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INVESTIGATION OF A CLASSROOM-BASED READING INTERVENTION STRATEGY FOR OLDER ELEMENTARY STUDENTS WITH POOR DECODING SKILLS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Arts and Sciences College
In partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Communication Sciences and Disorders

by
Shara Brinkley
B.S., Evangel University, 1973
M.S., Colorado State University, 1978
M.S., University of Nebraska-Lincoln, 1987
May, 2010

DEDICATION

To the children for whom reading is arduous and unproductive, I dedicate this research and future endeavors. You deserve to know the power of the written word.

ACKNOWLEDGMENTS

I acknowledge my dependence on the all-mighty, invisible God through whom all was created and exists now and forever. He has been my faithful guide and companion through every difficulty, from the initiation of the journey to the current stage of the trip. He promises incredible adventures for the future and I am thrilled at the prospect.

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ABSTRACT

Using a response to intervention framework, this study investigates the efficacy of a classroom-based intervention for struggling readers with decoding deficits in the upper elementary grades. Twenty two students in the fourth and sixth grades from four classrooms in low-performing schools received either a short 20-minute intervention delivered by their teacher or access to the lessons for an equivalent amount of time but no teacher instruction. Using three orthographic patterns, the 24 lessons consisted of a series of ten minimally contrasted words differing by one letter. The students in the experimental group decoded the words using a visual alphabet (Phonic Faces) and then spelled each word to reinforce the orthographic connections. Practice with word cards and contextual reading with the words in a short story were also included in the lesson. The experimental group receiving the teacher instruction made significant gains in nonword reading compared to the control group and these gains were not based on verbal ability or performance on a particular orthographic pattern. These results indicate that following intervention, the experimental group was beginning to more fully decode each letter of a word.

REVIEW OF LITERATURE

Two related initiatives from the American Speech-Language Hearing Association (ASHA) are resulting in changes in the traditional role of the speech-language pathologist (SLP) in schools. The first is the position statement on reading and writing among children and adolescents (ASHA, 2001). This statement charges SLPs to play a critical and direct role in the literacy development of students with communication disorders, and also make contributions to literacy efforts on behalf of other children and adolescents in collaboration with other academic professionals. The second initiative provides guidelines for the role of the SLP within the Response to Intervention (RTI) model of service delivery to struggling learners (ASHA, 2006). The ASHA guidelines recommend more of the SLP's time be allotted to activities with a focus on addressing the language foundation of literacy and learning, including consultation and classroom-based intervention. This study represents a response to these initiatives by examining the outcome of a reading intervention based on orthographic patterns targeting poor readers in upper elementary grades. The intervention, consistent with the RTI model, was implemented within the students' classrooms using small group instruction provided by the classroom teacher.

The Need for Collaborative Efforts

Many classrooms in the upper elementary grades in the United States are populated with students who don't read well enough to access information from their textbooks, a fact confirmed by the latest statistics from the National Assessment of Educational Progress (NAEP), commonly referred to as the Nation's Report Card. Nationally, 34% of students in the 4th grade fail to meet requirements at a Basic level, defined as "partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at a given grade" (Lee, Griggs, & Donahue, 2007, p.6). Some states have even more discouraging figures, including Louisiana, with 48% of

fourth grade students failing to achieve Basic level in statewide evaluations of reading (NAEP,2007). Considering that Basic level is only *partial mastery* of what is *fundamental for proficient work*, we can infer that those students who fall below the Basic level face significant challenges with the reading materials present in typical classrooms.

The teachers in these classrooms are under increasing pressure to improve the academic achievement of their students, who often have difficulty with the foundational reading skills of word recognition and decoding (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996). Although these students may have received reading instruction that focused on basic skills in the earlier grades, they either failed to master or are not able to apply these skills to read with fluency and to easily gain information from print. Once these students fall behind in literacy, they rarely if ever close the gap without intensive intervention (Torgesen et al., 2001).

School districts have had to respond to the pressure exerted by underperforming students on annual yearly progress reports required by No Child Left Behind (2001) legislation. Prompted by language in the reauthorization of the Individuals with Disabilities Educational Improvement Act of 2004 (IDEA 2004), districts have begun to use Response to Intervention, an initiative designed to systematically address critical academic issues in a model of prevention rather than failure. The RTI model features multiple tiers of reading intervention with increasing intensity based on individual need. Several overriding principles guide implementation of RTI in schools. The first is high quality core instruction for all students in classrooms using research-based instructional practices with highly qualified instructors (IRA, 2009). High-quality literacy instruction is defined as a program or set of educational practices that have a record of success in achieving positive reading outcomes, including those practices that are causally linked to

achievement in word recognition and reading comprehension (Justice, 2006). This is the *first tier* of instruction.

Progress in reading development is closely monitored using scientifically based assessment tools. Students who fail to exhibit adequate growth in reading are provided supplementary intervention to support development of critical reading skills. This is considered the *second tier* of instruction. Progress at this level is monitored to inform the focus of instruction. When students achieve adequate reading skills, supplemental intervention can be discontinued as long as periodic monitoring is continued.

Students who fail to achieve necessary reading levels after supplemental instruction receive in-depth assessments with a focus on processing limitations that may be affecting literacy development (Justice, 2006). The students may then be placed in special education for continued educational services. This is the *third tier*. Students who have proceeded through the RTI process of increasingly intensified intervention and still exhibit reading delays can more confidently be categorized as *learning disabled.*

Although RTI is typically implemented in the primary grades, it is equally applicable to students with poor reading skills in the upper grades (Ehren, 2009). Many students in classrooms who struggle with reading don't receive educational support from classroom teachers, special education teachers, or other reading specialists. Students in the upper grades may not have received the academic support that characterizes RTI practices: quality literacy instruction in the lower grades, comprehensive monitoring of educational progress, and increasingly intense supplemental intervention. They may not have benefited from previous reading instruction and as a result, exhibit deficient reading skills at a time when literacy demands in the classroom are increasing. The goal of intervention at this level is to prevent the

negative consequences of academic failure, including eroding self-confidence, alienation, anti-social behavior, and eventually dropping out of school (Ehren, 2008). Older students who struggle with literacy need to develop efficient strategies to maximize their reading efforts in content-rich classrooms in the upper grades.

Speech-language pathologists have much to offer in the effort to improve reading and written language abilities within the RTI model. SLPs, more than any other professionals, have the background to understand the language foundation of reading problems (Ehren, 2002). Trained in the use of the diagnostic-prescriptive approach, the SLP can help explore and deliver specific language-based treatments to address the individual needs of the student (Ehren, 2005). However, to be maximally effective, the SLP needs to work collaboratively with others, including classroom teachers, to implement language-based interventions. Inherent in the RTI model is a commitment to team building. Although SLPs may have knowledge and expertise, planning and implementation of interventions involve all stakeholders. Teachers who are willing to provide a Tier 2 intervention to their struggling readers may need resources and coaching from the SLP to identify student needs and implement appropriate interventions (ASHA, 2006). SLPs can contribute expertise on the language foundations of literacy, while the teacher contributes expertise in the instructional aspects of intervention, resulting in effective supplemental instruction to struggling readers.

Typical Literacy Development

Reading is fundamentally a language-based skill, sharing many characteristics and processes of spoken language (Catts & Kamhi, 1999). Learning to read for most children requires focused attention and explicit instruction (Adams, 1990), whereas learning to talk occurs naturally in the course of development. To learn to read, children must learn to map the written

symbols of their language (orthography) onto the sounds of their language (phonology). This process is called phonological recoding or simply decoding. In deep orthographies like English, with inconsistencies in both letters to sounds and sounds to letters, most students need instruction for several years to attain reading competence (Ziegler & Goswami, 2005). The extant reading research has identified phonological awareness, letter (or orthographic) knowledge, and phonics as vital elements in the acquisition of reading.

Phonological Awareness. The ability to recognize, identify, or manipulate sound units in spoken language is an important skill in the development of reading. A substantial amount of research (Adams, 1990; Goswami & Bryant, 1990; Scarborough, 1998) has shown that good phonological awareness skills generally characterize good readers and poor phonological skills characterize poor readers. According to Stanovich (1992), phonological skills develop on a continuum from shallow understanding of large phonological units (i.e., phrases, words, and rimes) to deep understanding of smaller units (phonemes) after literacy instruction begins. Phonemic awareness (PA), sensitivity to individual sounds within words, develops as a refinement of phonological awareness.

Improving phonemic awareness has been shown to be beneficial to students in the development of word identification, spelling, and reading outcomes for students (Adams, 1990; Bus & van Ijzendoorn, 1999, Vellutino & Scanlon, 1987). Students who can hear and manipulate sounds within words, such as segmenting the initial sound in words, segmenting words into constituent sounds, blending sounds to make words, or deleting sounds from words, have a strong phonological base on which to build literacy skills. There is a clear bi-directional relationship between phonological skills and literacy instruction (Wagner, Torgesen, & Rashotte, 1994).

The quality of a child's phonological representations has important implications for literacy development. Mental representations of sounds form from exposure to spoken language. The phonological system develops as input from the environment is received and patterns are detected. According to the Lexical Restructuring Model (Metsala & Walley, 1998), increases in vocabulary in the preschool years prior to reading and writing instruction necessitate changes in the structure of spoken word representations. As words are added to the lexicon, word forms become more segmental from pressure due to vocabulary size, sound similarity, frequency, familiarity, and neighborhood density. This gradual restructuring of phonological representations impacts the development of phonemic segmentation ability. Beginning with implicit understanding of phonemes for perceptual representations and spoken word recognition, the restructuring leads to the ability to consciously access and manipulate phonemes as cognitive units. Phonemic awareness emerges from the growth of more fully specified phonological representations demanded by increasing lexical development.

Orthographic Awareness. A child's sensitivity to the regularities of letter sequences in the language is called orthographic awareness. Children learn that *lob* is allowed but *xyb* is not. Orthographic awareness appears to develop quite early. Cassar and Treiman (1997) found that kindergarteners were able to detect legal double letter combinations in nonwords (i.e., *baff* vs. *bbaf*) even with limited exposure to print. In a similar study, Wright and Ehri (2007) taught kindergarten and first grade students single syllable words with a single vowel between consonants. Words either had doubled letters in the initial position, double letters at the end, or single consonants (ie., *rrug*, *jett*, or *fan*) . The words with doubled letters at the beginning (illegal orthographically) required more time to acquire and when asked to spell the words, the subjects failed to remember the initial doubled letters in the words. Orthographic knowledge, the

understanding of how the sounds (phonemes) of a language are mapped to the symbols (letters) of that language for use in reading and writing, develops as children are exposed to more literacy experiences. More advanced orthographic knowledge results in the mapping of larger orthographic units to represent syllables and morphemes in English.

Knowledge of the alphabetic principle, that letters have sounds associated with them and that the letter sequences can be used as a roadmap to blend the connected sounds together to form a word, is a significant achievement for young readers and usually occurs only with direct instruction (Adams, 1990). As young readers acquire deeper understanding of the orthography of the language, they strengthen their ability to use their orthographic knowledge productively. Share (2004) demonstrated that students in 3rd grade could recall orthographic detail after a single exposure to a novel printed letter string, but that first graders could not. For the 3rd graders, the initial exposure to a word carried the strongest learning potential, determined by the amount of orthographic detail recalled in spellings after one, two, or four exposures to the words. Successive exposures to words added no additional orthographic information on the spelling task. However, it is important to note that only the third graders, with two additional years of exposure to written language, could demonstrate their orthographic knowledge, and that the mean accuracy of the responses on the spelling task was 61% for the group, indicating that the words probably weren't unitized as sight words after this minimal exposure to the orthography.

Phonics. Phonics instruction teaches students to read and write words using the relationships between letters of written language and sounds of spoken language, the alphabetic principle. Developing phonemic and orthographic awareness is not enough to learn to read. Students also need to understand the relationships between the letters and sounds and be able to use phonemic knowledge to quickly and accurately decode words to access the meaning of the

print. The National Reading Panel (2000) examined the experimental research on reading acquisition and concluded that systematic phonics instruction was superior to non-systematic (i.e., providing alphabetic cues as needed during reading or writing), or no instruction. The panel found that many types of phonics programs were equally effective, as long as they systematically taught letter-sound relationships and letter patterns to students. The size of the group receiving the phonics instruction was not significant, allowing for groupings of individuals, small groups, or classrooms. The panel also recommended that phonics be integrated with instruction in phonemic awareness, fluency, and comprehension.

Instruction in phonics helps students learn how to map the more than 40 sounds in the English language using the 26 letters in the orthography of the language. English is a deep orthography, meaning that there are inconsistencies in letter-to-sound correspondences, such as the pronunciation of *c* in print as either /k/ or /s/, as well as in sound-to-letter spellings, such as the long *i* sound represented as a variety of orthographic patterns. Ziegler and Goswami (2005) analyzed numerous cross-lingual studies of reading acquisition and concluded that phoneme recoding skills take longer to develop in orthographies that are less transparent, such as English. The slower rate of learning to read in English compared to other languages was attributed to the low orthographic consistency of the language; variations in teaching methods among different countries did not contribute to the slower rate of acquisition.

Vowels present difficulties in English for beginning readers due to the variations in mappings between letters and sounds and constitute most of the reading errors for adult readers (Fowler, Liberman, & Shankweiler, 1977). Phonic rules can help readers identify which of the 15 vowel sounds in English correspond to the 5 vowel graphemes. For example, the consonant-vowel-consonant (closed syllable) orthographic pattern indicates that the pronunciation of the

vowel is usually the short sound because the vowel is bounded by two consonants. The inconsistencies of English orthography notwithstanding, Hanna, Hanna, Hodges, and Rudorf's (1966) analysis found that 50% of spellings in English follow phonic rules and another 36% follow with only one error. This leaves 14% of words as "irregular;" however, most of these are consistent considering their word meaning, origin, and morphology. The most frequently encountered words in this category are often presented to beginning readers for memorization, such as the Dolch List. Only about 4% of English words are oddities, such as *choir* and *yacht.*

Models of Reading Development

Ehri's (1992) amalgamation theory of reading development posits that learning to read is a connection-forming process. As young readers practice reading specific words, access routes are created for these words into lexical memory using knowledge of grapheme-phoneme correspondences to amalgamate or bond the letters of words to the phonemes in the pronunciations. As children learn the alphabetic principle that letters have sounds (grapho-phonics) and that sounds within words can be segmented and blended into words (phonemic awareness), they also learn spelling patterns that are helpful for decoding the words (orthographic knowledge). Connections are formed as children see the letters in a word, activate the sounds in memory, blend the sounds together and pronounce the word. The letters are perceived as visual symbols of the phonemes and the letter string is remembered as an alphabetic, phonological representation of the word. Reading the word several times secures the word in memory with its pronunciation. Irregularly-spelled words follow a similar process, activating memory for the graphemes that have connections, leaving only the exceptional letters without a connection. Exposures to other words that follow the irregular patterns strengthens these patterns as well. Ehri (2005) believes that the spellings serve as a phonetic map, presenting

the pronunciations visually and that quick computation of the grapheme-phoneme relations is critical for sight-word learning.

Share's self-teaching hypothesis (Jorm & Share, 1983; Share, 1995) takes a similar view of orthographic learning. Share believes that the process of translating unfamiliar printed words into speech, or phonological recoding, leads to item-based orthographic representations that are linked to phonological, morphological, syntactic and semantic information. The successful decoding of words creates well-specified orthographic representations by focusing on the order and identity of the letters and their phonological representations. This process fosters the ability to independently access the pronunciations of words from new letter strings, enabling the self-teaching process (Share, 2004).

After investigating cross-linguistic reading acquisition, Ziegler and Goswami (2005, 2006) developed the psycholinguistic grain size theory of reading. This theory postulates that phonological representations are based on the salient grain size of the language the child speaks and reads. The grain size refers to the size of lexical units needed to convert print to its phonological equivalent (Frost, 2006). In shallow orthographies, such as Italian, the consistency of grapheme-phoneme correspondences allows a fine grain approach to reading acquisition. Students learn to decode very rapidly because of the simple syllable structure of the language and its consistent letter-to-sound orthography. In deep orthographies, such as English, with bi-directional inconsistencies in letter-to-sound (reading) and sound-to-letter (spelling), readers need to use a variety of recoding strategies, both small (phonemes) and large (i.e., rimes, syllables) grain.

The psycholinguistic grain size theory postulates that as restructuring of the phonological representations occurs with lexical development, phonological detail is added at both small and

large grain size levels from the structural characteristics of syllables. Orthographic neighborhood density, defined as the number of words that can be created by changing one letter and preserving the letter positions, will also affect phonological restructuring due to the reciprocal relationship between reading acquisition and phonological development. Determination of the units that are mapped depends on the phonological structure of the language, the neighborhood characteristics of the orthography and phonology, and the transparency of the grapheme-phoneme mappings. In languages that have consistent orthographies, mapping of letters to sounds allows rapid phonemic development of fine grain sizes. When letters have the same sound and sounds have the same letter, mappings of letters to sounds are fine grained at the phonemic level.

Learning to read in more inconsistent languages forces the development of a variety of grain size mappings, including phonemes, rimes, syllables, and words. For example, the *ight* rime pattern applies to 90 words in English. Fine grain mapping would be less productive than the use of the rime in decoding a word such as *light*. Some words have consistent grapheme-phoneme correspondences, such as *leg, can,* and *mom* that can be decoded using phonics rules. Still others, such as *was, one,* and *yacht,* must be learned as whole words.

There is evidence (Brown & Deavers, 1999; Goswami, 1986, 1988; Goswami, Porpodas, & Wheelwright, 1997) that many children learning to read in an inconsistent orthography like English spontaneously develop strategies using a larger grain size. In Brown and Deavers' (1999) study, adults and children from ages 5 to 9 read two lists of nonwords, one list with *regular consistent* orthographic patterns, such as *deld* and one list with *irregular consistent* patterns such as *dalk*. If a small grain size was used to decode the irregular consistent nonwords, the pronunciation of the word would be /dælk/, with each grapheme pronounced with its

equivalent phoneme, whereas if a larger grain size was used, as reading by analogy would predict, the word would be pronounced /dɔ:k/, rhyming with *talk.* The results showed that all of the readers used both rime-level and grapheme-level correspondences when decoding the irregular nonwords; however, adults and the more skilled readers used significantly more of the analogy responses than the less skilled readers. Thirty-nine percent of less skilled readers' responses were rime-level, compared with 53% and 58% of more skilled reader and adult responses, respectively. The less skilled group used the larger grain size in phonological recoding, but not to the same extent as the more skilled and adult readers. The students had received little or no instruction focused on rime-level correspondences in their reading instruction in school. This led Brown and Deavers (1999) to conclude that children learning to read use the most productive strategy, regardless of the type of reading instruction they've received. Treiman, Mullennix, Bijiljac-Gagic,& Richmond-Welty (1995) found that the rime-level is the most predictable for English spelling-to-sound mappings, but simple grapheme-to-phoneme mappings at the small-grain level may be necessary for unfamiliar words. Experience with a variety of orthographic patterns may allow skilled readers to use the analogy strategy more productively than less skilled readers to decode new words.

Phases of Reading Development

Ehri (1992, 1995, 2005) characterized the acquisition of reading in 4 phases of development: pre-alphabetic, partial alphabetic, full alphabetic, and consolidated phases. In the pre-alphabetic phase, the child is unable to use alphabetic connections to aid in word pronunciation, but relies on visual features of the letters to remember the word. Preschoolers in the pre-alphabetic phase may pay attention to letters, especially the letters in their names, but haven't formed letter-sound connections. Environmental print is read from contextual cues, such

as the orange sign from Home Depot. Children may appear to read, but because visual and contextual features are not easily remembered, they are essentially non-readers.

The partial alphabetic phase occurs when young readers begin to learn the names and sounds of letters. Connections are formed with some of the more salient letters, typically the initial and final graphemes of words. These connections are partial because knowledge of grapho-phonic connections is incomplete, especially for vowels, and the ability to use phonemic awareness to segment and blend sounds in words is still developing. Decoding unfamiliar words during this phase is difficult and laborious. According to Share (1995, 2004), it is the process of exhaustive letter-by-letter translation of a printed word into its spoken equivalent that is critical for forming the word-specific orthographic knowledge necessary to support independent reading. This may be one of the primary benefits of phonological recoding at this phase of development.

In the third phase, full alphabetic readers can use their substantial knowledge of grapheme-phoneme correspondences and the phonemic awareness they've developed to segment and assign sounds to the letters in printed words consistently. Accuracy in decoding unfamiliar words increases and spellings of words contain all of the phonemes represented in the spoken word. The printed words have become bonded to the pronunciations in memory. The students have also been exposed to words frequently enough to establish a small corpus of words they can read by sight, greatly facilitating the reading process.

In the consolidated phase, readers increase the number of words they can read by sight and begin using larger orthographic patterns such as rimes, morphemes, syllables and words to decode multisyllabic words. This consolidation of subgroupings of letters into syllabic and morphemic units is what characterizes the reading of skilled readers (Adams, 1990, Share, 2004). Good readers are able to quickly recognize pronunciations of words they've encountered before.

Ehri and Wilce (1983) found that students can read familiar words as quickly as they can name digits, indicating that the words were unitized, or read as single units. They also found that poor readers didn't show unitization until fourth grade.

Difficulties in Reading Development

Some readers are delayed in their acquisition of fluent and accurate reading skills, struggling with the process of letter-by-letter translation of print to speech. The question of why students have difficulty in learning the alphabetic principle to achieve rapid and accurate access to the pronunciation and meaning of print has stimulated a significant amount of research. In a report prepared by the National Research Council (Snow, Burns, & Griffin, 1998), three problems were identified that hinder the attainment of good reading ability: problems in understanding and using the alphabetic principle to achieve word reading skills, reading comprehension deficits, and lack of motivation. Of these three, poorly developed word reading skills are believed to constitute the most consistent and debilitating deficit of struggling readers (Adams, 1990; Share & Stanovich, 1995).

Learning to read requires the simultaneous development of a variety of linguistic, visual, and memory processes. The preponderance of evidence seeking to explain the struggle to develop accurate word reading skills converges on difficulty in the ability to process phonological features of words (Liberman, Shankweiler, & Lieberman, 1989). Metsala and Walley (1998) contend that deficits in lexical restructuring play a causal role in reading disabilities due to difficulties in phonological processing and phonemic awareness. Ehri and Saltmarch (1995) found that older reading disabled readers displayed characteristics consistent with Ehri's partial alphabetic phase. Their disabled readers had formed connections with only the initial and final letters, the most salient to detect. Medial sounds were poorly bonded,

indicating weak phonological representations. The group of reading delayed students in McCandliss and colleagues' (2003) study could decode the first letter of pseudowords, but had difficulty decoding other letter positions, indicating a partial grasp of the alphabetic principle. Accuracy with medial letters, usually vowels, was especially poor.

Harm and Seidenberg (1999) conducted a computer simulation of reading acquisition using both a normal, unimpaired and an impaired phonological model. They found that the unimpaired model was able to cluster words with shared rimes, such as MEAT, SEAT, EAT, TREAT and used the overlapping phonological information to generate a correct pronunciation of the nonword GEAT. The impaired model, however, was unable to create overlapping phonological representations among the words with the same rime and failed to correctly pronounce the nonword. Analysis revealed that the increased workload due to the phonological impairment caused the system to tend to memorize word forms holistically and store them as item-specific representations instead of componential forms. The initial sound carried a much stronger influence in the impaired model than in the unimpaired model, similar to findings that poor readers can decode the initial sound more accurately than medial and final sounds (McCandliss, et al., 2003). Harm and Seidenberg (1999) concluded that poor phonological representations result in poor learning from orthography to phonology and instead of forming sublexical units such as rimes and onsets, words are learned as item-specific representations. The holistic formations result in poor nonword reading, the hallmark of readers with poor decoding skills (Rack, Snowling, & Olson, 1992).

According to Ziegler and Goswami (2005), atypical development in reading can stem from either a constraint on learning, such as a phonological deficit, or from experiential factors, such as impoverished instruction, or from an interaction between the two. Children who enter

school with delays in oral language as well as phonological and print-related knowledge due to lack of experience or genetic factors are at risk for delays in learning to read (Hecht, Burgess, Torgesen, Wagner, & Rashotte, 2000; Hart & Risley, 1995). Clay (1987) contends that in most cases, reading difficulties in beginning readers are caused by instructional deficits. In a longitudinal study, Vellutino and colleagues (1996) found that a 67% of the students in a group that was deficient in letter naming and phonological awareness in kindergarten achieved scores within the average range following only one semester of remediation in first grade. These students maintained the gains in reading through the fourth grade. The struggling readers who remained after intervention represented only 1.5% of the student population. With focused instruction, all but a minority of these students were able to achieve normal reading development.

With 34% of fourth graders failing to acquire basic proficiency in reading on a national level (NAEP, 2007), a significant number of students in American public schools lack the reading skills necessary to ensure accurate and fluent word reading. In a study of eighth and ninth grade students, Hock et al. (2009) found that 61% of the struggling adolescent readers had low scores on every component of reading measured, including word recognition, fluency, vocabulary, and comprehension. Struggling readers were defined as those failing to achieve a standard score of 96 on a standardized reading comprehension measure. Obviously many of these students at the upper grade levels had failed to achieve fluent and accurate decoding at the word level and continued to struggle with automatic word recognition.

Intervention for Struggling Readers

Struggling readers with word recognition deficits need not be doomed to failure forever. Decades of research on reading interventions has confirmed the efficacy of instruction focused

on improving reading outcomes. Intervention studies with older students have found that older readers are generally responsive to reading instruction with medium to large effect sizes (McCandliss, et al., 2003; Rashotte, MacPhee, & Torgesen, 2001; Scammacca et al., 2007). In a meta-analysis of interventions directed toward older students, Scammacca et al. (2007) found that adolescents benefit from interventions focused on both word level and text level instruction and that word study is appropriate for students struggling at the word level. Foorman and Torgesen (2001) reviewed extant research on effective reading instruction and concluded that children who are developing reading skills more slowly need to acquire the same set of skills as typically developing students, but the manner in which the instruction is provided may need modification. They identified several critical elements in the instruction of children with reading delays, stating that intervention should be explicit and comprehensive, intensive and supportive.

Children who have experienced difficulty with learning to read need interventions that explain the alphabetic principle, specifically, as stated by Foorman and Torgesen (2001), "direct, systematic, and comprehensive instruction to build phonemic awareness and phonemic decoding skills (phonics)" (p. 208). In a study by Torgesen et al. (1999), three reading interventions were compared: regular classroom instruction; embedded phonics, a program teaching whole-word learning, incorporating letter-sound instruction within words during reading and writing; and a program that emphasized articulatory movements of sounds and directly taught phonemic and orthographic awareness at the word level. The program that emphasized the most phonemically explicit intervention produced the greatest gains in a group of at-risk children and was the only intervention that reliably produced differences between groups receiving the intervention and those that were not. Jeynes (2008) specifically focused on students of poverty in a meta-analysis of reading studies related to phonics instruction. The analysis found that urban minority

elementary students benefit from phonics instruction, especially when the instruction was systematic and explicit.

Teaching the Alphabetic Principle. Explicit and comprehensive instruction should systematically teach the alphabetic principle of letter-sound relationships. Adams (1990) lists three benefits of teaching students how to sound out words: a) The reader can independently decode unfamiliar words. The goal of reading is to independently access print to retrieve the meaning of the text. Students who learn and can apply letter-sound correspondences to text gain valuable skills to use in constructing pronunciations and meanings from other words they've never seen. b) The reader can remember the identity and order of the letters within syllables. By focusing on the mostly alphabetic nature of printed words, students learn orthographic patterns and regularities they can apply to their reading task. c) Orthographic representations are built through talking about the letter-sound relationships. Talking with students about the relationships between letters and sounds teaches the connections they may not infer from mere exposure to print.

Foorman, Breier, and Fletcher (2003) looked at thirty years of reading research to find interventions that would improve reading success. They concluded that interventions that teach the alphabetic principle are successful at improving reading outcomes for their students. They suggest teaching the alphabetic principle for decoding the 86% of words that adhere to phonic relationships, using other linguistic cues to remember the next 10% and then memorizing the 4% that are oddities. About 90 phonic elements are thought to be necessary to master reading in English.

Teaching Orthographic Regularities of Phonic Patterns. In a replication of Clymer's (1963, 1996) classic study of phonic generalizations, Johnston (2001) reanalyzed the utility of

using phonic patterns to teach phonics and concluded that when broken down into specific vowel combinations, phonic patterns can be quite consistent and useful for phonics instruction. Orthographic patterns with high utility, such as consonant-vowel-consonant, consonant-vowel-consonant-silent *e* and vowel digraph patterns can help students understand the regularities that occur in English orthography. Word recognition has been found to depend more on pattern recognition than on abstract rules (Seidenberg & McClelland, 1989) so teaching a pattern such as a rime (i.e., -ight) or orthographic pattern (i.e., consonant-vowel-consonant letter string) would be efficacious. While typically developing readers may become proficient at using both small and large-grain units (Brown & Deavers, 1999), students who are struggling with reading acquisition may need explicit and systematic teaching to learn these relationships.

Teaching Full Decoding of Words. Generally, poor readers fail to fully decode each letter of a word. They may be able to use their knowledge of letter-sound relationships to decode the initial grapheme, but fail apply what they know to subsequent letters, especially vowels. Attention to each letter is an important skill to develop so that fully specified phonological representations can be formed, enabling the student to become a full alphabetic reader (Ehri, 2005). Students who have poorly represented phonological representations and holistic orthographic connections may need many exposures to correct word decoding focusing on each letter to develop more componential representations (Harm & Seidenberg, 1999; Share, 2004).

Using Multi-sensory Approaches. Although some students with poor reading skills may have had adequate reading instruction, accurate and fluent word recognition eludes them. Children with poor phonological skills may need an approach that uses stronger skills to bootstrap the reading process. Use of visual strategies to illustrate salient phonological features is one method of instruction that has been well documented in the literature on reading. Thorpe

and Borden (1985) found that visual-auditory instruction with teacher praise was the most effective method of teaching word reading to learning disabled students. Auditory Discrimination in Depth (ADD) (Lindamood & Lindamood, 1984) is a program that uses pictures of articulatory gestures of phonemes to teach the kinesthetic, auditory and visual features associated with each sound. The goal is to train accurate discrimination among the sounds to boost phonemic and orthographic awareness and increase decoding skills. It instructs students to see and feel the sounds in words as they read the letters. Torgesen et al. (2001) investigated the use of two instructional programs, ADD and an embedded phonics program, with older students who had severe reading disabilities. The ADD program focused on teaching children awareness of the mouth movements of each phoneme. They learned labels for place and manner of articulation using pictures and mirrors of their own mouth movements. Vowels were taught using a vowel circle representing differences in sounds based on mouth shape and tongue position. Letters were introduced simultaneously with the phonemes, providing a natural segue into spelling and then decoding simple orthographic patterns. When all of the 44 English vowels and consonants had been introduced, the students practiced reading and spelling individual words, along with high frequency irregular words. Simple phonics rules were taught, along with strategies for decoding multisyllabic words. Most of the instructional time (95%) was spent in decoding and encoding individual words and the remaining 5% in reading decodable text. In contrast, the embedded phonics program used writing and spelling activities to teach phonemic awareness and directly taught phonemic decoding strategies, spending a greater percentage of time in reading and writing connected text. Students in both groups received 67.5 hours of individual instruction over a period of 8 to 9 weeks, followed by 8 weeks of generalization training. The students made significant gains in both groups, with between a half and two-thirds

of the students (depending on the reading assessment used) performing within the average range following intervention. These gains were maintained over the 2-year follow-up period.

The visual cues provided by ADD (Lindamood & Lindamood, 1984) have been shown to be effective in increasing phonemic awareness and discrimination between sounds. The child must then discern the relationship between sounds and letters to utilize the alphabetic principle. The relationship between phonemes and letters is not obvious from the shape of the letters. A program designed to make this relationship more transparent is termed Phonic Faces (Norris, 2001). The Phonic Faces alphabet is designed to associate the shapes of alphabetic letters with speech sound production cues (an approach that directly exploits the language foundation of the alphabetic principle). Each phoneme, including the 15 vowels of English, is represented by a unique face. By imitating the speech production cues shown in the faces, the associated sound is produced. This approach integrates the visual attributes of the letters with the auditory features and kinesthetic production cues of the related phoneme. For example, Figure 1 shows the Phonic Face Katie representing the /k/ sound.

Figure 1.Katie, visualizing the /k/ sound.

Katie's mouth is open, the back of her tongue is elevated to the roof of her mouth, and the letter *k* is imposed on the tongue. The vertical line of the letter *k* represents the elevated tongue stopping the airflow at the back of the mouth while the oblique lines represent the explosion of air that occurs when the /k/ sound is produced. Consonants in the alphabet are direct representations of phonetic features of their respective phonemes, while vowels are cued by

associations as well as mouth gestures. For example, the short vowel *a* is as an open mouth crying /æ/, while the long *e* vowel is represented as a wide mouth with teeth highlighted (see Figure 2).

Figure 2. Phonic Faces cards illustrating the vowels /æ/ and long *e*.

Each sound in Phonic Faces has a name and the sounds are organized into groups of sounds. Consonants and digraphs (i.e., *th* and *ng*) are drawn as *kids*. Vowels are arranged in groups of *babies*, consisting of short vowel sounds, and *adults*, the long vowels. This grouping allows for the creation of stories that illustrate phonic rules. For example, the closed syllable (single vowel between consonants) phonic rule states that if a vowel is bounded by a consonant on both sides, the vowel is usually the short vowel sound. The Phonic Faces story for the phonic rule says that if a baby (the short vowel) has two kids (the consonants) to take care of it, the baby is safe and can stay, making its own sound. The phonetic features depicted on the faces for individual letter-sounds together with the stories that define the orthographic patterns of syllables provide a language-based means of understanding and using the alphabetic principle for decoding words.

The efficacy of the use of Phonic Faces for establishing the letter-sound relationship has been well established in a series of studies. Terrell (2007) showed that following 18 book readings associating Phonic Faces with words beginning with that sound, toddlers as young as 20-24 months were able to point to letters within the faces, find a specific letter from a choice of Phonic Faces cards, and produce the associated sound when shown a Phonic Face card. The

skills were maintained when tested 6 weeks following intervention. McInnis (2008) found similar results for toddlers taught using sight words containing Phonic Faces as the initial sound accompanied by pictures depicting the meaning drawn into the remaining letters. The toddlers not only learned more words in this condition but also showed evidence of abstracting and using the alphabetic principle. The toddlers were able to select untaught words that began with the same sound as a familiar Phonic Faces letter.

Brazier-Carter (2008) read stories in which the Phonic Faces were the characters who produced their sound as a natural part of the story (e.g., "Kevin smiled at Katie. Katie coughed - k k k."). Head Start teachers were taught to explicitly refer to words containing the target sound and to engage the children in producing the sound when the target letter was encountered. The preschoolers made significantly greater gains in print concepts and phonemic awareness than a comparison group. Banajee (2007) presented the Phonic Faces books to children with severe speech and physical impairments in an ABAB design and found higher levels of letter-sound identification, sound-to-letter identification, identification of letter names, and identification of location of letters and sounds in all word positions for all three subjects during the Phonic Faces Storybook phases.

Collins, Norris, and Hoffman (2007) taught two of four first grade teachers to use Phonic Faces to introduce new phonic patterns to the entire class and to decode unknown words during small group reading lessons. The Phonic Faces were used within the regular curriculum used in all four classrooms, but Phonic Faces were used where plain letters were typically used. Results from DIBELS testing showed significantly greater gains for nonsense word reading, oral reading fluency, and retelling fluency compared to control classrooms by mid-year testing. More children had reached Benchmark levels and none remained in the intensive level.

Evidence suggests the cues provided by Phonic Faces are effective in teaching the alphabetic principle for a range of age groups and ability levels. Clinical trials suggest they have positive effects for older students with reading deficits. However, the use of Phonic Faces with older students who are experiencing difficulty with decoding skills has yet to be documented empirically.

Using a Variety of Language Processes. The National Reading Panel (2000) recommended reading instruction that integrates phonemic awareness, phonics, fluency, and reading comprehension. Decoding practice that is integrated with other reading and writing processes helps readers generalize and apply new learning in different contexts and with different words.

Spelling and reading are reciprocal processes that support literacy bi-directionally. In a study with typically developing second graders, Conrad (2008) found that repeated practice in spelling words benefited reading those words and practice in reading words benefited spelling those words; however, transfer from spelling to reading was greater than from reading to spelling. Spellers could both spell and read the words they practiced, but readers were not as proficient in spelling the words they had practiced reading. Gains in generalization to untrained words were also greater with spellers than readers. According to Perfetti (1997), spelling requires more fully specified orthographic representations. Reading is a recognition process whereby words can be pronounced with partially specified orthographic information. Spelling, on the other hand, requires complete processing of each sound unit into orthographic units and may provide opportunity for more complete orthographic learning.

Shahar-Yames and Share (2008) examined the role of spelling in the acquisition of orthographic information with Hebrew third-grade students. They found that spelling

production—writing of the letters of the word as opposed to a recognition task—yielded superior orthographic learning when compared to the reading or control conditions. They concluded that the process of spelling words, namely, identifying the spoken phonemes, selecting the associated grapheme, and the kinesthetic-motor act of writing, may create additional connections enhancing phoneme-grapheme learning. The addition of the kinesthetic-motor activity required in spelling words may be especially beneficial to struggling readers.

Intensity. Foorman and Torgesen (2001) emphasized the need for intervention with struggling readers that was of adequate frequency and duration to produce changes in their reading behavior. Students who have had difficulty in acquiring adequate reading at the word level require more instructional time. They may learn the phonological recoding process more slowly, or may need to unlearn and relearn poor phonological representations resulting from incomplete or erroneous decoding experiences with words (Harm, McCandliss, & Seidenberg, 2003; Share, 2004). Classroom teachers usually have short periods of time on a daily basis that could used to work with struggling readers if intervention materials and programs were available. The National Reading Panel (2000) found that small group instruction was as effective as one-on-one instruction and short, frequent instructional blocks are an effective learning paradigm.

Support. Struggling readers may have experienced negative consequences of their inability to acquire fluent reading skills and need both cognitive and emotional support (Foorman & Torgesen, 2001). By scaffolding reading instruction to ensure success, a teacher can support a child's learning in ways that allow learning of new reading concepts. For example, use of carefully constructed lists of target words that progressively change by only one letter-sound (i.e., ran, rat, cat, cot) can teach orthographic patterns and decoding skills in a supportive way so that reading failure is minimized. Readers can use the phonological and orthographic

information obtained from decoding the previous word to support their approach to the next word. Dense orthographic neighborhoods are conducive to more fully specified mental representations (Metsala & Walley, 1998). McCandliss et al. (2003) used this type of reading intervention with a group of 24 older children experiencing reading difficulties, an adaptation of Beck and Hamilton's (1996, 2000) Word Building program. Each of the 77 lessons included 5-16 letter cards for forming word chains differing by a single letter, word cards for the target words, and sentences using most of the targeted words from the lesson. Six syllable shapes were targeted, including a single vowel between consonants, silent *e* syllables, vowel digraphs, and syllables with vowel changes such as r-controlled vowels. In each of the 20 50-minute sessions, the tutor built word chains by changing one letter and aided the child in decoding the words. Next, a short flashcard assessment was given using the target words, followed by a sentence reading activity that included as many of the target words as possible. When students mastered one lesson, they could move on the next unit. The authors reported significant growth in decoding, phonemic awareness, and reading comprehension for the students receiving the intervention.

Visual supports and teacher dialog that explains the reading process help make decoding explicit and accessible. Engaging multiple modalities, such as visual, auditory, and kinesthetic activities, may create overlapping connections and strengthen phonological and orthographic representations for students who are struggling with reading (Shahar-Yames & Share, 2008).

Support also involves allowing sufficient practice for students to become proficient. Repeated practice with newly decoded words allows consolidation of the connections formed by the decoding process and builds fluency, another vital characteristic of skilled readers (National Reading Panel, 2000).

Study Overview

The speech-language pathologist presents a unique perspective regarding reading and reading instruction, particularly for students who struggle with reading mastery. The alphabetic principle reflects phonemes and rules for combining phonemes to represent words, making an alphabet based on auditory features and speech production cues (i.e., Phonic Faces) a logical scaffold for students who have failed to master advanced phases of the alphabetic principle as described by Ehri (1992, 1995, 2005). In a RTI model, the SLP need not be responsible for providing direct services to all students who could benefit from a language-based approach, but is maximally effective when working collaboratively with others to implement interventions (Ehren, 2005).

Students who continue to struggle with reading in the upper elementary grades need explicit, intensive, and supportive instruction that helps them apply the alphabetic principle to decode unfamiliar words using both a fine and large grain analytic approach. Because they have failed to acquire accurate, fluent reading from earlier reading instruction, they may need modifications in the manner in which reading skills are taught, using strengths to bootstrap weaker skills.

This study explored whether an intervention implemented with older students with poor decoding skills would provide a realistic model of intervention within an RTI approach. The question was addressed by asking whether poor readers would benefit from instruction in decoding using orthographic patterns a) taught using an alphabet that visualized speech production cues, and b) was implemented by classroom teachers in collaboration with a speech-language pathologist.

It was hypothesized that the intervention would result in greater gains in

1. Nonsense and real word decoding
2. Spelling patterns
3. Reading comprehension

METHOD

Participants

The participants of this study included four teachers who implemented the intervention in their classrooms and 22 students reading below grade level. The participants were recruited from four different schools in rural areas within Louisiana. All of the schools were participating in a mentoring program because of poor performance on state and national test scores in language arts. These schools were ranked among the lowest in the state (i.e., two of these school districts ranked 58 and 65 out of 66 districts) rendering performance scores in the unacceptable range.

Teachers. Four teachers were recruited to participate in this study. Reading instruction focusing on decoding is not part of the curriculum in upper elementary where students are expected to know how to read words and the focus shifts to interpreting literature and using structural analysis (e.g., roots, affixes) to interpret word meanings (Louisiana Department of Education Grade Level Expectations, 2008). Classroom time for extra activities is limited and the teachers indicated they could provide intervention to their students selected for the experimental group but not the control group because of accountability testing and the requirements to teach the standard curriculum. It was therefore agreed that the control group would be provided the equivalent amount of time with the materials to be completed as seatwork without direct teacher instruction (consistent with typical worksheet activities assigned in a classroom). Three of the teachers were classroom teachers, one in the fourth grade and two in the sixth grade, and one teacher taught special education in second through sixth grades. Years of teaching experience ranged from 7 years to 19 years, with a range of 4-15 years of experience

at the current grade level. All of the teachers were certified by the state; three held a bachelor's degree and one a Master's degree in education.

Table 1
Characteristics of Teachers

Teacher	Age	Gender	Race	Grade	Years Experience	Years this Grade	Highest Degree
1	32	F	AA	4	7	4	BA
2	35	F	AA	6	6	6	MA
3	49	M	AA	R	15	5	BA
4	51	F	AE	6	19	15	BA

Note: [a] AA = African American; EA = European American
[b] R = Resource teacher

Students. The student participants of this study were 22 fourth and sixth graders identified by their teachers as those reading below grade level and considered to be poor readers. The teachers obtained signed consent from parents and the students gave assent for participation in the research in accordance with Internal Review Board procedures. Those who returned both forms were administered a battery of tests to determine eligibility for the study and to establish baseline performance. Students were included in the study if they were reading below grade level and demonstrated poor performance on two measures of decoding ability (i.e., a word attack subtest from a standardized test and an experimenter designed orthographic pattern test). Poor decoding was defined as at least one year delay on the word attack measure and no more than 60% accuracy on the nonwords of the orthographic pattern test. One student achieved a score of 70% on the pattern test, but the word attack score was 2.8 years delayed, so this subject was also included in the study.

The pretesting revealed a diverse group in ability as measured by the Peabody Picture Vocabulary Test 3rd Edition (PPVT - III) (Dunn & Dunn, 1997). Using the Quotient Rating Scale for standardized measures (Hresko, Herron, & Peak, 1996), those subjects performing within the average (quotient scores of 90-110) to below average range (quotient scores of 80-89)

were included in the High Verbal Ability group and those with scores in the poor range (quotient scores of 70-79) to very poor range (quotient scores below 70) were included in the Low Verbal Ability group. Matched pairs within classrooms were randomly assigned to either the experimental or the control condition, resulting in four groups: Experimental High Verbal (EH) (mean quotient = 95.5), Control High Verbal (CH) (mean quotient = 87.8), Experimental Low Verbal (EL) (mean quotient = 66.2), and Control Low (CL) (mean quotient = 64.4).

The subjects ranged in age from 9 years, 3 months to 13 years, 7 months (mean EL = 11.55; EH = 11.59; CH = 11.67; CL = 11.76). Ten of the students were African American and 12 were European American. More of the subjects were boys, with 14 male and 8 female students. These students represented the profile of poor readers typically included in the regular classroom in these schools.

Table 2 profiles subject scores organized by treatment group and verbal ability. To determine if there were significant subject group differences at pretest, a two treatment group (experimental and control) by two verbal ability group (high and low) multivariate analysis of variance (MANOVA) was conducted. Using Wilk's criterion (Λ) as the omnibus statistic, no significant main effect was found for treatment group (experimental versus control), F (7, 12) = .511, p = .81, η_p^2 = .230, indicating that the experimental and control groups were not different at pretest. As expected, a main effect was found for verbal ability level F (7, 12) = 9.35, p < .001, η_p^2 = .845. In addition, a difference was also found for passage comprehension (F (1,18) = 9.695, p = ..006, η_p^2 = .350. However, while the verbal ability groups differed, there was no interaction between experimental and verbal ability groups, F (7, 12) = 1.30, p = .327, η_p^2 = .432, indicating that the high and low verbal ability groups were equally distinct from one another in both the experimental and control conditions. The average PPVT score of the low verbal

Table 2

Characteristics of Study Subjects and Assessment Measures at Pretest

								WJDRB		
Subject	Gender	Race[a]	Grade	Age	PPVT[b]	OPT	Spell	WID	PC	WA
Experimental Low Verbal										
1	F	AA	6	12;11	58	25	11	26	12	7
2	M	EA	4	10;2	64	72	25	31	19	5
3	F	EA	4	10;11	67	26	9	18	13	3
4	M	AA	4	11;5	69	53	7	23	11	5
5	F	AA	6	12;4	73	76	62	49	24	21
Mean				**11;5**	**66.2**	**50.4**	**22.8**	**29.4**	**15.8**	**8.2**
SD					**5.6**	**24.4**	**23.0**	**11.9**	**5.5**	**7.3**
Experimental High Verbal										
1	M	EA	6	12;8	85	65	38	41	26	11
2	M	EA	6	11;5	87	82	41	48	27	13
3	F	AA	6	13;2	90	53	31	34	20	4
4	M	AA	6	13;7	93	79	52	52	24	11
5	F	EA	4	9;3	109	83	43	49	26	17
6	M	EA	4	9;6	109	61	15	28	18	6
Mean				**11;6**	**95.5**	**70.5**	**36.7**	**42.0**	**23.5**	**10.3**
SD					**10.8**	**12.6**	**12.6**	**9.4**	**3.7**	**4.7**
Control Low Verbal										
1	F	AA	4	10;4	58	54	5	23	12	6
2	M	AA	6	12;8	62	64	23	35	20	6
3	M	EA	4	10;10	65	67	42	43	25	11
4	F	EA	6	13;5	67	66	30	39	24	5
5	M	AA	6	12;5	70	36	10	27	14	4
Mean				**11;10**	**64.4**	**57.4**	**22.0**	**33.4**	**19.0**	**6.4**
SD					**4.6**	**13.0**	**15.0**	**8.3**	**5.8**	**2.7**
Control High Verbal										
1	M	AA	6	13;2	81	81	50	50	27	13
2	M	EA	6	12;5	81	86	45	40	26	13
3	M	EA	4	9;5	86	35	21	30	16	7
4	M	EA	6	12;8	89	76	62	49	28	12
5	M	AA	6	12;7	93	68	48	47	24	16
6	F	EA	4	10;2	97	72	37	45	24	7
Mean				**11;6**	**87.8**	**69.7**	**43.8**	**43.5**	**24.2**	**11.3**
SD					**6.5**	**18.1**	**13.8**	**7.5**	**4.3**	**3.6**

Note: PPVT=Peabody Picture Vocabulary Test-Third Edition (Dunn & Dunn, 1997); OPT=Orthographic Pattern Test, Author Devised; Spell=Elementary Spelling Inventory-1 (Bear, Invernizzi, Templeton, & Johnson, 2004); WJDRB=Woodcock Johnson Diagnostic Reading Battery (Woodcock, Mather & Schrank, 2004) Subtests: WID=Word Identification, PC=Passage Comprehension, WA=Word Attack.

[a]AA=African American; EA=European American [b]PPVT standard scores; others raw scores.

experimental group (mean = 66.2, sd 5.6) was similar to the low verbal control group (mean = 64.4, sd 4.6) as were the scores of the high verbal experimental group (mean = 95.5, sd 10.8) and the high verbal control group (mean = 87.8, sd 6.5). The average Passage Comprehension score of the low verbal experimental group (mean = 15.8, sd 5.5) was similar to the low verbal control group (mean = 18.0, sd 5.8) as were the scores of the high verbal experimental group (mean = 23.5, sd 3.7) and the high verbal control group (mean = 24.2, sd 4.3).

Table 3 displays the means and standard deviations of the treatment groups with the high and low verbal groups combined on age and measures of verbal ability, spelling, and reading.

Table 3
Mean and Standard Deviation Values for Study Participants on Age and Assessment Measures by Treatment Group

	Experimental n=11		Control n=11		Group Comparisons
Measure	M	*SD*	M	*SD*	
Age in years	11;5	1;5	11;7	1;3	$F(1,20) = .48, p = .50$
PPVT-III[a]	82.2	17.5	77.2	13.4	$F(1,20) = .57, p = .46$
OPT	61.4	20.6	64.1	16.5	$F(1,20) = .12, p = .74$
Spelling	30.4	18.6	33.9	17.8	$F(1,20) = .21, p = .65$
WJ Word Id	36.3	12.0	38.9	9.1	$F(1,20) = .34, p = .57$
WJ Passage Comp	20.0	5.9	21.8	5.5	$F(1,20) = .56, p = .46$
WJ Word Attack	9.4	5.8	9.1	4.0	$F(1,20) = .02, p = .89$

Note: PPVT-III= Peabody Picture Vocabulary Test-Third Edition (Dunn & Dunn, 1997); OPT=Orthographic Pattern Test, Author Devised; Spelling=Elementary Spelling Inventory-1 (Bear, Invernizzi, Templeton, & Johnson, 2004); WJ=Woodcock Johnson III Diagnostic Reading Battery (Woodcock, Mather & Schrank, 2004) Subtests: Word Id=Word Identification, Passage Comp=Passage Comprehension, Word Attack.
[a] PPVT-III values reported as standard scores; all other values are raw scores

Measures

The students were administered a battery of assessments consisting of standardized and experimental measures, designed to identify their ability levels at pre- and posttest and to

identify students who met criteria for decoding difficulties. Students were individually assessed on all measures with the exception of the Spelling Inventory. This measure was administered as a group whenever possible.

Peabody Picture Vocabulary Test-III (PPVT-III) (Dunn & Dunn, 1997). Receptive vocabulary was assessed using the.PPVT-III. This norm-referenced test is designed to assess receptive vocabulary in standard English and as a screening test for verbal ability. Correlations of .91 and .90 have been found between the PPVT-III and the WISC-III Verbal IQ and the Full Scale IQ measures of intellectual functioning. Students are presented with a page displaying four black-and-white drawings and are asked to indicate the picture that best matches the stimulus word that is presented. Raw scores are converted into standard scores, with a mean of 100 and a standard deviation of 15. The students were administered the PPVT-III at pretest only.

Elementary Spelling Inventory-1(ESI-1). The ESI-1 from *Words Their Way* (Bear, Invernizzi, Templeton, & Johnston, 2004) assessed students' orthographic knowledge of English. In this evaluation, twenty-five words are orally presented to the students, one at a time, followed by a sentence in which the word is used and then a repetition of the single word is given. The test begins with regular spellings of closed syllable words such as *bed* and *ship*, followed by progressively more difficult words. The test is scored using two measures. The number of correctly spelled words is calculated from the total number of administered words. The second measure is the number of spelling features used. Students' use of orthographic patterns in their spelling includes using consonants at the beginning and final positions of words, using short vowels, digraphs and blends, such as *sh* and *mp* in *ship* and *lump*, and long-vowel patterns, such as the correct use of the *oa* in *throat*. A child could get credit for use of the *oa*, for example, even if the word was spelled incorrectly, as in *troat*. A score of 25 correctly spelled words and

53 orthographic patterns yielded a total score of 78 possible points. The ESI-1 was administered at pretest and posttest.

Woodcock-Johnson III Diagnostic Reading Battery (WJIIIDRB) (Woodcock, Mather & Schrank, 2004). Three subtests from the WJIIIDRB were administered at pretest and posttest.

The *Word Identification* subtest of the WJIIIDRB assesses a student's ability to identify letters and then pronounce words of increasing difficulty and decreasing familiarity. Many of the words have irregular spellings and are not easily decodable.

The *Passage Comprehension* subtest measures a student's understanding of text. This assessment uses a cloze procedure, in which the student reads a short passage and then supplies an appropriate word for a blank embedded in the text. The passages increase in difficulty as pictures are eliminated and length and linguistic complexity increase.

The *Word Attack* subtest measures students' ability to decode unfamiliar words, requiring application of phonic and structural analyses of words. The letter combinations are pseudowords that follow regular patterns of orthography in English and become more difficult as they increase in complexity.

Orthographic Pattern Test (OPT). The researcher developed a pseudoword test to assess students' knowledge of regular patterns in English orthography. These pseudowords were constructed to parallel the syllable structure of real words used in the intervention and measured progress in decoding from pretest to posttest. Three of the primary orthographic patterns for short and long vowels were chosen (Clymer, 1996; Johnston, 2001). These patterns represent high frequency syllable types that have a high level of regularity in print. Ten pseudowords were

constructed that conformed to each pattern resulting in quasi-words that appeared similar orthographically to real words but had no semantic content. Ten foil words representing vowel patterns other than the three of interest in this study were embedded as foils in each test, such as *mook* and *lork*. Because consonant clusters, such as the *st* in *stig* conform to the regularity of pronunciation of the vowel, they were also included in both the experimental pseudoword test and in the intervention words.

The *Closed Syllable Rule* is a vowel between consonants pattern (i.e., *lud, gom, fen*). The vowel in this pattern is usually a short vowel. The ten pseudowords were comprised of two words using each of the 5 vowels and a variety of consonants. An example of the closed syllable pattern test is located in Appendix C.

The *Silent e Rule* is a single syllable word ending in silent *e* pattern (i.e., boke, dite, jabe). In this pattern, the *e* at the end of the word is silent and the vowel between the consonants is usually long. The ten pseudowords used for this pattern assessed words containing the long a, i, o, and u vowels.

The *Vowel Combination Rule* is a pattern in which two vowels appear between consonants (i.e., *moab, jaid, gleep*). With this orthographic pattern, the reader uses the long vowel of the first vowel of the vowel pair to decode the word. The ten constructed pseudowords used two-vowel combinations representing the most common orthographic representations of this pattern (Johnston, 2001), combined with consonants to make 10 unique words.

Twenty words per pattern were presented, ten target words conforming to the pattern, and ten foil words. Three pattern tests were administered. The students took the test both before initiating the treatment and again post-intervention. The examiner manually recorded the

responses online and also audio taped the student, providing auditory back-up for scoring questions and reliability calculation. Each response was scored by analyzing correct pronunciation of each phoneme in the word, yielding scores for initial consonant or cluster, vowel, and final consonant or cluster positions. From the audio tapes, a second examiner with experience in reading instruction and in scoring audio transcriptions analyzed and rescored twenty percent of the total number of tests. Point-to-point agreement was 88%.

The students who qualified to participate in the study had been identified by their teachers as poor readers. Their scores on the pattern tests and on the WJ Word Attack subtest confirmed that these students were very delayed in their ability to decode phonologically regular words.

Intervention Materials

Eight lessons were developed for each of the three orthographic patterns, resulting in 24 different intervention lessons. Each intervention lesson focused on learning to decode ten real words selected to teach the targeted orthographic pattern. Real words were chosen to teach the patterns in order to increase generalization, automaticity, and motivation. These ten words were arranged in a series of minimal contrast words differing by a single grapheme. From the initial word, a minimal change of one grapheme characterized the second and each succeeding word. For example, a single-syllable word chain for the closed syllable pattern was: pan-can-cat-rat-rot-rob-rib-rip-drip-drop. The change occurred in any position of the word, with either consonants or vowels. A consonant could also be added or deleted from the previous word to form a consonant cluster (i.e., rip-drip). The configuration of the letter changes was designed so that attention was focused on each position of the letters within the word.

The lesson manual for each orthographic pattern contained eight lessons, four with single-syllable words and four with two-syllable words, one syllable of which contained the targeted pattern. The two-syllable words used the same minimal contrast chains for the targeted syllable, but also contained a second syllable that was not consistent orthographically with the previous word. An example of a word series for a two-syllable word chain for the closed syllable pattern with the targeted syllable underlined was: panic, candle, cattle, rattle, rotten, robber, ribeye, ripple, dripping, dropping. The students read aloud the target syllable, and then added the second syllable with the help of the instructor when necessary.

The instructional materials were designed to use several language modalities throughout the reading and writing activities, including decoding out loud, stories for semantic rehearsal, spelling, fluency training, and reading in context.

Intervention Procedures

The students in the study participated in 24 lessons, 8 lessons for each of the 3 selected patterns. Each student received an individual copy of the lessons. The intervention sessions occurred 4 days each week, for a total of 6 weeks to complete the lessons. The teachers scheduled 20 minutes a day for the sessions, for a total instructional time of 8 hours. Classroom teachers provided the instruction for their students in the experimental group who were included in the intervention. Group size ranged from 2 to 5, depending on the number of students participating from the teacher's classroom. The control group was given access to the lessons for the same amount of time as the experimental group, but no intervention was provided to this group. Instead, the students were told to read the passage and follow the instructions, but were not aided in any way by the teacher.

In situations where the students from both groups were in the classroom at the same time, the groups were physically separated during the intervention, with the experimental group receiving instruction from the teacher while the control group worked independently in their lesson books across the room. The other students in the classroom were engaged in quiet independent seatwork while the teacher worked with the students in the experimental group and monitored the activity of the students in the control group.

The teachers with participating students in separate classes delivered the intervention to students in the experimental group at a different time than that of the control group. They provided direct instruction to the members of the experimental group and allowed an equivalent amount of time with the materials to students in the control group. Students who were not participating in the experiment were occupied with quiet seatwork or homework.

Students engaged in five reading and writing activities during each lesson. The same ten words occurred in all of the activities of the lesson. For each lesson the students conducted the following activities in sequence:

1. read aloud a short story containing all of the words,
2. decoded and pronounced each word individually,
3. spelled the words from dictation,
4. practiced reading aloud the words on word cards,
5. re-read the short story aloud with the embedded words.

An example of a lesson is provided in Appendix D. The implementation of the lessons is detailed below.

Story reading. The students first read out loud a short story written by the investigator containing all of the target words. The students read this story at the beginning of the session

and after the practice activity with word cards. The narratives were simple episodes often using animals or children that would be of interest to the students. The participants read the text out loud and their teachers helped them with pronunciation and comprehension when necessary. The stories gave the students an authentic reason to learn to say the targeted words. The stories also gave the student immediate practice in applying the decoding strategy learned in the lessons to words located in sentences and in longer discourse contexts. In addition, the narratives provided variety and an alternative to the work of decoding and spelling words. A second reading allowed the students to locate the words they had encountered in the lesson's activities, enabling them to read the text more easily.

Decoding the minimal-contrast word strings. The ten words chosen to demonstrate the orthographic pattern were arranged so that readers pronounced the first word and then used the uttered phonetic information from all but one letter to pronounce the second and each succeeding word. Poor readers usually use phonetic information from the initial letter to help them decode unfamiliar words but succeeding letters are often disregarded (Ehri, 1995, 2005). This reading activity required the readers to fully decode each word because changes occurred in all positions of words. It simplified the decoding task by holding most of the word constant and allowing the readers to exert processing attention on the one change in each word. Readers could narrow the field of possible letter-sound pairings and decode more easily. The instructors explicitly taught the students to use orthographic regularities and to fully translate the visual sensory grapheme to articulatory motor output, encouraging the development of strategic reading habits (McCandliss, et al., 2003).

The teachers pointed to the word list in the students' lesson books and then introduced the students to Phonic Faces (Norris, 2001). The teachers first explained that all of the sounds

had names, the consonants faces were *kids*, the short vowel faces were *babies*, and the long vowel faces were *adults*. Then they taught the first phonic rule, the closed syllable rule, telling the Phonic Faces story and visually illustrating the story by laying out the cards associated with the letters of the first word. The teachers used the Phonic Faces cards arranged in the sequence from the word list for that lesson. If the first word was *ran*, for example, the teacher laid out three cards, depicting the *r*, the *a* and the *n*. Then the students heard the Phonic Faces story: because two kids, Arlene and Enos, are present to care for one baby, Amy Ann, the baby can stay and make her sound. Thus, the students learned that the sounds produced would be /r/, /æ/, /n/, blended together and pronounced as /ræn/ from the letter sequence *ran*. Figure 3 depicts the Phonic Faces card sequence for the word *ran* with Arlene, Amy Ann, and Enos.

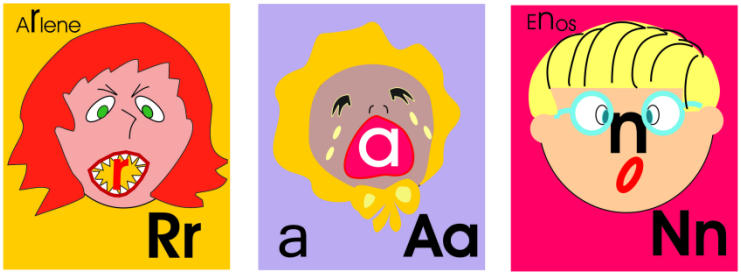

Figure 3. Phonic Faces cards representing the word *ran*.

The teacher then directed the students to the next word in the list in their lesson book. If the word was *ram*, the teacher laid the *m* card over the *n* card and allowed the students to decode the new word, changing the /n/ sound in the previous word to an /m/ sound to produce the new word, *ram*. The teacher highlighted each succeeding change in the word list, training the students to observe which letter in the next word was different, letting them choose where to place the new card in the array, repeating the phonic story, and then allowing the students to decode the new sound sequence. Sometimes the vowel changed, so students had to incorporate

new vowel sound changes as well as consonant changes as they occurred in the word strings. To decode all ten words, the students looked at their word lists, observed the Phonic Faces array, decoded the words letter by letter, and then blended them together to form the next word.

The *Silent e* phonic story was similar. The teacher arranged the Phonic Faces cards in the sequence of the word and then told the phonic story. For example, the story for the word *rate* was, "Look, we have Mr. E at the end of this word. He hates babies and yells so much that the adult (Miss A, the long A sound) comes to protect the baby, so she says her name (long A) and Mr. E has to be silent. That makes the word /r/ /e/ /t/ or /ret/." The students learned the phonic rule by remembering the story and recognizing the arrangement of kids, babies, and adults using the Phonic Faces cards.

Spelling from dictation. Following the decoding segment of the lesson, the students covered the word list with a card or folded their paper so the word list was hidden. Then the teacher directed the students to the blank spaces on their lesson sheets and dictated the ten words for the students to spell in the same order as in the decoding activity. They allowed sufficient time for the students to encode the words, writing the letters of the sounds in the words they had just decoded. The students were instructed to listen to the change in each succeeding word and to write the letter sequence that reflected that change. The teacher laid out the Phonic Faces cards after each word was spelled, changing the card that was different from the preceding word. This activity provided scaffolding for the newly emerging phonic skills. The teacher reminded the students about the phonic rule and alerted them to discrepancies in the choice and arrangement of the letters that represented the sounds in the targeted words.

Word recognition. To improve reading fluency and to give the students exposure to the words in other contexts, the students then practiced reading the target words from word cards.

The students made their own cards or used the cards provided by the researcher (See Appendix E). Accuracy and speed were emphasized in the practice phase. Students read the words to each other or to the teacher. This activity provided the students with numerous opportunities to see, hear, and read the words.

Repeated reading. The short story containing all of the target words provided a means of contextualizing the syllable patterns previously examined in isolation and of immediately applying newly-learned skills. The repeated reading also encouraged development of reading fluency. The students re-read the story, decoding the words in the story that they had just practiced. The group read the story collectively as the teacher provided scaffolding support and reminded the students to use the phonic rule they had just learned in the target words. The repeated oral reading of the story typically resulted in improvement in decoding speed and accuracy. The story was the culminating activity and provided motivation by allowing the students to locate and read the target words in text.

Control Group Procedures

The control group participants had a lesson book identical to those in the experimental group. The teachers told the students to work through the lesson, following the written instructions. The teachers did not provide any further help with reading and did not provide the students with the Phonic Faces cards. Instead, plain letters were used to teach the same patterns using vowel rules. For the closed syllable pattern, the student workbook presented the rule that a vowel between two consonants is short. For the double vowel rule, the workbook indicated that when two vowels are together, the first vowel has a long sound and the second vowel is silent. The final e pattern stated if there are two or more vowels and the word ends with e, the e is silent and the vowel before it is long. The students did not hear the words pronounced nor were they

provided feedback on the correctness of their response. The students worked in their books for 20 minutes a day, the same amount of time that the experimental group was engaged in their lesson. A total of 24 lessons were completed.

Teacher Preparation

Before the intervention began, the teachers were trained by the researcher to implement the intervention techniques and procedures. The teachers had previously received training in the use of the Phonic Faces cards at a 2-hour large group workshop and were familiar with concepts and appearance of the cards. They understood the phonic stories and how the categories represented by the cards (i.e., kids, babies and adults) helped to explain the phonic rules. The teachers needed more specific training in the application of their knowledge to the students in their classrooms using the research protocol as well as instruction in the additional procedures involved in the intervention.

The researcher individually trained each of the teachers, each session lasting approximately one hour. The instructors received an extensive training manual explicitly detailing the procedures for preparing and implementing each lesson. Included in the manual were word lists for all eight lessons for each of the three patterns (see Appendix F and G). The manual provided a list of the order of the Phonic Faces cards for all of the lessons, allowing the teacher to quickly arrange the cards for each lesson. Detailed explanations of the Phonic Faces cards and stories in the manual served as an additional resource for the teacher when questions arose. There were sheets of word cards for each lesson printed on card stock. Each lesson was scripted and the teacher followed the daily lesson plan, ensuring fidelity to the research procedure.

During the training, the researcher demonstrated a lesson, using the list in the manual to prepare the order of the cards, following the lesson script, and then allowing the teacher to practice with support from the researcher until they were confident they could deliver the intervention according to the protocol. The researcher periodically visited the teacher to further refine their skill in implementing the instruction. The teachers were required to complete all lesson activities daily, including the initial reading of the passage containing all of the words, reviewing the phonic story, decoding the ten words, spelling the target words, practice using word cards, and re-reading of the passage.

While the teachers were working with the students in the experimental group in their classrooms, the remainder of the class was engaged in quiet seatwork. In the classrooms where students from both the experimental and control groups worked in the same environment, the teacher monitored the members of the control group while providing the intervention session, ensuring that both groups had equal time with the instructional materials. Teachers with participants in separate classes either delivered the intervention to the experimental group or monitored control group activity.

Posttest Measures

The same assessment procedures that were used in the initial assessment were again administered, with the exception of the PPVT-III. Upon completion of the 24 lessons, the students were evaluated using the spelling, reading, and orthographic pattern tests. The Woodcock-Johnson subtests of Letter-Word Identification, Passage Comprehension, and Word Attack were re-administered to document changes in students' reading skills. The students retook the Spelling Inventory and the Orthographic Pattern Test. Gain scores between pretest and posttest were used to compare changes between experimental and control conditions and

high and low level verbal ability groups on measures of reading, spelling, and orthographic patterns.

RESULTS

A two treatment (experimental and control) by two verbal ability (high and low) multivariate analysis of variance (MANOVA) was conducted to determine the effects of the intervention and the verbal ability levels on five dependent variables (i.e., the gain scores for the reading and spelling measures). The assumptions underlying MANOVA were analyzed. Although the sample size is not large, it is expected that the populations of interest are multivariately normally distributed. Using the Box's M statistic, the nonsignificant *p (F* (15, 402.6) = .827, p = .648) value confirmed that the population variances and covariances among the dependent variables were equal across all levels, suggesting that the assumption was met. Because the participants were randomly sampled, it is assumed that a score on a variable for one participant was independent from scores on the variable for all other participants, meeting the independence assumption.

Recall that the experimental and control groups did not differ significantly for the five spelling and reading measures at pretest. Table 4 displays the means and standard deviations for gain scores on the dependent variables for the two groups and two levels on measures of orthographic patterns, spelling, word identification, passage comprehension, and word attack. Using Wilk's criterion (Λ) as the omnibus statistic, significant main effects were found for treatment group (experimental versus control), F (5, 14) = 3.99, p = .018, η_p^2 = .588 and also for verbal ability level F (5, 14) = 4.24, p = .015, η_p^2 = .602. For these variables, the effect sizes were large in magnitude. No interaction between groups and verbal ability level was found, F (5, 14) = 1.32, p = .312, η_p^2 = .320.

Visual inspection of the results in Table 4 shows that the experimental group's means for gains on the assessment measures exceeded those of the control group on each of the measures

and that neither verbal ability group was exclusively superior on all of the five measures for the experimental group. However, for the control group, the high verbal ability group means were superior to the low ability group on all measures.

Table 4
Means and Standard Deviations for Gain Scores from the Assessment Measures by Verbal Ability Group

		Group				
		Experimental (n=11)		*Control (n=11)*		
Measure		*M*	*SD*	*M*	*SD*	η_p^2
OPT *						
	High	8.33	7.66	2.50	5.09	
	Low	14.00	12.79	-0.40	5.64	
	Total	10.91	10.17	1.18	5.29	0.317
Spelling						
	High	8.50	4.76	0.67	6.50	
	Low	-1.40	2.51	0.00	2.12	
	Total	4.00	6.37	0.36	4.80	0.133
WJ Word Id						
	High	1.67	3.56	0.33	2.50	
	Low	3.00	2.35	0.00	1.22	
	Total	2.27	3.00	0.18	1.94	0.173
WJ Passage Comp						
	High	1.50	2.81	0.83	2.93	
	Low	0.20	2.39	-2.40	2.30	
	Total	0.91	2.59	-.64	3.04	0.103
WJ Word Attack						
	High	3.17	1.83	1.0	3.63	
	Low	.40	2.51	-1.4	1.67	
	Total	.91	2.91	-0.09	3.05	0.153

Note: OPT=Orthographic Pattern Test, Author Devised; Spelling=Elementary Spelling Inventory-1 (Bear, Invernizzi, Templeton, & Johnson, 2004); WJ=Woodcock Johnson Diagnostic Reading Battery (Woodcock, Mather & Schrank, 2004) Subtests: Word ID=Word Identification, Passage Comp=Passage Comprehension, Word Attack.
* $p < .05$

To probe the statistically significant multivariate effects, the between subject effects were examined. The Bonferroni adjustment was used to control for Type I error rate. Only the Orthographic Pattern Test, F (1,18) = 8.35, p = .01, η_p^2 = .317 was significant. Post hoc analysis

for the gain scores consisted of simply examining the group effect. The experimental group produced significantly superior performance on the Orthographic Pattern Test in comparison to the control group. No further comparisons yielded significant findings, indicating that the treatment was equally effective for participants with both high and low verbal ability scores.

The gains on the OPT by orthographic pattern were investigated to determine whether one pattern was significantly easier to learn. Analysis revealed that there were no significant differences, $F(3,16) = 2.83$, $p = .07$, $\eta_p^2 = .346$, between the short vowel, double vowel, and silent *e* patterns on the OPT.

Summary

The results indicate that the intervention was successful for improving knowledge of orthographic patterns in reading individual nonwords and was equally effective for participants with low and high verbal ability scores. Differences in gain scores between the three orthographic patterns were not found to be significant.

DISCUSSION

The intent of this study was to investigate the implementation of a classroom-based intervention delivered by teachers to their students who struggle with reading. Although teachers have daily access to students and a desire to help students for whom reading is a particular challenge, they need effective, efficient methods to teach the reading skills that these students have failed to master. Speech-language pathologists have a deep understanding of the language foundations of reading, can take a diagnostic-prescriptive approach to develop interventions for remediating reading delays, and can provide support for teachers in their endeavors to boost the reading skills of their lowest students. This study demonstrates that teachers and SLPs working together can effect changes in the reading behaviors of struggling students through a RTI model of classroom-based reading instruction.

An efficient intervention for teachers must allow teachers to be trained quickly and implemented easily. In this study, teachers received a 2-hour workshop explaining the use of Phonic Faces cards and phonic stories to teach the 3 orthographic patterns that would be used in the study. Each teacher also received individual training for an hour in their classrooms to teach the specific procedures required to implement the study protocol. The teacher's manual provided all of the materials, instructions, and scripts for each lesson. Observations and discussions with the teachers verified the ease of implementation of the lessons. On a feedback questionnaire, all of the teachers reported a positive, enjoyable learning experience for students and teachers alike.

Efficiency in implementation also demands that instruction be conducted by the teacher during regular classroom time. In this instantiation of the intervention, despite the demands and distractions of a typical classroom, the teacher was able to provide a short, focused reading lesson to students while their classmates engaged in quiet seatwork. The materials and

intervention procedures moved the students quickly and successfully through each section of the lesson so that these older students, aged 9 to 13 years, remained actively involved throughout the session. The interaction of the teacher with the students was crucial to its success, as evidenced by the failure of the control group to demonstrate growth on posttest measures after exposure to the same lessons but no teacher interaction. Adams (1990) underscored the importance of teacher-student dialog about the relationships between letters and sounds to the development of decoding skills.

Decoding Words

Intervention also needs to be effective. This intervention was designed to increase the awareness of phonemes within words and the ability to use patterns of English orthography to decode words for low reading 4th and 6th grade students performing 1 to 5 years below grade level on measures of decoding. The intervention focused on teaching three orthographic patterns that have immediate applicability to students' reading, the closed syllable (short vowel) pattern, the silent e pattern, and the double vowel pattern. Many poor readers, including the sample of students in this study, struggle to decode words with phonetically regular orthographic patterns. Understanding orthographic patterns can help students access the pronunciation of a majority of the words in the English language, about 86% of words, according to Hanna et al. (1966). Before the initiation of the intervention, the accuracy level of the students for the simple one-syllable pseudowords on the Orthographic Pattern Test was very low, indicating students did not see familiar spelling patterns when they looked at letter sequences. Following this short intervention, experimental subjects made significant gains when compared to the control group who completed the same lessons during independent seatwork, but without teacher interaction or access to Phonic Faces cards and stories. In addition, the significant results on the OPT for

decoding of nonwords that were demonstrated by the experimental group were based on a relatively small sample of participants, 22 total, 11 per group. Even though the study was underpowered, a significant finding was found with a large effect size.

Gains by the experimental group indicated that students were able to recognize the targeted patterns within the pseudowords to a greater extent than the control students. Successful decoding of pseudowords requires correct application of orthographic knowledge about the pattern to novel letter sequences. By more accurately decoding the nonsense words, the experimental group showed that they had generalized the knowledge they had acquired about the targeted orthographic patterns in real words to pseudowords on the OPT.

While the gains were modest, they did indicate that the experimental students were beginning to make more large-grain analysis in their attempts to read a word. They no longer approached reading words with a letter-by-letter strategy but began to find orthographic patterns within words.

According to Ehri (1992, 2005), each time a word is decoded, connections between letters and their pronunciations are formed, linking spellings, pronunciations and meanings in memory so that after the word is read a few times, recognition of the word as a unit occurs. The students in this study, like many struggling readers, showed evidence of connections with the initial sound of the word, but much more fragile connections with the remaining letters, especially the vowels. The gains made by the experimental group indicate that the students who had received the reading instruction were more completely analyzing letters to help them find the correct pronunciation of the words. Continued experience with successful decoding can strengthen the connections between letters and their constituent sounds, leading to more accurate and refined orthographic representations and greater decoding skill. This study lends support to

Share's (1995, 2005) contention that by fully engaging in the alphabetic process of decoding, students can become more independent, self-teaching readers.

The intervention targeted orthographic patterns that helped students understand the appropriate vowel sound for a specific pattern of consonants and vowels. In the experimental condition the Phonic Faces cards and phonic stories were used to explain the patterns. The Phonic Faces cards make the vowel shift from a short to a long sound obvious because different faces represent long and short vowels associated with the same letter. The teacher repeatedly demonstrated how the short (i.e., baby Phonic Face) was replaced by the long (i.e., adult cohort) when two *babies* were alone together in a word or when Mr. E (final e in a word) started complaining about the presence of a baby in his word. The Phonic Faces stories provided a narrative to help students remember the pattern rule, as well as visualization of the vowel shift and a logical reason for the shift to occur (at least within the context of the lesson). The exchange of the faces within the minimal contrast target words and the decoding activity focused attention on each letter in the word as well as larger patterns within the word, and provided multiple opportunities to manipulate the vowel shift using the multisensory cues provided by the faces.

Use of the Phonic Faces cards and phonic stories focused the child's attention on not only individual letters and their constituent sounds (fine grain analysis), but they also cued the reader to look at the orthographic pattern of the word (large grain analysis). For readers who had not developed a large-grain perspective, use of both types of analysis may have added decoding strategies that encouraged flexibility in their approach to reading, enhancing their ability to decode the words. Ziegler and Goswami (2003) contend that readers need to use both fine- and large-grained strategies to successfully decode in an inconsistent orthography like English.

Students who fail to spontaneously infer the orthographic regularities of their language may need explicit instruction and multisensory input like the intervention provided to students in the present study to understand and use the orthographic patterns to help develop efficient decoding skills. Whether the use of Phonic Faces is a tool that is more successful in this goal than plain letters remains open to question since teachers did not directly instruct on these principles with plain letters. Since the control group worked independently, it cannot be determined whether the teacher instruction on the patterns, the Phonic Faces, or a combination of both contributed to the greater gains in the experimental condition.

The emerging ability to find orthographic patterns within words was limited to the patterns taught. The Word Attack subtest of the WJDRB_III (Woodcock, Mather & Schrank, 2004) also assesses pseudoword reading, but the difference between the groups was not statistically reliable. The OPT counted the accuracy of each decodable grapheme, while the Word Attack subtest required the entire word to be decoded correctly. For example, one of the test items on the Word Attack test, "gnobe" contained the silent "e" pattern but also the "gn" silent letter pattern, confounding the decoding process with two different orthographic patterns. Struggling readers might know one pattern, but not the other, resulting in an incorrect response. Thus, the OPT could document finer distinctions in the growth of decoding ability by noting changes in each decodable grapheme within a word. Students who are progressing incrementally toward greater decoding accuracy could show gains on the OPT that might not appear on the Word Attack test. The OPT also targeted the three orthographic patterns that were taught, while the Word Attack subtest included many orthographically regular patterns. Improvement in decoding skills for orthographically regular pseudowords in older struggling

readers in this study did not significantly change performance on standardized reading scores when compared to a control group.

The groups had been divided into groups based on verbal ability because of the diversity of the population. One of the reasons was to investigate whether level of verbal ability would have an impact on the effectiveness of the treatment. The changes on the OPT were found for both groups, students with either high or low verbal ability, indicating that the intervention was equally effective regardless of the level of verbal ability. These students who continued to struggle with reading in the upper elementary grades benefited from a reading intervention targeting orthographic patterns and were not limited by verbal ability. Because the intervention included many language-based activities, including a short story, orthographic patterns, phonic stories, spelling, and repeated readings, it is encouraging that gains made during the intervention were not limited to those students who had stronger language skills.

Spelling

While decoding involves the recognition and application of patterns generated by others, spelling requires the production of a letter sequence that fits both the sounds of the word and the canonical order of the letters. Spelling is particularly difficult because there often are multiple orthographically plausible ways to spell a word, but only one is considered correct. In this study, spelling was measured using the Elementary Spelling Inventory-1 (ESI-1) (Bear, Invernizzi, Templeton, & Johnson, 2004). The ESI-1 examines the ability to spell words with regular and irregular patterns and is comprised of four words with a closed syllable pattern (i.e., bed, lump), two words with a vowel digraph pattern (i.e., float), and two with a silent e pattern (i.e., drive), along with more complex spelling patterns. Because there were so few words that used the orthographic patterns that were taught, it may be necessary to use a spelling measure with more

exemplars from the targeted orthographic patterns to document changes in orthographic knowledge as a result of the intervention.

Comprehension

Minimal changes were seen in comprehension in this study, a finding that was not surprising in that comprehension was not addressed in the treatment. McCandliss, et al. (2003) reported significant changes in comprehension using a similar approach, and had concluded that as reading decoding and fluency improved, comprehension followed. In their study, six syllable patterns were taught over approximately 20 hours of instruction, or more than twice the exposure to word patterns as this study. A longer period of intervention would be needed to determine the effects on passage reading for both fluency and comprehension.

Intervention Components

This intervention combined several instructional components that had been found to produce positive reading outcomes. Each portion of the lesson involved a different linguistic process related to literacy, but maintained the same 10 words throughout the lesson. Within the decoding portion, the target words differed by only one grapheme, allowing students to exert processing attention on the letter that had changed from the previous word. In a similar study, McCandliss, et al. (2003) taught six phonic patterns and used word chains with minimally contrasted words. The experimental subjects in their study demonstrated improved decoding, phonemic awareness, and comprehension skills. Conrad (2008) and Shahar-Yames and Share (2008) demonstrated positive reading results when spelling activities were targeted. The use of Phonic Faces has been shown to positively impact acquisition of orthographic knowledge by tapping into visual, auditory and tactile modalities. This is the first study to incorporate the use of phonic stories as a mnemonic aid to teach orthographic patterns, so its relative contribution is

unclear. The intervention also included opportunities for repeated practice with the target words to improve fluency as well as contextual reading of targeted words. In this study, it is impossible to identify which component or combination of components accounted for the growth of reading skills in the experimental group. Further study is needed to identify the relative contributions of each component of the intervention.

Limitations

The student population obtained from the classrooms of this study was very diverse, as evidenced by the large standard deviations of the sample on assessment measures. Although the purpose of the study was to include students from typical classrooms, a heterogeneous sample of students can limit statistical findings and generalizability. The study was also limited by the small sample size, both in teachers and in students. A larger, less diverse sample would strengthen the comparisons. Although this is a first step, more diffuse implementation through the involvement of more teachers and students is needed to fully understand the utility of the intervention and its application in academic contexts.

The decoding gains made by the students were modest and the effects did not have an impact on reading scores. This study only implemented the intervention for a short period, and a longer period of intervention is needed to test the efficacy of the approach for improving passage reading. The students received 8 hours of instruction and evidenced gains in decoding, but these students may need a more intensive intervention lasting longer than 6 weeks. Because these students perform much lower than peers on reading tasks, they need extended help to improve reading skills so that they can more fully benefit from classroom reading experiences. The length of the intervention was short compared to many intervention studies. For example, the tutors in Torgesen and colleagues' (2001) research provided 67.5 hours of one-on-one

intervention to their sample of poor readers for 2 50-minute sessions per day for 8 weeks. The students in the McCandliss, et al. study (2003) received 20 hours of one-on-one instruction over 14 weeks. Although teachers in classrooms have a limited amount of time to devote to struggling readers, this study demonstrated that even short time commitments can result in positive reading outcomes. The students may, however, require extended intervention to continue making progress in reading skills.

Three orthographic patterns were targeted for intervention, but understanding of more patterns may be very helpful for students who have not learned the utility of using both fine and large grain strategies to read. For example, learning to use the r-controlled vowels or the *ight* pattern would significantly increase the number of orthographic patterns that these readers could recognize. Systematic instruction of the most useful orthographic patterns would be helpful for students who struggle with word level reading.

Teacher fidelity to the intervention protocol was another limitation of this study. Teachers were provided with a script and encouraged to use it daily, but implementation of the intervention was not monitored closely enough to confirm teacher fidelity to the scripted lesson and ensure that each student in the study received similar instruction. Visits to the teachers were informal and encouraging, but documentation of fidelity was not implemented and limits the generalization of findings.

The control group's access to the intervention materials, sans the Phonic Faces cards and story, may not have been an adequate alternative to the experimental group. The control participants received the same lesson books, but the teacher did not help them with the directions or activities and therefore could not ensure that the participants engaged in the reading activities. The alternative could have been quiet seat work but no intervention materials, what the

remaining students in the class were doing, or another type of intervention, such as math. Because the teacher was already providing 20 minutes of instructional time to the experimental group, an additional 20 minutes of time allotted to the control group was not feasible for the teachers. However, this may limit comparisons between the control and experimental group because of the dissimilarities between the experiences of the two groups.

Summary and Implications

This study was initiated to address an issue teachers had raised concerning upper elementary students within classrooms who can't read well enough to gain information from classroom texts. The teachers were interested in providing supplementary instruction to these students, but didn't have the means to do so. Development of the intervention by a speech-language pathologist and implementation by classroom teachers resulted in positive reading gains in the students involved in the instruction when compared to a control group that had access to the intervention lessons but no teacher instruction. This study suggests that students who struggle with word-level reading at upper grade levels can benefit from instruction focused on orthographic pattern recognition. Although the initial findings are encouraging, further study is indicated using larger populations and more stringent research methodology to determine the most efficient and effective ways to support literacy development in student populations.

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APPENDIX A
PARENT CONSENT FORM

Phonics Instruction in the Regular Classroom: An Investigation with Older Students

Primary Investigator: Shara Brinkley, 37 Azalea Dr., Monroe, LA 71203
318-345-5235, Available for questions M & F, 8:00-4:00

Purpose: The purpose of this study is to investigate a method of providing phonics instruction to older students in the regular classroom.

Subjects: Students in the fourth through eighth grades with reading difficulties will be selected by their teachers to receive additional instruction in phonics from their teachers within a small group during regular classroom time.

Description of the study: Each day, the teacher will meet with a small group of selected students to read for 10 minutes from a classroom text. The teacher will stop to teach a targeted phonic pattern, such as silent 'e' words, and have the students decode a list of words. The group will practice reading the words, and will then resume their reading of the classroom text. Both before the instruction starts and after completing the 8 lessons, students will read a list of nonsense words into a tape recorder to check for progress. A total of 3 phonics patterns will be taught.

Benefits: Students will have the opportunity to receive direct instruction in phonics rules and decoding strategies from their teacher. They will also receive standardized testing prior to and after the intervention. The study may help teachers learn methods of helping students with decoding and reading skills. There are no known risks.

Right to Refuse: Participation is voluntary, and a student will become part of the study only if both student and parent agree to the student's participation. At any time, either the subject may withdraw from the study or the subject's parent may withdraw the subject from the study without penalty or loss of benefit.

Privacy: Results of the study may be published, but no names or identifying information will be included for publication. Subject identity will remain confidential unless release is legally compelled.

Signatures:

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, LSU Institutional Review Board, (225)578-8692. I will allow my child to participate in the study described above and understand the investigator's obligation to give me a signed copy of this consent form.

Parent's Signature_____Date_____

Child's Name_____

The parent/guardian has indicated to me that he/she is unable to read. I certify that I have read this consent form to the parent/guardian and explained that by completing the signature line above he/she has given permission for the child to participate in the study.

Signature of Reader_____Date_____

APPENDIX B
STUDENT ASSENT FORM

Phonics Instruction in the Regular Classroom: An Investigation with Older Students

Student Form

I, _____, agree to be in a study to help teachers find ways to teach students how to read better. I may have to read in a small group with my teacher every day for about 10 minutes and will have to read words in the group. I understand that I'll have to do some testing before, during, and after the teaching series. I can decide to stop being in the study at any time without consequences.

Student's Signature_____Date_____

Age_____

Witness_____Date_____

APPENDIX C
ORTHOGRAPHIC PATTERN TEST
STUDENT SCORING SHEET—PATTERN 1—CLOSED SYLLABLE

STUDENT_____#_____

	PRETEST Date_____		POSTTEST Date_____		GAIN
	Sounds	✓ Pattern	Sounds	✓ Pattern	Pattern
jad					
stig					
lork		X		X	
mup					
doob		X		X	
turb		X		X	
gom					
bouve		X		X	
lud					
kib					
froim		X		X	
crax					
sout		X		X	
vown		X		X	
fen					
zough		X		X	
hegs					
brop					
waum		X		X	
mook		X		X	

Total # correct patterns 1._____**2.**_____**Total gain in patterns**_____

STUDENT SCORING SHEET—PATTERN 2—SILENT E

STUDENT_____#_____

	PRETEST Date_____		POSTTEST Date_____		GAIN
	Sounds	✓ Pattern	Sounds	✓ Pattern	Pattern
luze					
bife					
bight		X		X	
lerb		X		X	
doub		X		X	
jabe					
routh		X		X	
sape					
tume					
nobe					
daub		X		X	
poib		X		X	
boof		X		X	
mugh		X		X	
rade					
soud		X		X	
dite					
fook		X		X	
lipe					
boke					

Total # correct patterns 1._____**2.**_____**Total gain in patterns**_____

STUDENT SCORING SHEET—PATTERN 3—TWO VOWELS

STUDENT_____#_____

	PRETEST Date_____		POSTTEST Date_____		GAIN
	Sounds	✓ Pattern	Sounds	✓ Pattern	Pattern
hoin		X		X	
roud		X		X	
moab					
jaid					
teigh		X		X	
buit					
mough		X		X	
poot		X		X	
crawn		X		X	
woast					
gleep					
brait					
rean					
broid		X		X	
hown		X		X	
loat					
pight		X		X	
toib		X		X	
fay					
dain					

Total # correct patterns 1._____**2.**_____**Total gain in patterns**_____

APPENDIX D
SAMPLE LESSONS

LESSON 1A—Closed Vowel

1. READ THIS STORY

A cat and a rat were friends, but they always got into trouble. One day, they were walking down the road. Rat smelled some brownies that were cooling in a window. He said to the cat, "Let's rob this lady and take the pan of brownies."

"How can we rob this lady, Rat? She's nice. She lets us drop in for pie."

"Well," said Rat, "these brownies might rot. Let's take them."

So Cat put up his hands to get the brownies. Just then, Rat saw the lady and hit the cat in the ribs. Cat fell over, and his pants went "Rip!" Cat's face turned red, and he dropped the pan of brownies. They ran away, and after that, they never stole anything again. They had learned their lesson—never rob a nice lady or your pants will rip.

2. REVIEW THE PHONIC FACES STORY

3. READ THESE WORDS:	**4. NOW WRITE THEM**
pan	**1.**_____
can	**2.**_____
cat	**3.**_____
rat	**4.**_____
rot	**5.**_____
rob	**6.**_____
rib	**7.**_____
rip	**8.**_____
drip	**9.**_____
drop	**10.**_____

5. PRACTICE READING YOUR WORDS AGAIN.

5. RE-READ THE STORY.

6. WRITE A SENTENCE USING TWO OF THE WORDS:

_____

_____

_____

LESSON 1—Silent e

1. READ THIS STORY

It was Mouse Pride Week and three mice made a float to ride in the parade. They got some lace and paper for a good price and covered an old wagon. They wrote a secret code on the side of the float for all of their friends to read.

They rode in the wagon, waving to the crowd and throwing candy. Some mice got angry when someone threw a bone instead of candy, so the mice police had to spray some mace on the mice in the crowd. But the bad mice were sorry that they had ruined the parade and bought everyone ice cream cones. Then everyone was happy and gave Mouse Pride Week a big thumbs up.

2. REVIEW THE PHONIC FACES STORY.

3. READ THESE WORDS:	**4. NOW WRITE THEM**
bone	**1.**_____
cone	**2.**_____
code	**3.**_____
rode	**4.**_____
ride	**5.**_____
pride	**6.**_____
price	**7.**_____
mice	**8.**_____
mace	**9.**_____
lace	**10.**_____

5. PRACTICE READING YOUR WORDS AGAIN.

6. RE-READ THE STORY.

7. WRITE A SENTENCE USING TWO OF THE WORDS:

_____

_____

_____

LESSON 1—Double Vowel

1. READ THIS STORY

A criminal roach decided to steal a roast from a woman while she was asleep. He had to read the map to her house, find the right road, cross the stream, and then climb a steep hill to her house. He got real close to the kitchen window and looked inside. There was the roast! He squeezed in the window, then into the steel pan to get the roast. Alas, the steel pan had grease on the sides and when he tried to get the roast out of the pan, he kept slipping. He got so tired, he fell asleep in the steel pan.

When the woman woke up, she went into the kitchen, found the roach in her roast pan and killed him. That was the end of the roach's life of crime.

2. REVIEW THE PHONIC FACES STORY.

3. READ THESE WORDS:	**4. NOW WRITE THEM**
sleep	**1.**_____
steep	**2.**_____
steel	**3.**_____
steal	**4.**_____
stream	**5.**_____
real	**6.**_____
read	**7.**_____
road	**8.**_____
roach	**9.**_____
roast	**10.**_____

5. PRACTICE READING YOUR WORDS AGAIN.

6. RE-READ THE STORY.

7. WRITE A SENTENCE USING TWO OF THE WORDS:

_____

_____

_____

APPENDIX E
SAMPLE WORD CARDS

pan	can
cat	rat
rot	rob
rib	rip
drip	drop

APPENDIX F
SAMPLE LESSON SCRIPTS

LESSON SCRIPTS—PATTERN 1
CLOSED SYLLABLE

LESSON 1
Find a sentence from passage in your curriculum that contains the closed syllable pattern Consonant-Vowel-Consonant, like “pad” or “man.” It can have a blend at the beginning or end, like “stop” or “best” or can be a short vowel pattern within a two-syllable word like “napkin” or “cabinet.”

Arrange the Phonic Faces for the first lesson: P, Amy Ann, N, C, T, R, Omar, B, Iris Iggy, D. Some of the cards will be used more than once. Cut the word cards for the first lesson and arrange them according to the lesson list.

If this is the first time the students have seen the Phonic Faces cards, you’ll want to introduce them to the PF cards, the babies, the adults and the kids. You might say something like this: **I have some cards that show how sounds and letters work. Let’s look at these (put down the baby cards Amy, Ethan, Iris, Otto, Eunice). These are all babies. Sometimes we say these are “short” vowels. Amy Ann is crying, so she says, “Aaaa,” like a baby crying. Say, “Aaaaa,” that’s baby Amy Ann. Now we see Ethan Evan. He has a new tooth, so he says “Eeeee,” showing his new tooth. Iris Iggy doesn’t like carrots so she says, “Iiiiiii,” icky carrots. Omar Otto opens his big mouth and says, “O-o-o-o.” Eunice Ulma is very smart and she says, “Uh-uh-uh-uh.” Now we have the kids, what we call the consonant sounds. The first is Peter. His upper lip puffs out a /p/ sound. Enos is “N” the nose sound. Celia has two pigtails, so she can either say, /s/ or /k/. Tina’s tongue taps behind her teeth like this--/t/ /t/ /t/. Arlene is very mean. She says, /rrrrrr/. Bejay’s lower lip says /b/ and Dedra’s tongue is like a drum behind her teeth, /ddddd/. Those are the kids and babies we’re going to talk about today.**

To begin the lesson, read with the students the passage you’ve selected. Because you only have 10 minutes, try to start close to the sentence with the target word. As you come to the word you’ve selected, have the students read the word, then stop and start the mini-lesson. Explain the phonic pattern using the Phonic Faces story. **“When a baby (short vowel) is between 2 big kids (consonants), the big kids take care of the baby. That means the baby gets to say its sound. Use the baby’s sound to sound out the word.”**

Put out the Phonic Faces cards for the first word. Have the students read the words one by one, blending the sounds together.

You should say:
The first word starts with a P, which says /p/ and the next sound is Amy Ann, the baby crying sound /a/, the last sound is N, the nose sound. We have p-a-n or

…what? Right--pan. If we put the C on top of the P, we change p-a-n to ….what? Yes, can. Next, put the T on the N, and say, **Now we have…..right, cat.** Then work through the rest of the word list, having the students read each word as you change the cards, marking student responses.

Put the R on C for "**rat**" Omar on Amy for "**rot**" (Omar's mouth is open for /o/)
B on the T for "**rob**" Iggy on Omar for "**rib**" (Iggy hates carrots,says short i)
Take the P from under the first stack and put it on the B for "**rip**"
Add the D to the front of the word for "**drip**"
Put Omar back on top of Iggy for "**drop**"

For each word, have the students decode the word, prompting with the phonic story and sounds as necessary.

After all the words have been decoded, have the students cover the word list and dictate the words in the order given so the students can spell each word. Use the Phonic Faces cards to reinforce the correct spelling of each word.

Use the word cards to practice decoding each word several times, from the beginning to the end, the end to the beginning, or both as time allows.

Return to the reading passage and re-read the original story. Spend the rest of the time reading the passage, looking for more words with the closed syllable pattern.

APPENDIX G
LESSON WORD LISTS

PATTERN 1—CLOSED SYLLABLE

Lesson 1	Lesson 2	Lesson 3	Lesson 4
pan	gun	keg	den
can	gum	leg	pen
cat	bum	let	pet
rat	bug	get	pest
rot	beg	got	nest
rob	bet	clot	rest
rib	set	clock	fresh
rip	let	tock	mesh
drip	led	tick	mush
drop	sled	stick	shun

Lesson 5	Lesson 6	Lesson 7	Lesson 8
panic	canyon	office	dentist
candle	cactus	copper	pencil
cattle	capture	cottage	petal
rattle	napkin	compose	reptile
rotten	happen	comet	ripple
robber	chapter	contest	dipper
ribeye	champion	confess	flipper
ripple	chimney	honest	dimmer
dripping	insect	tonic	umpire
dropping	index	tunnel	thunder

PATTERN 2—SILENT E

Lesson 1	Lesson 2	Lesson 3	Lesson4
bone	state	bike	made
cone	stale	like	make
code	stole	lake	fake
rode	stone	take	flake
ride	stove	stake	fluke
pride	drove	stroke	puke
price	drive	smoke	plume
mice	dive	slope	plane
mace	dine	rope	cane
lace	shine	ripe	crane

Lesson 5	Lesson 6	Lesson 7	Lesson 8
cupcake	mistake	sunshine	sand dune
baker	estate	divine	june bug
broken	octane	divide	jukebox
joker	airplane	abide	lukewarm
spoken	birthplace	abode	likewise
spider	homeplate	hambone	strike out
dispute	explode	telephone	astride
refute	ala mode	alone	glider
acute	hormone	timeline	glade
ice cube	landmine	iodine	glued

PATTERN 3—DOUBLE VOWEL

Lesson 1	Lesson 2	Lesson 3	Lesson 4
sleep	train	suit	vain
steep	strain	fruit	rain
steel	trait	cruise	drain
steal	trail	bruise	bait
stream	tray	braise	wait
real	bray	brain	waist
read	play	train	roast
road	plead	chain	coast
roach	pleat	cheek	coat
roast	treat	sheet	throat

Lesson 5	Lesson 6	Lesson 7	Lesson 8
payday	reader	blackmail	exclaim
daylight	breeder	frailty	explain
dainty	beeper	braiding	spleen
painted	sleeping	brainy	greenery
painkiller	leapyear	rainbow	rearview
sprained	seaport	railroad	appear
sprayed	dishsoap	really	repeat
prayer	soaking	reel	retreat
preaching	oaktree	degree	cheated
poaching	oatmeal	greedy	cheaper

VITA

Shara Brinkley is the research project coordinator for the Treatment of Lexical Deficits in Young Children project at Arizona State University, funded by a 5-year NIH research grant. In that capacity, she trains and supervises personnel, manages recruitment and scheduling of subjects, conducts assessments, and oversees the collection and analysis of data from the project. She has served as a site coordinator and teacher mentor for a project to improve the oral and written language and literacy instruction of teachers in upper elementary and middle schools. She worked as speech-language pathologist for many years in public schools, developed and implemented literacy interventions for kindergarteners, and taught language and literacy courses for classroom and special education teachers.

Ms. Brinkley's passion for language and literacy development in children drives her desire to research and develop interventions and materials that will help all students achieve mastery of oral and written communication. Future projects include development, research, and publishing of interventions targeted for upper elementary students, as well as books, materials, and programs for language delayed and language-learning preschoolers.