to think of other longer words that begin with that syllable.

Root Syllable/Nonsense Word	Student correctly reads	Student generates two longer words
mum		
min		
but		
sub		
bot		
quin		
wim		
tux		
win		
wit		

**LESSON 5: 1 VOWEL, 5 DIGRAPHS**

New Tiles: E, CH, CK, SH, TH, WH

Known Letter Tiles: A, B, C, F, G, H, I, L, M, N, P, R, S, T, O, D, J, K, V, Z, U, QU, X, Y, W.

**Lesson 5: Procedure A: Review known Letters and Sounds**

Tutor sets out letter tiles used in last lesson for review: A, B, C, D, F, G, H, I, J, K, L, M, N, O, P, QU, R, S, T, U, V, W, X, Y, Z.

Tutor asks student to identify vowels and to tap key word for each sound. Tutor points to each of the other consonant tiles and asks student to name sound of each letter.

Review letter/Sound	Student correctly names letter	Student correctly says sound	Review letter/Sound	Student correctly names letter	Student correctly says sound
a			l		
i			m		
o			n		
u			x		
b			p		
c			r		
f			s		
g			t		
h			z		
j			d		
k			v		
qu			y		
z					

### Lesson 5: Procedure B: Review/Do Extra Practice Page

#### Lesson 5: Procedure C: Phonemic Awareness Warm-up

Tutor says word; student repeats word and says just the first sound, last sound, or vowel sound and points to the letter that makes the sound.

Dictated Word	Student id correct sound	Student point to correct tile	Dictated Word	Student id correct sound	Student point to correct tile	Dictated Word	Stdnt id crct sound	Student points to correct tile
YIT			RUX			YUV		
WOG			VIN			MOX		
YAD			ZAM			YIK		
VAM			TIG			VAB		
ZUG			VAL					

#### Lesson 5: Procedure D: Teach New Vowel Sound

Tutor brings out E tile to teach short /e/ {ẽ}. Tutor teaches that most common sound E makes is short e as in Eddy. Tutor can help student visualize story in head to create key word for /e/. Tutor demonstrates tapping for key word: taps right index finger while saying /e/, then taps middle finger while saying /dy/. Student taps Eddy twice and then taps /e/ three times.

#### Lesson 5: Procedure E: Teach 5 Digraphs

Tutor explains that student now knows the sound of every letter in our alphabet-26. However there are 44 different sounds in English, so sometimes letters pair up to represent one sound. When two letters pair up to make one sound, it is called a digraph. Tutor pulls down first digraph tile for SH and asks student to tell her the names of the two letters and the sound the sound they make together. Tutor pulls down rest of digraphs-SH, TH, WH, CH, CK. Student says name of letters and then sound that letter makes (tutor must make sure student does not insert schwa sound when making sound of letter). If student does not know sound that letter makes, student writes letter down on Keyword page and thinks of and draws a picture to remind him of sound. Tutor brings down tiles for new consonants one by one and ask student to name letter and then the sound that letter makes.

**LESSON 5: Procedure G: Read Sounds on Tiles**

Tutor places tiles in front of student and first points to the vowel tiles. Tutor asks student to tell her why they are a different color and then asks student to tape vowels for her. Student taps and says apple, apple, /a/, /a/, /a/, itchy, itchy, /i/ /i/, /i/, olive, olive, /o/, /o/, /o/, upper, upper, /u/, /u/, /u/, and Eddy, Eddy, /e/, /e/, /e/. Tutor then points to each of the other consonant tiles and asks student to name letter and then make its sound (Tutor should mix order of consonants with those from previous lesson)

Letters-Review	Student names letter	Student makes correct sound for letter	Letters-Review	Student names letter	Student makes correct sound for letter
I		/i/ {ī} (itchy)	A		/a/ {ă} (apple)
G		/g/ (goat)	P		/p/
L		/l/	T		/t/
R		/r/	F		/f/
C		/c/ (cat)	S		/s/
H		/h/	B		/b/
N		/n/	M		/m/
O		/o/ {ō} (olive)	U		/u/ {ū} (upper)
D		/d/	X		/eks/
K		/k/	W		/w/
J		/j/	Y		/y/ (yellow)
V		/v/	QU		kw
New Letters					
E		/e/ (Eddy)			
Ch					
Th					
Sh					
Wh					
CK					

**LESSON 5: Procedure G: Spell Sounds with Tiles**

Tutor dictates sounds; student repeats and points to tile that makes sound.

Dictated Sound	Student correctly points to tile (identify key word for vowel)	Dictated Sound	Student correctly points to tile (identify key word for vowel)	Dictated Sound	Student correctly points to tile (identify key word for vowel)
ch			o		
th			a		
wh			e		
sh					
k					
u					
i					

**Lesson 5: Procedure H: Read Real Words with Tiles**

Tutor builds first word with tile. Student taps vowel sound. Tutor demonstrates touch and say for each letter by using her index finger to touch and say each sound. Student does touch and say for each sound. Next, tutor explains how to slowly blend sounds by dragging her finger underneath the word while running the sounds together. Student does slow blending. Next, tutor demonstrates how to say it fast like a word and student follows. Finally, tutor changes word by replacing one tile with a new tile and student repeats touch and say and slow blending of word

Tutor build word	Student does touch and say	Student blends sounds	Tutor builds first word	Student does touch and say	Student blends sounds
PIG			SHOP		
PEG			CHOP		
PED			CHIP		
WED			RIP		
WET			RICK		
WIT			THICK		
WISH			THIN		
WITH			THEN		
			WHEN		

**Lesson 5: Procedure I: Spell Real Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor demonstrates for student: Tutor says word, student repeats word once and then again very slowly. Tutor uses fingers of non-writing hand to break word into sounds; she raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Student follows. Tutor tells student to pull down a tile for each finger while making the sound. Finally tutor teaches student how to double check by slowly blending the tiles together and then saying them fast like a word. Next, tutor tells student to change just one tile to make new word (Tutor names tile and tells student new word)

Dictated Word Pairs	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word	Student correctly changes tile for new word
BEN-BAN				
SUCK-MUCH				
MOTH-MATH				
WEB-WEB				
SHUT-SHOT				
YES-YET				

**LESSON 5: Procedure J: Read Nonsense Words with Tiles**

Tutor builds words with tiles; student figures out vowel first and taps vowel when it changes. Student does touch-say for each tile, slowly blends sounds together and says it fast like a word

Tutor builds word	Student taps vowel	Student does touch-say	Student blends word
CHED			
THUN			
SHOM			
BICK			
WHAD			

**Lesson 5: Procedure K: Spell Nonsense Words with Fingers, then Tiles**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to pull down a tile for each finger while making the sound. Student double checks by slowly blending the tiles together and then saying it fast like a word.

Dictated Word	Student correctly finger spells	Student correctly pulls down tiles	Student correctly blends word
LICH			
FASH			
THEP			
SHEM			
CHUB			

**Lesson 5: Procedure L: Read Words through Word Frame**

Student puts word frame around each word and reads the word.

Word	Correctly Read	Word	Correctly read	Word	Correctly Read
wed		Ken		shud	
them		met		chep	
mug		when		vock	
Rick		mesh		neth	
shag		Rex		bosh	
Chet		quick		wheck	
lock		yet		quish	

**Lesson 5: Procedure M: Spell Words with Fingers, then Paper**

Tutor dictates words and student breaks word into sounds. Tutor says word, student repeats word once and then again very slowly. Student uses fingers of non-writing hand to break word into sounds; student raises thumb while saying first sound, index finger while saying next sound, and middle finger while saying final sound. Tutor tells student to make each sound and tell her what letter he needs. Student makes each sound while writing it down on paper. As a last step, student double-checks what he wrote by blending the sounds together and then saying it fast like a word.

Dictated Word	Student correctly breaks word into sounds	Student correctly spells word out loud	Student correctly spells word on paper
Real			
JET			
PATH			
WHIP			
SHED			
CHIP			
GOSH			
Nonsense			
WHAP			
CHEM			
QUISH			
THUB			
HOSH			

**LESSON 5: Procedure N: Read Phrases**

Student reads phrases and creates sentences

Who Phrase	Correctly Reads/Creates +/-	Where Phrase	Correctly Reads/Creates +/-
Rex and Ed		at the dock	
A red hen		on the path	
Thin Ken		in a shop	
A vet		on a ship	
A big duck		in a bath tub	
Fat Chad		at the shed	
<b>Did What Phrase</b>		<b>Create own sentences</b>	
had a bash		<b>Add-on Phrases</b>	N/A
did dash			
met Beth			
got sick			
got wet			
sat with a thud			
<b>Create own sentences</b>			

**Lesson 5: Procedure O: Read Sentences**

Student reads first sentence to self and then reads sentence aloud to tutor. Student identifies number of phrases in sentence, marks phrases, and re-reads with phrasing.

Student reads sentence	Student marks phrasing +/- WHO DID WHERE ADD- WHAT ON				Student re-reads with phrasing
1. Rex and Ed met Beth.					
2. Fat Chad sat with a thud.					
3. A duck got sick in a bath tub.					
4. Thin Ken did dash on the path.					
5. A red hen got wet at the dock.					
6. A vet had a bash in a shop.					
7. Fat Chad got sick at the shed.					
8. Thin Ken got wet on a ship.					
9. A vet got a fish at the dock.					
10. Rex and Ed met Beth at a bash on a ship.					

**Lesson 5: Procedure P: Read Longer Words Together**

Student reads first syllable of longer word. Tutor thinks of one longer word that begins with that syllable. Student tries to think of other longer words that begin with that syllable.

Root Syllable/Nonsense Word	Student correctly reads	Student generates two longer words
thun		
shep		
chip		
shag		
whis		
thim		
chap		
sham		
ched		
whim		

APPENDIX G  
DATA COLLECTION SHEET

Clinician: \_\_\_\_\_ Participant #:  
\_\_\_\_\_

Date of Sessions: \_\_\_\_\_ Session # and time:  
\_\_\_\_\_

Procedure session began with: \_\_\_\_\_

Procedure session ended with: \_\_\_\_\_

Clinician Notes/Comments

---

Clinician: \_\_\_\_\_ Participant #:  
\_\_\_\_\_

Date of Sessions: \_\_\_\_\_ Session # and time:  
\_\_\_\_\_

Procedure session began with: \_\_\_\_\_

Procedure session ended with: \_\_\_\_\_

Clinician Notes/Comments

---

Clinician: \_\_\_\_\_ Participant #:  
\_\_\_\_\_

Date of Sessions: \_\_\_\_\_ Session # and time:  
\_\_\_\_\_

Procedure session began with: \_\_\_\_\_

Procedure session ended with: \_\_\_\_\_

Clinician Notes/Comments

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APPENDIX H  
BOOK 2 READING AND SENTENCE PROBES

Test sentences for Book 2, Consonants and Short Vowels  
Student answer sheet

Instructions for student: This is a short spelling and reading test to assess what you have learned so far. The first five sentences will be dictated to you. Please spell the words on the blank lines provided below. You may ask the tutor to repeat the sentence. The next five sentences are short sentences for you to read. Please read each sentence carefully and as best you can.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

1. I have a pot of rum.
2. A thin coat of wax is needed.
3. Why did Ken quit?
4. He saw a tick on his leg.
5. The van was in the lot.

## Test Sentences for Book 2, Consonants and Short Vowels/Examiner's Page

Instructions for tutor: Below are ten sentences to test what the student has learned so far. Please dictate the first five sentences to the student. The student has blank lines on his/her answer sheet on which to write the answers. You may repeat any of the sentences if asked. The next five sentences are sentences for the student to read. Ask the student to read each sentence one at a time as best he/she can. You cannot help the student with any word or words he/she struggles with or misreads. The test words are underlined and italicized. These are the only words you are testing. When the student is finished, write the participant number on the test page and the date and collect the test page. Please indicate a misspelled or misread word on your test sheet by drawing a line through the word. Each spelling word is worth ten points and each reading word is worth 10 points. Pass criteria is 80% for spelling and 80% for reading, so a student may miss two spelling words and two reading words. If a student misses more than two spelling words or two reading words, print those words on an index card and ask the student to practice them until the next session. At the next session you will test only the sentences containing those words.

Spelling sentences-please dictate to the student

1. The *pin* is on her *bed*.
2. I gave *Bob* the *tin*.
3. You have *mud* on your *pen*.
4. He gave his *chin* a *tug*.
5. We will *shun* the *fox*.

Score: \_\_\_\_\_

Sentences for the student to read

1. I have a *pot* of *rum*.
2. A *thin* coat of *wax* is needed.
3. Why did *Ken* *quit*?
4. He saw a *tick* on his *leg*.
5. The *van* was in the *lot*.

Score: \_\_\_\_\_

APPENDIX I  
INTEROBSERVER AGREEMENT FORM

Interobserver Reliability Form

Clinician \_\_\_\_\_

Date Observed \_\_\_\_\_

Time of session \_\_\_\_\_

Behavior	Behavior Expected	Behavior used correctly	Behavior observed but not used correctly
1. Tutor gestures to self when she dictates word.			
2. Tutor gestures to student when she asks student to repeat word			
3. Tutor uses full swooping motion during slow down step			
4. Tutor draws finger in small swoop on table as example for student to read word slowly			
5. Tutor draws line on table with index finger as example for student to "say it fast like a word".			
6. When finger spelling, tutor makes sure student uses non-writing hand and starts with thumb (left for everyone)			
7. Tutor asks student if there is any word he/she needs to check for correct spelling.			
8. Tutor says clean sounds (she does not insert schwa consonant)			
9. Tutor asks student to watch her when she dictates word.			
10. When spelling sentences, tutor always asks student if he began sentence with a capital and ended with correct punctuation (or ended with a period).			
Total			

APPENDIX J  
TEST SCORE RESULTS ON DEPENDANT VARIABLE MEASURES

Table J-1. Pretest and Posttest scores for treatment group on *Letter-Word Identification* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
7	35	34	49	46	<0.1	<0.1	2.3	2.2
10	37	38	55	56	0.1	0.2	2.5	2.6
11	58	56	86	82	17	12	6.3	5.6
12	48	55	72	82	3	11	3.8	5.3
13	54	53	83	80	12	9	5.1	4.8
14	44	44	68	67	2	1	3.3	3.3
16	57	63	85	93	16	33	5.9	8.5
18	36	38	47	50	<0.1	<0.1	2.4	2.6
20	53	65	78	96	7	39	4.8	9.8

Table J-2. Pretest and Posttest scores for control group on *Letter-Word Identification* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Posttest Grade Equivalent
2	62	61	97	92	43	30	7.5
3	57	61	83	89	13	23	7.5
4	58	57	91	88	27	22	5.9
6	65	62	98	92	44	31	8.0
8	59	62	88	92	22	31	8.0
9	56	56	86	85	17	15	5.6
15	61	60	90	87	25	20	7.1
17	66	66	96	95	39	38	10.6
19	60	66	89	98	23	45	10.6

Table J-3 Pretest and Posttest scores for treatment group on *Spelling* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
7	24	25	57	59	0.2	0.3	2.4	2.6
10	21	23	49	55	<0.1	0.1	1.8	2.2
11	41	40	94	92	35	29	8.3	7.7
12	31	31	75	74	4	4	4.1	4.1
13	27	31	66	75	1	5	3.1	4.1
14	24	28	59	69	0.3	2	2.4	3.3
16	26	28	61	66	0.5	1	2.8	3.3
18	23	25	51	56	<0.1	0.2	2.2	2.6
20	28	46	65	103	1	57	3.3	12.9

Table J-4 Pretest and Posttest scores for control group on *Spelling* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
2	36	37	88	89	22	22	5.7	6.2
3	36	38	83	86	13	18	5.7	6.6
4	32	33	81	82	10	12	4.4	4.7
6	43	42	100	97	49	42	9.9	9.0
8	37	36	88	85	20	15	6.2	5.7
9	39	40	94	94	33	36	7.1	7.7
15	43	43	97	96	43	40	9.9	9.9
17	43	41	94	90	35	24	9.9	8.3
19	40	44	89	100	23	49	7.1	10.9

Table J-5 Pretest and Posttest scores for treatment group on *Word Attack* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
7	8	13	64	72	1	3	1.9	2.5
10	10	18	71	82	3	11	2.2	3.6
11	15	19	75	80	4	9	2.9	3.9
12	20	25	84	92	14	29	4.3	6.7
13	16	20	80	85	8	15	3.1	4.3
14	11	16	73	80	4	9	2.3	3.1
16	21	24	84	89	15	23	4.7	6.1
18	19	22	77	82	6	12	3.9	5.1
20	21	29	83	100	13	50	4.7	12.9

Table J-6 Pretest and Posttest scores for control group on *Word Attack* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
2	22	29	91	104	27	60	3.5	12.9
3	18	22	77	83	7	13	3.6	5.1
4	26	17	97	83	43	13	7.5	3.3
6	22	26	87	94	19	34	5.1	7.5
8	18	19	81	81	10	11	3.6	3.9
9	19	24	84	91	15	28	3.9	6.1
15	28	25	97	89	43	24	10.2	6.7
17	30	25	103	87	59	20	15.4	13.0
19	22	20	86	82	17	11	5.1	7.8

Table J-7 Pretest and Posttest scores for treatment group on *Sound Awareness* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
7	15	16	52	53	<0.1	<0.1	K.8	K.9
10	27	38	70	89	2	24	1.9	4.7
11	32	30	77	73	6	4	2.6	2.3
12	35	35	82	82	12	12	3.3	3.3
13	36	35	85	83	16	13	3.6	3.3
14	28	29	72	73	3	4	2.0	2.1
16	40	41	94	97	34	42	7.3	9.4
18	31	34	74	79	4	8	2.4	3.0
20	25	44	66	116	1	85	1.6	>18.0

Table J-8 Pretest and Posttest scores for control group on *Sound Awareness* (WJ III Achievement subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
2	42	44	105	118	64	89	12.4	>18.0
3	36	35	83	81	13	10	3.6	3.3
4	42	39	105	93	62	32	12.4	5.7
6	33	33	79	79	8	8	2.8	2.8
8	36	38	84	89	15	22	3.6	4.7
9	28	31	71	76	3	5	2.0	2.4
15	31	33	75	78	5	7	2.4	2.8
17	44	42	114	99	83	47	>18.0	12.4
19	41	42	97	101	42	52	9.4	12.4

Table J-9 Pretest and Posttest scores for treatment group on *Sight Word Efficiency* (TOWRE subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
7	34	29	55	--	<1	<1		1.8
10	31	41	<55	62	<1	<1		4.4
11	62	66	74	77	4	6		4.6
12	79	76	90	83	25	13		6.4
13	66	64	79	78	8	7		4.6
14	46	47	65	65	1	1		2.6
16	30	44	--	62	--	<1		4.4
18	34	40	--	57	--	<1		3.6
20	50	74	1	81	66	10		6.0

Table J-10 Pretest and Posttest scores for control group on *Sight Word Efficiency* (TOWRE subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
2	75	71	86	83	17	13		8.8
3	80	79	86	82	17	12		8.6
4	40	28	65	56	<1	<1		3.6
6	79	74	90	81	25	10		6.0
8	82	67	92	77	29	6		6.8
9	80	76	90	87	25	19		9.6
15	51	52	67	67	1	1		3.2
17	74	64	79	72	8	3	6.0	5.6
19	81	76	87	83	19	13		

Table J-11 Pretest and Posttest scores for treatment group on *Phonemic Decoding Efficiency* (TOWRE subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
7	10	10	55	55	<1	<1		1.8
10	26	18	75	68	5	2		4.8
11	20	38	70	84	2	14		5.6
12	49	45	95	91	36	27		3.6
13	17	17	66	66	1	1		2.2
14	17	16	66	64	1	<1		2.2
16	16	14	64	60	<1	<1		4.0
18	16	17	60	62	<1	<1		4.4
20	11	37	56	83	<1	13		5.4

Table J-12 Pretest and Posttest scores for control group on *Phonemic Decoding Efficiency* (TOWRE subtest)

Particip. Number	Pretest Raw Score	Posttest Raw Score	Pretest Standard Score	Posttest Standard Score	Pretest Percentile	Posttest Percentile	Pretest Grade Equivalent	Posttest Grade Equivalent
2	41	38	87	84	19	14		9.0
3	39	30	85	76	16	6		6.4
4	22	14	76	67	6	1		4.8
6	54	47	102	93	55	32		8.6
8	36	32	82	80	12	9		8.0
9	39	41	85	87	16	19		9.6
15	28	29	77	77	6	6		4.0
17	31	42	76	84	6	14	4.4	9.0
19	39	26	83	75	13	5		

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## BIOGRAPHICAL SKETCH

SallyAnn Giess was born on June 2, 1964, in Buffalo, New York. She grew up in Buffalo and graduated from Kenmore East High School in 1982. In June 1986, Ms. Giess earned a Bachelor of Arts degree from the State University of New York at Buffalo (UB) and in January 1989, she received her Master of Arts degree in Communication disorders and sciences from UB. Ms Giess has held the Certificate of Clinical Competence in Speech-Language Pathology from the American Speech-Language Hearing Association since 1991. She is currently licensed to practice Speech-Language Pathology in the state of Florida.

After working as a Speech-Language Pathologist for several years, she returned to school in 1993 to pursue a law degree. Ms. Giess graduated from the University of Dayton in Dayton, Ohio with her Juris Doctorate in 1996. After graduating from law school, Ms. Giess moved to North Carolina. She worked several years in the legal field before returning to speech language pathology in the Charlotte-Mecklenberg School System, where she worked until coming to the University of Florida in 2001.

Upon completion of her Doctor of Philosophy degree, Ms. Giess will begin a career as an assistant professor in the Department of Speech-Language Pathology in the Graduate School of Medical Education at Seton Hall University in South Orange, New Jersey.