2003

Individual Phonological Awareness Training for Speech/Language Impaired First Graders

Sarah Weaver
Eastern Illinois University

THESIS/FIELD EXPERIENCE PAPER REPRODUCTION CERTIFICATE

TO: Graduate Degree Candidates (who have written formal theses)

SUBJECT: Permission to Reproduce Theses

The University Library is receiving a number of request from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow these to be copied.

PLEASE SIGN ONE OF THE FOLLOWING STATEMENTS:

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or for the purpose of copying it for inclusion in that institution's library or research holdings.

[redacted] 3-19-03

Author's Signature Date

I respectfully request Booth Library of Eastern Illinois University **NOT** allow my thesis to be reproduced because:

_____

_____

_____

_____ _____

Author's Signature Date

This form must be submitted in duplicate.

Individual Phonological Awareness Training for

Speech/Language Impaired First Graders
(TITLE)

BY

Sarah Weaver, B.S.

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2003
YEAR

I HEREBY RECOMMEND THAT THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

2-25-03
DATE

[redacted]
THESIS DIRECTOR

2-25-03
DATE

[redacted]
DEPARTMENT/SCHOOL HEAD

Individual Phonological Awareness Training for

Speech/Language Impaired First Graders

BY

Sarah Weaver, B.S.

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE

IN THE DEPARTMENT OF COMMUNICATION DISORDERS AND SCIENCES,
EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2003
YEAR

I HEREBY RECOMMEND THAT THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

2-25-03
DATE

[redacted]
THESIS CO-DIRECTOR

DATE

THESIS CO-DIRECTOR

2-25-03
DATE

[redacted]
THESIS COMMITTEE MEMBER

2-25-03
DATE

[redacted]
THESIS COMMITTEE MEMBER

Running Head: PHONOLOGICAL AWARENESS INTERVENTION

Individual Phonological Awareness Training for Speech/Language Impaired First Graders

Sarah Weaver, B.S.

Eastern Illinois University

ACKNOWLEDGMENTS

Several individuals have dedicated much of their time and effort towards my master's thesis project. Therefore, I would like to take this opportunity to formally thank them for their efforts.

First, I would like to acknowledge Dr. Rebecca Throneburg and Mrs. Jean Smitley for their time, effort, and patience in planning, reviewing, editing the project. Their support and encouragement was always present, and they allowed me to be independent on the project. I would also like to thank the teachers, staff, and parents at Shelbyville Elementary School for their participation and cooperation. Finally, I would like to thank the thesis committee members, CDS faculty, and graduate assistants for their interest and support of the project.

Special thanks are also due to my family and friends, who have offered support and motivation to complete the project. Specifically, I would like to thank my parents for their encouragement and support throughout my college career. I would also like to thank Chad for his cooperation throughout the project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Running Head: PHONOLOGICAL AWARENESS INTERVENTION

Individual Phonological Awareness Training for Speech/Language Impaired First Graders

Sarah Weaver, B.S.

Eastern Illinois University

Abstract

The purpose of the present study is to determine the effects of individual phonological awareness and phonics training emphasizing auditory, motoric, and alphabetic properties of phonemes with 3 children who did not make substantial gains following classroom phonological awareness intervention. Subjects were enrolled in the first grade and exhibited speech and/or language impairments. The individual phonological awareness program contained 3 parts: (1) phonological awareness, (2) phoneme-grapheme correspondence, and (3) decoding and spelling and employed a single subject multiple probe baseline across behaviors design. Results indicated that individual treatment was successful for teaching phonological awareness, phoneme-grapheme correspondence, and decoding and spelling. Clinical implications were that direct, coordinated intervention allows students more repetition, practice, feedback, and consistency when learning literacy skills.

CHAPTER I

Introduction

Reading is a highly valued skill in the United States, and failure to acquire good reading proficiency has been linked to a variety of academic and social consequences. For example, less proficient readers typically possess lower self-esteem, academic performance, and professional outcome. Reading is a critical skill that impacts future success.

Reading is defined as a complex process that includes a strong sense of language, letter and word perception, comprehension, reaction to concepts, and understanding text structure (Lapp & Flood, 1992). Comprehension is one primary skill that readers must acquire in order to attach meaning to written text. To comprehend text, readers must possess skills in attention, syntax, semantics, memory, imagery, and pragmatics. The other primary skill necessary for reading is decoding, which entails proficiency in the areas of phonology, synthesis, attention, auditory perception, morphology, sequential memory, and visual perception. Phonological awareness is one key element involved in decoding, but visual or orthographic representation of words is the primary goal of reading instruction. While phonological awareness is primarily an auditory skill, phonics focuses on processing visual information into a sound or word. Children usually require direct instruction to acquire proficient reading skills, and many professionals have focused on investigating the role of linguistic awareness in oral and written language development because of its relationship to reading acquisition (Warrick, Rubin, & Rowe-Walsh, 1993).

Phonological awareness is one type of linguistic awareness task that researchers have devoted considerable time examining in order to identify its relationship to reading (Ball & Blachman, 1991; Lundberg, Frost, & Peterson, 1988). Phonological awareness is the ability to reflect on and manipulate the sounds of an utterance independent from word meaning (Stackhouse, 1997). Common tasks often consist of rhyming, isolating sounds, and segmenting, deleting, substituting, and blending sounds (Lewkowicz, 1980). Additional components of phonological awareness training may or may not include instruction in sound-letter correspondences. Investigators have demonstrated that children's performance on phonological awareness tasks can predict later reading achievement (Lundberg, Olofsson & Wall, 1980; Swank & Catts, 1994). Furthermore, approximately 70 percent of children with reading difficulties exhibit poor phonological awareness skills (Catts, Fey, Zhang, & Tomblin, 1998).

Traditional phonological awareness programs have taught children by focusing on the acoustic/auditory properties of phonemes. As a result, the programs often consisted of tasks involving listening to sounds in words and segmenting, deleting, substituting, and blending sounds (Lewkowicz, 1980). Conversely, other researchers (Lindamood & Lindamood, 1998) have focused on children's understanding of phonological processing by emphasizing the articulatory posture, motor movements, and tactile sensation associated with phonemes. Despite the obvious differences between the approaches, both methods have demonstrated successful results in teaching disabled readers phonological awareness skills.

Several researchers have documented that the most successful reading intervention programs for normally developing children incorporate training in both

phonological awareness and phonics skills (Ball & Blachman, 1991; Blachman, 1991; Dahl & Scharer, 1999). In addition, current literature has demonstrated that functional alphabetic reading skills can be taught to poor readers with speech and/or language deficits (Gillon, 2000; Hilgenberg, 2000; Warrick, et al, 1993).

A number of different professionals, such as learning disabled teachers, regular classroom teachers, Reading Recovery teachers, Title 1 teachers, and speech-language pathologists, may play an important role in providing special reading intervention to children with speech and/or language impairments. In addition, speech-language pathologists who have primarily focused on the treatment of speech and/or language skills are expanding their scope of practice to include literacy intervention (ASHA, 2000). In fact, Schuele (2001) stated that it may be beneficial to temporarily dismiss all goals in order to improve struggling kindergarten and first grade students' reading performance. Professionals collaborating to provide coordinated services is preferable to professionals using different approaches and targeting reading difficulties in disjointed manners.

Children with speech and/or language disorders are at risk for developing adequate reading skills. Similarly, children with communication impairments often exhibit poor phonological awareness skills. Since the current available literature clearly demonstrates that phonological awareness and phonics abilities have a remarkable impact on decoding ability and later reading achievement, it is not surprising that numerous studies have demonstrated significant gains in reading scores for normal and speech/language impaired children following intervention.

Speech-language pathologists possess a unique knowledge that can be beneficial when carrying out a role in the prevention and remediation of language-based reading difficulties (ASHA, 2000). While they must concern themselves with balancing speech and/or language goals, they must also consider that delaying special reading intervention to children already at risk for reading failure may hinder future language abilities, a phenomenon known as the "Matthew Effect" (Stanovich, 1986). If these children are not systematically taught to read, they will most likely fall further and further behind in reading and language development, and they may also develop a negative attitude towards reading (Gillon, 2000). If time for speech-language and literacy goals is not sufficient, delaying speech-language goals in light of gaining purposeful reading skills in first grade warrants careful consideration (Schuele, 2001).

If speech-language pathologists are going to work on literacy with struggling readers on their caseloads, they should try to collaborate and coordinate their services with other professionals, such as learning disabled teachers or Reading Recovery teachers who may be already working with at-risk or struggling students. One of these possible professionals, Reading Recovery teachers, receive special training in a framework for whole language approaches and general reading instruction. Their services provide children with opportunities to experience reading and develop appropriate reading strategies in a variety of contexts. Their instruction often includes elements of phonics instruction, but the individual sessions focus on remediating the confusion and frustration associated with reading tasks (Hicks & Villaume, 2000).

Because speech-language pathologists and Reading Recovery teachers possess different areas of expertise that have been proven to help build reading skills for children

struggling with reading, professionals need to work together systematically on an agreed upon set of goals to accommodate communication impaired children with reading difficulties. Classroom teachers may be effective in teaching phonological awareness skills to most children, but speech-language pathologists and Reading Recovery teachers may also play an important role in the remediation of children's reading disorders. Shared efforts between professionals can facilitate a multidisciplinary approach for children with reading difficulties that will provide numerous opportunities to support and carryover newly learned reading skills.

Multiple professionals can treat children who are failing in reading. Unfortunately, only a handful of studies have specifically looked at phonological awareness training or a combined phonological awareness-phonics approach for children exhibiting communication disorders (Gillon, 2000; Hilgenberg, 2000; Korkman & Peltomaa, 1993; van Kleeck, Gillam, & McFadden, 1998; Warrick et al., 1993). These studies have illustrated improved performance with intervention. Korkman and Peltomaa and van Kleek et al. conducted their studies with preschoolers before they experienced any reading failure. In addition, Korkman and Peltomaa evidenced coordination between teachers, speech-language pathologists, and psychologists. Warrick et al. only included children with language delays and did not incorporate letters into the phonological awareness training. On the other hand, Gillon only included subjects with expressive phonology disorders, and speech-language pathologists provided the intervention. Hilgenberg (2000) evaluated the effectiveness of individual phonological awareness training for children who participated in previous classroom phonological awareness intervention but received minimal benefit from the training. Even so, the program

focused minimally on phonics principles and did not involve coordination between speech-language pathologists and Reading Recovery teachers. The benefits of reading intervention providing phonological awareness and phonics training to children with speech and/or language disorders who failed to improve despite previous efforts are currently unclear. In addition, studies evaluating professional coordination between speech-language pathologists and Reading Recovery teachers are lacking.

The purpose of the present study is to determine the effects of individual phonological awareness and phonics training emphasizing auditory, motoric, and alphabetic properties of phonemes with three children who did not make substantial gains following a classroom phonological awareness intervention program. The individual phonological awareness program will contain three parts: (1) phonological awareness, (2) phoneme-grapheme correspondence, and (3) decoding and spelling.

CHAPTER II

Review of Literature

The following review of literature considers several areas of research in the realm of reading. First, a review of normal reading acquisition and theories regarding reading development are discussed. Then, phonological awareness skills and development are presented along with supporting studies illustrating the significance of phonological awareness abilities with relation to reading performance. Classroom phonological awareness interventions are also reviewed. Following the discussion of phonological awareness, phonics instructional approaches and studies are addressed. The review then focuses on characteristics of and intervention for poor readers. Students with speech and/or language disorders are described, and the role of speech-language pathologists is presented. Because the purpose of this study is to determine the effects of individual phonological awareness training for children with speech and/or language disorders, the review concludes by documenting research investigating reading intervention for students with speech and/or language disorders.

Normal Reading Development

Reading is defined as the process of constructing meaning from printed symbols. Gough and his colleagues (Gough & Tunmer, 1986; Hoover & Gough, 1990) proposed that single word decoding and comprehension skills are related to reading ability. The task of reading is quite complex, and beginning readers must coordinate many cognitive processes to read accurately and fluently, including recognizing words, constructing the meanings of sentences and text, and retaining the information read in memory (National Reading Panel, 2000). Decoding refers to the word recognition process of converting

printed symbols to words. The reader must have skills in the areas of phonology, synthesis, attention, auditory perception, morphology, memory, and visual perceptual memory in order to perform decoding operations (Ratner & Harris, 1994). Furthermore, words can be decoded using two different routes. First, word recognition can occur through a direct visual route (i.e., visual, orthographic) in which meaning is quickly attached to printed symbols. In contrast, the indirect phonetic route of decoding uses sound-symbol correspondence to gain lexical access and attach meaning to printed text. While a majority of poor decoders have poor phonological decoding skills, other poor decoders have greater difficulty with sight words than phonetically decodable words (Catts & Kahmi, 1999). Following the application of decoding, the process of comprehension, which requires skills in attention, syntax, semantics, memory, imagery, and pragmatics, must be performed to interpret the meaning of words, sentences, or discourse (Ratner & Harris, 1994).

The development of single word decoding skills has been debated. As a result, two primary theories regarding single word decoding exist. One theory developed by Chall (1983) proposes that children learn to read by passing through three discrete stages of decoding. The logographic or first stage is characterized by creating associations between words or graphics with no knowledge of letter sound relationships, which generally occurs during the preschool years. The second stage, referred to as the alphabetic stage, occurs when children employ the concept that written language is composed of letters that correspond to sounds. Children in kindergarten through second grade primarily use this stage that entails "sounding out" words and gaining access to the meaning of the words by using phonetic properties of the word. Finally, children enter

into the orthographic stage when they read by identifying larger units of words. Words and syllables are decoded automatically, and the children learn to transform letter combinations and larger pieces of words. Therefore, the meaning of written words is accessed through visual word recognition. This stage is evident in normal developing children in third grade and beyond.

An alternative theory of single word decoding development, the Self-Teaching Hypothesis, posits that children use a "self-teaching mechanism" to develop orthographic or direct visual representation of words (Jorm & Share, 1983; Share, 1995; Share & Stanovich, 1995). Children first employ the indirect phonetic route to access the auditory lexicon. In turn, the repeated phonological decoding of words promotes the development of visual, orthographic representations of those words. As a result, children develop their visual lexicon and recognize words quickly and accurately. Frequently encountered words are processed orthographically, while novel or less common words require processing through sound-by-sound decoding. Unfortunately, self-teaching through phonological decoding skill is not guaranteed because the quality, amount, and memory of print exposure also plays an important role in developing orthographic concepts. It is inevitable that some children will experience ease with reading while others will struggle with every word (Catts & Kahmi, 1999).

Learning to decode an alphabetic script requires formal instruction in addition to explicit knowledge of the phonological aspects of speech. Phonological awareness is a fundamental initial factor, but phonics instruction is also necessary to acquire knowledge of letters and orthographic rules. The English language is comprised of 44 phonemes represented by the 26 letters of the alphabet. Graphemes are units of written language

which represent phonemes in the spelling of words, and they may consist of one letter (e.g., p, t, k) or multiple letters (e.g., ch, sh, ck, igh). Furthermore, there are 251 possible combinations of graphemes that represent the 44 English phonemes. Children learning orthographic knowledge through phonics instruction follow a developmental sequence in acquiring orthographic units. Children in kindergarten are generally expected to know some phoneme-grapheme correspondences, including consonants, lax vowels, digraphs, and blends. As the children enter first grade, they gain knowledge in variant correspondences such as single consonants, tense vowels, r-controlled vowels, dipthongs, consonant blends and digraphs, and silent letters and oddities. Irregular spellings, contractions, possessives, and abbreviations also begin to develop (Moats, 2000).

Phonological Awareness

Phonological awareness constitutes the ability to perceive spoken words as being composed of individual sounds. Phonological awareness is the ability to reflect on and manipulate the sounds of an utterance independent from word meaning (Stackhouse, 1997). It is an auditory skill that focuses on speech sounds. Phonological awareness skills are assessed using a variety of tasks, including recognition of rhyme, rhyme production, isolation of beginning, middle, or final sound, sound segmentation, identifying the number of syllables or sounds in a word, sound-to word matching, word-to-word matching, syllable and sound blending, sound deletion, specifying which phoneme has been deleted, sound substitution, and sound exchange (Ball & Balchman, 1991; Lewkowicz, 1980).

Several researchers have documented a developmental sequence for the acquisition of phonological awareness skills (Goldsworthy, 1996; Perfetti, 1991;

Stackhouse, 1997). Rhyming skills emerge at approximately age three, and the hierarchy of tasks concludes with the ability to form words by blending phonemes around the age of seven years. Specific phonological awareness skills and the approximate age of development as described by Goldsworthy (1996) are listed in Table 1. Approximately 80% of children exhibit no difficulties acquiring these phonological skills, while the remaining 20% struggle to comprehend the system (Lyon, 1985).

Many reading professionals concur that instruction in phonological awareness is important for any reading curriculum (Blachman, 1989; Boudreau & Hedberg, 1999; Brown & Felton, 1990; Gillon, 2000; Fox & Routh, 1980; Iversen & Tunmer, 1993; Warrick, et al., 1993). Causal relationships between phonological awareness and subsequent reading growth have been illustrated by longitudinal-correlational studies (Lewis & Freebairn, 1992; Wagner, Torgesen, & Rashotte, 1994). Specifically, investigations found that phonological awareness measures are strongly related to early reading success (Bradley & Bryant, 1983; Ehri, 1979; Fox & Routh, 1980; Helfgott, 1976; Liberman, 1983; Stanovich, 1986). To illustrate, a study conducted by Lundberg et al. (1980) demonstrated that measures of preschool phonological awareness skills predicted children's reading ability in kindergarten with 70% accuracy. Furthermore, another study examining 54 students at the beginning of first grade found that the phonological awareness skills of deletion, categorization, blending, and segmenting were good predictors of decoding ability at the completion of the school year (Swank & Catts, 1994). Since the relationship between phonological awareness ability and later reading achievement is evident, it is not surprising that numerous studies implementing phonological awareness training for whole classes have demonstrated a positive influence

on later reading growth (Ball & Blachman, 1991; Bradley & Bryant, 1985; Lundberg, et al., 1988).

Table 1

Phonological Awareness Development

AGE	SKILL	EXAMPLE
3 years	▪ Recite known rhymes ▪ Produce rhyme by pattern ▪ Recognize alliteration	Jack and Jill "cat" and "hat" "Mommy" and "Michelle" begin with the same sound
4 years	▪ Segment syllables ▪ Count syllables (50% of 4-year-olds can do this)	"cowboy" can be divided (clapped) into "cow" and "boy"
5 years	▪ Count syllables in words (90% of 5-year-olds can do this) ▪ Count phonemes within words (fewer than 50% of 5-year-olds can do this)	"sunny" has two syllables "cat" has three phonemes
6 years	▪ Match initial consonants in words ▪ Blend two to three phonemes ▪ Count phonemes within	"shoe" and sheep" begin with the same first sound /d/ / / /g/ form the word "dog" "cat" has 3 sounds

	words (70% of 6-year-olds can do this) ▪ Identify rhyming words ▪ Divide words by onset and rime	 "pit" rhymes with "mit" "stop" can be divided into /st/ /ap/
7 years	▪ Blend phonemes to form words ▪ Segment 3 to 4 phonemes within words ▪ Spell phonetically ▪ Delete phonemes from words	/p/ + /a/ + /t/ forms the word "pot" "pot" contains the sounds /p, a, t/ What is "spin" without /s/?

Phonological Awareness Training in the Classroom

The positive impact of phonological awareness training on reading acquisition has been studied extensively during the past twenty years (Bentin & Leshem, 1993; Blachman, 1991; Blachman, Ball, Black, & Tangel, 1994; Bradley & Bryant, 1983, 1985; Kennedy & Backman, 1993; Kozminsky & Kozminsky, 1995; Lie, 1991; Lundberg, et al., 1988; McGuiness, McGuiness, & Donohue, 1995; Torgesen & Davis, 1996). These studies collectively illustrate that phonological awareness training improves early reading achievement (Trioa, 1999).

For example, Lundberg et al. (1988) examined the effects of a classroom-based phonological awareness training program. Phonological awareness skills of 235 Danish

kindergarten students were evaluated at the beginning of the school year. The experimental group received fifteen to twenty minute sessions of phonological awareness training on a daily basis for the remainder of the school year whereas the control group received the regular preschool program consisting of social and aesthetic areas. Teachers conducted the phonological awareness sessions that focused on rhyme, segmenting words and syllables, and phonemes. Post-test results indicated that the experimental group's phonological awareness skills were significantly superior to those of the control group. Likewise, reading and spelling skills in first and second grade were significantly different between the two groups, with the experimental group outperforming the control group. The researchers concluded that phonological awareness facilitates later reading ability because students in the experimental group received long-term benefits from training.

Bradley and Bryant (1983, 1985) also investigated classroom-based phonological awareness training by dividing 65 kindergarten children into four groups that were equal in the areas of IQ, age, gender, and sound categorization ability. Each group received different training. The first group learned to categorize words by common initial, medial or final sounds. The second group was trained in categorizing words by common sounds just as group one, but the subjects also learned to pair the common sounds with corresponding plastic letters. Groups three and four served as controls, with group three learning to categorize words by semantic categories (e.g., animals, food) and group four receiving no training. Results indicated that groups one and two, who received phonological awareness training with or without letters, surpassed the control groups in reading and spelling. Furthermore, the second group, who learned categorization through

common sounds and corresponding plastic letters, obtained the best results for reading and spelling.

The National Reading Panel (2000) found that incorporating letters into phonological awareness training facilitated a larger transfer to reading and spelling than teaching phonological awareness without letters. Specifically, the panel demonstrated that effect sizes were almost twice as great when training incorporated letters compared to training that did not use letters.

Based on the current available literature, it is clear that phonological awareness abilities have a remarkable impact on decoding ability and later reading achievement. These results, however, must be interpreted cautiously because some researchers have suggested that not every student responds to group phonological awareness intervention equally (Torgesen & Davis, 1996). To illustrate, Lundberg et al. (1988) demonstrated large phonological awareness gains in their study, but subjects in the lowest quartile on pretest measures displayed little benefit from the instruction. Torgesen, Morgan, and Davis (1992) also illustrated this discrepancy when 30 percent of their at-risk kindergarten children failed to show the significant growth in phonological awareness and reading skills that the majority of the subjects displayed.

Phonics

Although phonological awareness abilities are obvious contributing factors related to reading achievement, they are not the only skills utilized when learning to read. Beginning readers need to develop foundational knowledge in concepts about print, phonological awareness, and letter names (Chall, 1996a, b). The construct of phonics, defined as the process of learning phoneme-grapheme correspondences and spelling

patterns, helps children use the alphabetic system to decode. The goal of phonics instruction is to help children acquire knowledge of the alphabetic system in order to read and spell words. Systematic instruction in phonics encompasses a variety of approaches (e.g., systematic, embedded, analytic) that employ sequential teaching and practice with phonic elements (National Reading Panel, 2000). Synthetic phonics teaches children to convert letters to sounds while analytic phonics focuses on using the word to analyze phoneme-grapheme relationships. Embedded phonics focuses on using sound-letter correspondences to write words. Furthermore, other approaches of systematic phonics instruction involve using context and familiar parts of words to recognize new words.

The National Reading Panel (2000), composed of several specialists in the area of reading, compiled results of studies investigating the effectiveness of systematic phonics instruction. A total of 38 studies with 66 treatment-control group comparisons were included in the report, and the majority of the studies (28) were conducted within the last ten years. Subjects included English-speaking children from different backgrounds and socioeconomic levels, and the studies encompassed several classrooms across the United States, which contained typical classroom teachers. The six possible outcome measures used to assess reading growth consisted of decoding real words, decoding nonsense words, word identification, spelling, comprehension, and oral reading accuracy, but few studies included all six outcome measures. To address questions regarding the impact of phonics instruction on reading growth, meta-analyses evaluating systematic phonics instruction as compared to no phonics instruction were conducted. Conclusions from the analyses provided strong support for systematic phonics instruction. For example, the report stated that reading growth, decoding, and reading comprehension were

significantly better with systematic phonics instruction, which contains instruction in correspondences between consonant letters and sounds as well as consonant and vowel digraphs, as opposed to a variety of non-systematic or non-phonics programs including basal programs, whole language approaches, and whole word programs. Furthermore, children that received systematic phonics instruction in kindergarten or first grade obtained larger gains in reading than children exposed to phonics instruction in second through sixth grade. Spelling skills were also significantly impacted by phonics instruction in kindergarten and first grade; however, children initially exposed to phonics instruction after second grade did not show significant differences in spelling growth.

Most studies included in the review by the panel consisted of synthetic phonics approaches that began by teaching a letter or letters that represented all 44 English phonemes. Furthermore, the synthetic programs that placed emphasis on converting letters (graphemes) into sounds (phonemes) had slightly greater effect sizes than larger unit phonics programs, but the two were not significantly different. In addition, some systematic approaches provide children with small books that carefully focus on the phoneme-grapheme correspondence taught.

While phonics instruction has been proven to be beneficial towards developing children's reading scores, it must be integrated into a balanced reading program containing other important reading instruction, such as phonological awareness and reading comprehension. For example, Dahl and Scharer (2000) found that phonics instruction alone did not teach first grade children the application skills needed to decode and encode unfamiliar words. Furthermore, a study conducted by Ball and Blachman (1991) found that letter-sound training alone was not sufficient in improving kindergarten

children's early reading skills; however, combining phonological awareness training with letter-name and letter-sound instruction produced an immediate impact on early reading and spelling ability. Blachman (1991) also concluded that phonological awareness intervention with sound-letter association increased kindergartners' performance on measures of phoneme segmentation, letter-sound knowledge, and reading.

Several different approaches to systematic phonics instruction have been developed by a number of professionals (National Reading Panel, 2000). For example, the Direct Instruction program initially teaches children letter-sound relations followed by decoding training that progresses from letter sounds to blending and then to context. The Lovett Direct Instruction teaches a left-to-right phonological decoding strategy by focusing on features of letters, providing visual cues, and connecting letters. The Lippincott Basic Reading Series teaches the alphabetic code by teaching one sound-letter correspondence at a time and instructing how to blend phonetically decodable words. Furthermore, the New Primary Grades Reading System for an Individualized Classroom teaches children how to decode words by individually pronouncing the letters in a word from left to right. The children are initially taught five sound-letter correspondences. Once they learn the letters, the children begin with blending two sounds and then add the third sound, a process called chain blending.

Stuart (1999) examined the effectiveness of two different systematic phonics approaches taught to at-risk kindergarteners for one hour per day for 12 weeks. Three teachers employed the Jolly Phonics program which focused on teaching five key areas of letter-sound relationship, letter formation, blending, identifying sounds in words, and irregular words using stories, pictures, and actions. Three other teachers used the Big

Book program, which drew the children's attention to written words in text and involved instruction with letters. Results from the study demonstrated that children in the Jolly Phonics program performed significantly better on measures of reading real and psuedowords. More importantly, though, the results illustrated that instruction in kindergarten is effective in boosting reading and spelling scores.

In a study by Blachman et al. (1999), classroom teachers provided inner-city children with low socioeconomic status with 11 weeks of phonological awareness training in kindergarten and systematic phonics instruction in first and second grade. A control group received the regular reading curriculum. The phonics instruction incorporated letter-sound correspondence into the "say it and move it" procedure and taught other phonics skills through analysis and blending, reading flash cards, reading phonetically controlled words, and writing to dictation. Results from the study indicated that children receiving the phonics training performed significantly higher than the control group in first and second grade.

Poor Readers

Most children with reading difficulties exhibit problems with decoding skills and/or listening comprehension. For example, research has demonstrated that many poor readers exhibit difficulties in storing and retrieving phonological memory codes as well as awareness of these codes. These phonological processing deficiencies hinder children's ability to decode words (Catts & Kamhi, 1999). Approximately 34% of poor readers, labeled as dyslexic, have good listening comprehension but exhibit difficulty with word recognition. As a result, these children are slow and inaccurate decoders, which influence their abilities with decoding and reading comprehension. An additional

37% of poor readers exhibit poor performance in word recognition and listening comprehension. These students are labeled as language learning disabled and have problems with reading comprehension. When compiling the profiles of children with language learning disability and dyslexia, approximately 70% of poor readers exhibit difficulty decoding and often display poor phonological awareness skills; they may also exhibit problems with sight word recognition or reading rate (Catts & Kamhi).

Intervention for Poor Readers

Reading Recovery

Since more than two-thirds of children with reading difficulties display problems in word decoding abilities, it is not surprising that special programs have been developed to help struggling readers overcome their decoding difficulties. Marie Clay developed a supplementary reading program, Reading Recovery, to provide struggling first grade readers with individually tailored reading instruction. Its initial implementation began in New Zealand, and the program expanded in other countries as well as several states within the United States (Lyons, Pinnell, & DeFord, 1993). Reading Recovery is designed to promote accelerated learning that allows first grade children functioning in the bottom 20 percent of their class to move toward average performance in a short amount of time (Swartz & Klein, 1997). Clay's theoretical model views reading as a psycholinguistic process, and, therefore, the components of the program include perceptual analysis, knowledge of print conventions, decoding, oral language, prior knowledge, reading strategies, metacognition, and error detection/correction strategies (Wasik & Slavin, 1993).

Reading Recovery teachers' education consists of 30 hours of initial training in addition to weekly inservice meetings for one year. The specially trained personnel provide one-on-one intervention to students for 30 minutes each day; however, the intensity of the program only allows teachers to provide services for one half of a day (Pinnel, 1991). The rest of the teacher's day is typically spent doing other tutoring or teaching (Shanahan & Barr, 1995).

Lessons in Reading Recovery typically include seven activities individually tailored to each student. First, the child rereads at least two familiar stories. Then, the Reading Recovery teacher records and analyzes the child's reading of a book introduced during the last session. Letter identification tasks are incorporated into the session if necessary. For example, boxes representing sounds or letters may be used. The next component requires the student to compose a story with guidance from the teacher. Upon completion of the story, the student rereads the composition several times. The story is then rewritten and cut-up by the teacher so that the student can reassemble the story correctly. After the writing task, the teacher introduces a new, challenging book that the student must read with at least 90 percent accuracy. The student is encouraged to talk about the pictures, use new, unfamiliar words evidenced in the book, and locate certain words containing specific letters. The final portion of the session is spent reading the new book (Pinnel, 1991). In the United States, the books are graded for difficulty levels in a range from 1 to 20 (Shanahan & Barr, 1995). During the session, the teacher keeps a Running Record on the student's ability to read each word in the texts. Reading Recovery's overall goal is to facilitate the use of meaning, syntax, and visual cues while

developing monitoring and searching strategies when reading (Dudley-Marling & Murphy, 1997).

Completion of the Reading Recovery program occurs when an acceptable reading level is achieved or when reasonable independence in reading is observed. A student may also be dismissed by surpassing an allotted time frame (Center, Wheldall, Freeman, Outhred, & McNaught, 1995).

Several researchers have examined the effectiveness of Reading Recovering for both short-term and long-term success. Pinnel, Lyons, DeFord, Bryk, & Selzer (1994) found that low-achieving first grade students who enrolled in Reading Recovery as opposed to other compensatory reading instruction yielded greater gains in reading performance. Furthermore, Shanahan and Barr (1995) compared five different studies to determine the effectiveness of the Reading Recovery program and found that first graders who successfully completed the program made dramatic progress in the areas of letter names, word reading, print awareness, writing, and phoneme representation. The study also found that Reading Recovery children made greater gains than their average classmates. Despite the fact that the program had positive outcomes for many low-achieving students, 10 to 30 percent of Reading Recovery students enrolled do not complete the program due to late enrollment, family relocation, or lack of progress.

Two studies have compared the traditional Reading Recovery program to Reading Recovery supplemented with phonological awareness training. A study by Hatcher, Hulme, and Ellis (1994) included seven-year-old children. The investigators added the phonological awareness skills of phoneme segmentation, blending, deletion, substitution, and transposition to the regular Reading Recovery curriculum. The students also learned

to apply sound-letter correspondences in writing and spelling tasks. Results from the study indicated that the group receiving Reading Recovery with phonological awareness performed better than the control group on measures of reading and spelling.

In a study by Iversen and Tunmer (1993), at-risk first graders received intervention that incorporated phonological awareness training into the Reading Recovery program. One group of students received the regular Reading Recovery program while another group received a modified Reading Recovery program with phonological awareness training. A third group served as the control. Children in the modified Reading Recovery group learned to make and break new words (e. g., and, sand, hand, band) using magnetic letter forms. They performed operations of adding, deleting, and substituting letters in reading and writing. Results indicated that students in both Reading Recovery groups increased their reading performance to levels that allowed them to exit the program. However, the modified Reading Recovery group reached the desired levels quicker than the regular Reading Recovery group; thus, the phonological awareness training improved the efficiency of the program.

Phonological Awareness: Instruction for Struggling Readers

Despite the fact that numerous studies have illustrated the effectiveness of phonological awareness intervention for normal children in the classroom, questions remain regarding the ability for children with reading difficulties to learn decoding skills. While some researchers have stated that it is difficult to teach phonetic decoding reading skills to these children (Lovett, Warren-Chaplin, Ransby & Borden, 1990; Lyon, 1985; Snowling & Hulme, 1989), other professionals have witnessed remarkable success in

building functional alphabetic reading skills (Alexander, Anderson, Heilman, Voeller, & Torgesen, 1991; Lovett, et. al., 1994).

Traditional phonological awareness programs have taught children by focusing on the acoustic/auditory properties of phonemes. As a result, the programs often consisted of tasks involving listening to sounds in words and segmenting, deleting, substituting, and blending sounds (Lewkowicz, 1980). While these programs have resulted in positive results, phonological awareness alone imparts certain complications because sounds within words are highly influenced by surrounding phonemes. Another complication is that individual phonemes are not acoustically perceived as single elements. Consequently, some researchers have attempted to incorporate other components that may play a role in helping children develop phonological awareness skills. Several studies have illustrated the positive influence that articulatory training has on expediting phonological awareness (Howard, 1988; Kennedy & Backman, 1993; Skjelfjord, 1976).

The Lindamood Phoneme Sequencing Program for Reading, Spelling, and Speech, formerly known as Auditory Discrimination in Depth (ADD), focused on developing kinesthetic or motoric awareness to facilitate phoneme perception and identification (Lindamood & Lindamood, 1998). The premise behind the program was that a deeper level of phonological processing is achieved when children learn the articulatory positions, movements, and feel associated with individual phonemes as opposed to auditory awareness alone. The program increased oral and phonological awareness by requiring participants to identify, classify, and label oral motor characteristics of speech sounds. Students used feedback from the ear, eye, and mouth to increase awareness, and the letter-sound correspondences were taught once articulatory

features were learned. Phonological awareness training consisted of tracking and sequencing speech sounds in words.

Several studies examining the ADD program's effectiveness have been conducted. For example, a study by Kennedy and Backman (1993) provided the ADD program and a comprehensive remedial program to ten learning disabled students between the ages of 11 and 17. The comprehensive remedial program focused on reading and spelling by teaching phonological awareness skills, sight words, orthorgraphic patterns, and sound-symbol correspondence. The results indicated that all of the learning disabled students exhibited significant gains on standardized reading and spelling measures; however, the ADD group's overall gains were not significantly different from the gains of the control group who exclusively received the comprehensive remedial program. The ADD group made significantly more gains on measures of phonological awareness and spelling.

Another study performed by Alexander, et al. (1991) examined the effectiveness of the ADD program children with for severe dyslexic decoding impairments. Ten subjects ranging in age from 7:9 to 12:9 were administered the ADD program. The average hours of training was 64, and the program was completed when each student finished all levels. Results from the study indicated that the ADD program was successful in improving all of the subjects' phonological awareness ability, as witnessed by perfect or near perfect scores on the Lindamood Auditory Conceptualization Test. Significant gains were present on the word identification and word attack reading measures, and all students tested within the normal range. Additionally, the students generalized their alphabetic reading skills when reading novel words. Despite their

notable gains, the authors concluded that the students' rate of decoding was probably slower than their average peers.

In a study conducted by Torgesen (2001), sixty children between the ages of 8 and 10 years with severe reading disabilities were provided with two different types of phonemically systematic, explicit reading instruction. Subjects included in the study were reported to have trouble with word-level reading skills, performed at least 1.5 standard deviations below the mean on the Word Attack and Word Identification subtests, had intelligence levels above 75, and performed below the minimum level on the Lindamood Auditory Conceptualization Test (Lindamood & Lindamood, 1979). The subjects were randomly assigned to an Auditory Discrimination in Depth (ADD) or embedded phonics (EP) instruction group, and intervention consisted of one-on-one 50 minute sessions twice a week until 67.5 hours of treatment were completed. Following the training, each participant received eight weeks of generalization training. Students in the ADD program received an instructional emphasis on phonemic awareness and phonemic decoding skills while the students in the embedded phonics program received intervention designed to instruct students to apply their phonological awareness and decoding skills when reading meaningful text. Initially, children in the ADD group displayed more improvement than those in the EP group on all reading measures; however, they did not keep pace with normal growth over time. While differences on some measures existed immediately following treatment, results from a two-year follow-up indicated that both the ADD and embedded phonics interventions provided equally effective instruction for the children. Reading rates for both groups were deficient at the 2-year follow-up, but accuracy performance on phonemic decoding, word reading, and

reading comprehension in short passages were within normal limits. Unfortunately, the interventions were only able to "normalize" the reading skills of one half to two thirds of the children, depending on the measure.

Phonics Instruction for Struggling Readers

Numerous studies have illustrated the importance of incorporating phonics instruction into reading intervention designed for at-risk or reading disabled populations. For example, the National Reading Panel (2000) reported that kindergarten and first grade disabled readers and at-risk children demonstrate significant benefit from systematic phonics intervention. However, children between second and sixth grade did not show a significant effect from phonics instruction, which may be attributed to comprehension problems or less intense instruction. In a study by Blachman et al. (1999), classroom teachers provided inner-city children of low socioeconomic status with 11 weeks of phonological awareness training in kindergarten, and systematic phonics instruction in first and second grade. Results from the study indicated that children receiving the phonics training performed significantly higher than the control group in first and second grade.

In addition, sixty-two nine-year old children with phonologically based reading difficulties were selected to participate in a study by Lovett et al. (1994). The subjects' ages ranged from 7 to 13 years, and each scored below the 25th percentile on four out of five reading measures. The study provided 35 hours of word identification training to randomly assigned students, with the first group receiving training in phonological analysis, blending skills, and letter-sound correspondences. The second group received training in a metacognitive phonics program that taught four word identification

strategies. Results indicated that both groups of children with reading disabilities improved speed and accuracy of word recognition skills. Not only were sizeable gains noted in word identification and word attack skills, but the significant improvement in speech- and print-based phonological processing deficits was more congruent with typically developing peers. The first group was able to transfer learned skills to regular words primarily through the phonetic route, while the second group showed improved ability in decoding difficult-to-decode words and exception words.

Students with Speech and/or Language Disorders

Several researchers have shown that children with language disorders often exhibit poor reading skills (Aram, Ekelman, & Nation, 1984; Gillam & Carlile, 1997; Menyuk & Chestnick, 1997). For example, a study conducted by Stark et. al. (1984) found that reading impairments were present in approximately 90% of children with language impairments. Investigations extended this finding by demonstrating that children with semantic-syntactic deficits (language impairment) have a higher risk of developing reading disabilities than children with articulation or phonology problems (Bishop & Adams, 1990; Hall & Tomblin, 1978; Levi, Capozzi, Fabrizi, & Sechi, 1982).

Further research has illustrated the impact of language impairment on reading achievement. Bishop and Adams (1990) examined the language and literacy skills of 83 8.5 year-old children who had language impairments prior to age 4 years. The study found that reading development was normal if normal language skills were exhibited by age 5.5 years. On the other hand, language impairments persisting past the age of 5.5 years were indicative of later reading difficulties. The study also demonstrated that mean

length of utterance at ages 4.5 and 5.5 years were good predictors of reading achievement at age 8 years.

A longitudinal study by Hall and Tomblin (1978), attained information regarding communication abilities and educational, social, and occupational status of 36 subjects. The 18 language impaired subjects and 18 articulation impaired subjects were evaluated 13-20 years after their initial contact. The results indicated important differences between language impaired and articulation impaired subjects. Specifically, language impaired subjects were more likely to have persistent articulation problems, less educational achievement, and poorer academic performance than the articulation impaired subjects.

Similar to the finding that students with language impairments often struggle with reading, numerous studies have indicated that children with speech and language disorders exhibit poor phonological awareness skills. For example, a study conducted by Bird, Bishop, and Freeman (1995) found that children between the ages of five and seven years with expressive phonological impairments scored significantly below normal peers on measures of phonological awareness and literacy. The children demonstrated difficulty segmenting and matching onsets and rimes even when the tasks were independent of verbal output. Likewise, Clarke-Klein (1991) found that children with severe speech-sound disorders exhibited more phonological deviations and performed more poorly on phonological awareness measures than their normal peers. Catts (1993) also demonstrated that children with speech-language impairments often exhibit deficiencies in phonological awareness skills by demonstrating that measures of phonological awareness and rapid-naming abilities predicted future reading outcome.

Boudreau and Hedberg (1999) performed a study comparing the early literacy skills of preschool children with specific language impairment to those of typically developing peers. The researchers found that the children with specific language impairment performed more poorly than their typically developing peers on early developing literacy skills such as rhyming, letter-name knowledge, letter-sound correspondences, retelling, and oral narratives.

Therefore, current research findings suggest that speech and/or language disordered children have an increased risk of experiencing difficulty with reading. These children often exhibit poor phonological awareness skills, which are highly correlated with early reading achievement. However, children must also understand sound-letter correspondences in order to decode. While these correspondences can be targeted through phonological awareness training emphasizing the sounds of the language, phonics instruction focusing on symbols that make sounds can also facilitate the development of phoneme/grapheme correspondences.

Role of the Speech-Language Pathologist

The American Speech-Language Hearing Association (ASHA) stated that speech-language pathologists can play a critical role and make a valuable contribution in the literacy development of children with or without communication disorders (ASHA, 2000). The position statement declared that "Difficulty in learning to read and write can involve any of the components of language—phonology, morphology, syntax, semantics, and pragmatics" (ASHA, 2000, p. 1). Furthermore, the statement recognized that speech-language pathologists possess knowledge that can assist with the prevention of reading failure. They should work with other professionals to develop programs such as

classroom phonological awareness training, and they should address written language for children on their caseload who experience little success with literacy skills (ASHA, 2000).

Reading Intervention for Children with Speech-Language Disorders

The positive impact of reading intervention for children with speech and language impairments has been documented by several studies. For example, Korkman and Peltomaa (1993) studied the impact of preventative treatment on preschool children with language impairments who were at risk for developing reading problems. The subjects included 26 male preschoolers, and the classroom treatment performed by a speech-language pathologist, preschool teacher, or psychologist consisted of phoneme awareness and grapheme-phoneme conversions on a two-letter syllable level. Following completion of the preventative intervention, students in the treatment group performed significantly better than the control group on measures of reading, spelling, and language skills at the end of the first grade year.

van Kleeck, Gillam, and McFadden (1998) also conducted a study that investigated the impact of classroom phonological awareness instruction on preschool children exhibiting speech and/or language disorders. Sixteen children with speech and/or language disorders were given 12 weeks of rhyming instruction in a fall semester and 12 weeks of phoneme awareness instruction in a spring semester that consisted of modeling, judging, matching, identifying, and generating initial and final sounds, blending sounds, and analyzing sounds. Graduate speech-language pathology students and teachers who were certified speech-language pathologists provided instruction in the classroom. Upon completion of the intervention, the children receiving phonological

awareness training performed well above the confidence interval of the control group on phoneme awareness skills.

In a study performed by Warrick et al. (1993), language-delayed kindergarten children were given phonological awareness training. The control groups consisted of 14 normal developing children and 14 language-delayed children. The treatment group consisted of 14 language-delayed students who received an eight week training program consisting of two 20-minute sessions per week. Instructional groups contained seven students each. The training included five minutes of word play that incorporated new goals or reviewed previous concepts. The next ten minutes were spent working on phonological awareness skills. Phonological awareness skills were targeted in the areas of syllable awareness, initial phoneme segmentation, rhyming, and phoneme segmentation (with use of blocks to represent each phoneme). Finally, the session concluded with five minutes of activities designed to review the targeted skills. Results indicated that only the training group of language-delayed children made significant gains on measures of repair, manipulation, rhyme, and final segmentation. Following intervention, the training group did not differ significantly from their normal peers, but did significantly differ from the language-delayed students who did not receive training. Furthermore, the differences between the normal and language-delayed control groups grew larger during pre- and post-testing. A one-year follow-up evaluation measuring skills of manipulation, rhyming, and segmentation indicated that the treatment group performed similarly to the normal control group on phonological awareness and real-word and non-word reading tasks. The language-delayed children who did not receive intervention performed significantly poorer than the other two groups. Overall, the study

illustrated that early phonological awareness instruction has a positive impact on future academic success in language-delayed children.

Similar findings were obtained in a study by Gillon (2000). Ninety-one reading delayed children from New Zealand were included in the investigation, ranging from five to seven years in age. Expressive phonological problems were present in 61 of the children, whereas 30 children exhibited normal developing speech and served as the control group. Children with phonological impairments evidenced no severe receptive language or cognitive delays and were divided into three groups: experimental intervention, traditional intervention control, and minimal intervention control. The experimental intervention consisted of 20 hours of integrated individual phonological awareness intervention that included rhyme, phoneme manipulation of sounds in isolation, initial or final phoneme identification, phoneme segmenting and blending without letters, grapheme-phoneme correspondences, and making words with letter blocks. In addition to the phonological awareness intervention, the activities integrated targets appropriate to the expressive phonological needs of each child. Next, the traditional intervention group received 20 hours of individual training in expressive phonological and language skills. The group learned to articulate sounds correctly using "the Van Riper method," which focuses on articulating a sound correctly in isolation, syllables, words, phrases, and sentences, respectively. Severely impaired children received the Nuffield Centre Dyspraxia Programme, which teaches basic placement and movements as well as coordination of speech sounds. Finally, the minimal intervention group received recommendations from a speech-language pathologist for improving speech production in the home and school environments. Results from the study

indicated that children in the experimental intervention group significantly outperformed the other two groups on measures of phonological awareness. As a result, they performed similarly to the normal control group. When compared to the traditional and minimal intervention groups, the experimental intervention group showed significantly better performance in word recognition, non-word decoding, and comprehension skills. Speech production improved for all three experimental groups; however, there was a trend for more improvement in the experimental intervention training group. Furthermore, five lower functioning children in the experimental intervention group were examined to illustrate phonological awareness intervention benefits. Four of the children displayed transfer effects to reading performance, and all of the children showed gains in speech production and phonological awareness. While these children were performing at the lower end of their group on reading skills prior to intervention, they performed at a level similar to their less severe peers following intervention.

A study performed by Hilgenberg (2000) investigated the effectiveness of individual phonological awareness training for three speech or language delayed children. During their kindergarten year, the subjects participated in classroom phonological awareness training, yet were still performing at a level at least two standard deviations below the class mean on the Phonological Awareness Literacy Screening (PALS) (Invernizzi & Meier, 1997). Subjects received a two-part training program that consisted of (1) phoneme awareness and letter-sound correspondence and (2) auditory phoneme blending and blending with letters. Three 40-minute sessions per week were provided during the summer between kindergarten and first grade years. Results indicated that training improved the accuracy of identifying phoneme-grapheme correspondences. In

addition, the study found that blending exercises improved single word decoding performance.

Summary and Statement of Objectives

Children with speech and/or language disorders are at risk for developing adequate reading skills. Similarly, children with communication impairments often exhibit poor phonological awareness skills. Since the current available literature clearly demonstrates that phonological awareness and phonics abilities have a remarkable impact on decoding ability and later reading achievement, it is not surprising that numerous studies have demonstrated significant gains in reading scores for normal and speech/language impaired children following intervention.

Speech-language pathologists possess a unique knowledge that can be beneficial when carrying out their role in the prevention and remediation of language-based reading difficulties (ASHA, 2000). While professionals must concern themselves with targeting speech and/or language goals, they must also consider that delaying special reading intervention to children already at risk for reading failure may hinder future language abilities, a phenomenon known as the "Matthew Effect" (Stanovich, 1986). If these children are not systematically taught to read, they will most likely fall further and further behind in reading and language development, and may also develop a negative attitude towards reading (Gillon, 2000). If time for speech-language and literacy goals is not sufficient, delaying speech-language goals in light of gaining purposeful reading skills in first grade warrants careful consideration (Schuele, 2001).

If speech-language pathologists are going to address literacy with struggling readers on their caseloads, they should try to collaborate and coordinate services with

other professionals, such as learning disabled teachers or Reading Recovery teachers, who may be already working with at-risk or struggling students. One of the possible professionals, Reading Recovery teachers, receives special training in a framework for whole language approaches and general reading instruction. Their services provide children with several opportunities to experience reading and develop appropriate reading strategies in a variety of contexts. The traditional instruction often includes elements of phonics instruction, but individual sessions focus on remediating confusion and frustration associated with reading tasks (Hicks & Villaume, 2000).

Classroom teachers may be effective in teaching phonological awareness skills to most children, but speech-language pathologists and Reading Recovery teachers may also play an important role in the remediation of children's reading disorders. Cooperative efforts between professionals can facilitate a transdisciplinary approach for children with reading difficulties that will allow numerous opportunities for support and carryover of newly learned reading skills. Each professional possesses areas of expertise that have been proven to help build reading skills for children struggling with reading. Therefore, professionals need to systematically coordinate an agreed upon set of goals to effectively accommodate communication impaired children with reading difficulties.

Research results indicate that instruction in both phonological awareness and phonics are effective strategies for remediating reading difficulties (Ball & Blachman, 1991; Blachman, 1991; Calfee & Norman, 1998; Dahl & Scharer, 1999). However, the "best" method for teaching phonological awareness and phonics skills to children at risk for reading disabilities is yet to be determined.

Multiple professionals may intervene with children who are failing in reading. Unfortunately, only a handful of studies have specifically looked at phonological awareness training or a combined phonological awareness-phonics approach for children exhibiting communication disorders (Gillon, 2000; Hilgenberg, 2000; Korkman & Peltomaa, 1993; van Kleeck et al., 1998; Warrick et al., 1993). These studies have illustrated improved performance with intervention. Two of these studies (Korkman & Peltomaa, 1993; van Kleeck, et al., 1998) were conducted with preschoolers before they experienced reading failure. Warrick et al. only included children with language delays and did not incorporate letters into the phonological awareness training. On the other hand, Gillon only included subjects with expressive phonology disorders, and speech-language pathologists provided the intervention. Hilgenberg (2000) evaluated the effectiveness of individual phonological awareness training for children who participated in previous classroom phonological awareness intervention, but realized minimal benefit from the training. The program focused minimally on phonics principles and was performed by a graduate student enrolled in Communication Disorders and Sciences at a University Clinic. The benefits of reading intervention incorporating phonological awareness and phonics training to children with speech and/or language disorders who have failed to make sufficient progress in classroom-based phonological awareness instruction in kindergarten are currently unclear. In addition, studies performed in the school setting by speech-language pathologists and other reading professionals are lacking.

The purpose of the present study is to determine the effects of individual phonological awareness and phonics training by speech-language pathologists and a

Reading Recovery teacher in the school setting. The training will emphasize auditory, motoric, and alphabetic properties of phonemes for three children with communication disorders who did not make substantial gains following a kindergarten classroom phonological awareness intervention program. The individual phonological awareness program will contain three parts: (1) phonological awareness, (2) phoneme-grapheme correspondence, and (3) decoding and spelling. The specific research questions are as follows:

1.) When verbally presented with individual sounds, does the correct production of a word significantly improve with individual phonological awareness training for three subjects with communication impairments?
2.) When verbally presented with a word, does the correct production of individual sounds significantly improve with individual phonological awareness training for three subjects with communication impairments?
3.) Does the accuracy of identifying sound-letter correspondences significantly improve with individual training emphasizing the acoustic, motoric, and symbolic properties of phonemes for three subjects with communication impairments?
4.) Does the accuracy of single word decoding significantly improve with individual decoding training emphasizing the acoustic, motoric, and symbolic properties of phonemes for three subjects with communication impairments?
5.) Does the accuracy of single word spelling significantly improve with individual decoding training emphasizing the acoustic, motoric, and symbolic properties of phonemes for three subjects with communication impairments?

CHAPTER III

Method

Subjects

Subjects who participated in the study included three first grade students from Shelbyville Elementary School in Shelbyville, Illinois. Prior to the study, four kindergarten classrooms received classroom phonological awareness training throughout the school year. Two speech-language pathologists provided the instruction. Each teacher worked with one of the two speech-language pathologists, and the training was provided for twenty minutes three times a week. The program was implemented in the 2000-2001 school year and taught early developing phonological awareness skills including rhyme, syllable segmenting, syllable counting, initial phoneme identification, and final phoneme identification in the fall semester. The spring semester introduced phoneme blending and segmenting. Phoneme-grapheme correspondences were incorporated with the phonological awareness training during the second semester of implementation. Teachers focused on one letter-sound correspondence each week as part of reading instruction throughout the school year.

All students from the four kindergarten classes that received classroom phonological awareness training were administered a phonological awareness pre-test developed by the two speech-language pathologists. The measure was re-administered at the completion of the kindergarten program. Following intervention, the Phonological Awareness Literacy Screening (PALS) (Invernizzi & Meier, 1997) was administered by graduate students in speech-language pathology in May 2001 to assess the phonological awareness skills of the students. The total points possible was 112, while the class mean

was 82 with a standard deviation of 20. Three students with speech and/or language disorders were identified as performing at least 1.5 standard deviations below the class mean (below 52) on the PALS. Results are listed in Table 2. The three students were invited to participate in an individual phonological awareness intervention program at the Shelbyville Elementary School during the fall 2002 semester.

Table 2

Subjects' Raw Scores on the PALS

Subtest	Subject A	Subject B	Subject C
Rhyme	10/10	10/10	7/10
Initial sound	5/10	4/10	4/10
Alphabet	18/26	10/26	16/26
Letter-sound	14/26	0/26	7/26
Spelling	1/20	0/20	2/20
Word recognition	0/20	0/20	0/20
Total	48/112	24/112	36/112

Subjects who qualified for participation in the study were given a research participation authorization form to take home to achieve parental consent (Appendix A). The form explained the general purpose of the research study as well as the professionals involved in planning and executing the training program. The parents were asked to complete, sign, and return the form, verifying their agreement for their child's participation in the study. All subjects returned signed permission slips.

All subjects were native English speakers with normal visual, auditory, and motor abilities. The three subjects were diagnosed with speech or language delays and received pull-out speech therapy for communication deficits during their kindergarten year; however, no individual intervention for phonological awareness had previously been provided. Subject A was diagnosed with an expressive language delay, Subject B was diagnosed with an articulation delay, and Subject C was diagnosed with receptive and expressive language delays with memory deficits.

To obtain baseline data regarding general speech and language performance and reading skills, the subjects were given a battery of tests during the week of September 13 to September 21. The Peabody Picture Vocabulary Test-Third Edition (PPVT-IIIA) was administered to evaluate comprehension of basic single word receptive vocabulary (Dunn & Dunn, 1997). The Test of Language Development 3rd Edition (TOLD-3) was administered to assess receptive and expressive language development (Newcomer & Hammill, 1997). The Goldman-Fristoe Test of Articulation-2 (GFTA-2) was administered to assess the subjects' articulation capabilities (Goldman & Fristoe, 2000). The fourth measure, the Phonological Awareness Test (PAT) was administered to evaluate initial performance in multiple areas and skill levels of phonological awareness (Robertson & Salter, 1997). The Ekwall Shanker Reading Inventory (ESRI) subtests Test 1: San Diego Quick Assessment and Test 2: Reading Passages were administered to assess reading performance (Ekwall & Shanker, 2000).

Table 3 presents a summary of standardized test results for Subjects A, B, and C. Subject A was diagnosed with an expressive language delay. He was 7-5 at the time of initial testing. Subject A performed within normal limits on the PPVT. The raw score

was 87, standard score 90, percentile rank 25, and age-equivalency was 6-6. Subject A exhibited 5 areas of deficits (greater than one standard deviation below the mean) on the TOLD-3. Scores for the following subtests were as follows: picture vocabulary = 6, oral vocabulary = 7, grammatic understanding = 8, sentence imitation = 7, and grammatic completion = 8 (mean = 10). The spoken language composite score was within normal limits at 86. The GFTA-2 revealed no articulation errors, a standard score of 110, percentile rank above 69 and an age-equivalency of 7;8. Scores on the PAT revealed below average performance in phonological awareness. Total test scores were as follows: raw score 100, standard score 71, percentile rank 5, and age-equivalency 6-0 (see Table 4 for PAT subtest scores). Finally, results from the ESRI revealed a limited ability in reading age-appropriate words. Subject A read 1 word from the graded word list and 3 different words out of 31 words from a first grade level reading passage. When a grade level paragraph was read to him, he was able to answer 6 of 10 comprehension question about the paragraph.

Table 3

Standard Score Test Battery Results for Standardized Tests

Test	PPVT	TOLD-3	GFTA-2	PAT
Subject A	90	86	110	71[a]
Subject B	99	96	65[a]	77[a]
Subject C	89	68[a]	103	below norms[a]

[a] One standard deviation or greater below mean.

Table 4

Pre-test Scores on the Phonological Awareness Test

Subtest	Possible points	Subject A		Subject B		Subject C	
		Raw	**SS**	Raw	**SS**	Raw	**SS**
Rhyming	20	20	**110**	10	**81**	16	**96**
Segmentation	30	16	**86**	17	**98**	4	*
Isolation	30	15	**71**	0	*	9	**69**
Deletion	20	13	**91**	9	**88**	5	**67**
Substitution	20	1	**72**	3	**89**	**7**	**100**
Blending	20	17	**94**	10	**77**	9	**67**
Graphemes	58	18	**62**	5	**70**	9	**63**
Decoding	80	0	*	0	*	0	*
Total Test	278	100	**71**	54	**77**	59	*

Note. SS = Standard Score.

* Standard Score is below norms.

A summary of standardized test results for Subject B is listed in Table 3. Subject B was diagnosed with an articulation delay and was 6-5 at the time of testing. Subject B performed within normal limits on the PPVT. The raw score was 84, standard score 99, percentile rank 47, and age-equivalency was 6-4 while chronological age was 6-5. Below normal abilities were identified on the TOLD-3 in the areas of relational vocabulary 7, oral vocabulary 7, and sentence imitation 8 (mean = 10). However, the spoken language composite score was within normal limits at 96. The GFTA-2 identified 27 articulation

errors, a standard score of 65, percentile rank of 5 and an age-equivalency of 3;2 while chronological age was 6-5. Sounds in error were as follows: initial position /g, d, l, r, θ, ð/, medial position /g, k, ŋ, θ, ð/, final position /g, k, l/ and blends bl, fl, fr, gl, gr, kl, kr, kw, pl, sl and sw. The subject was stimulable for /d, g, k/ and had liquid coloring for /l/ and /r/ in all positions. The PAT revealed below normal performance in phonological awareness. Total test scores were as follows: raw score 54, standard score 77, percentile rank 6, and age-equivalency 5-1. Results from the ESRI revealed a limited ability in reading age-appropriate words. Subject B read zero words from the graded word list and zero out of 32 words from a first grade level reading passage. When a grade level paragraph was read to him, he was able to answer 7 of 10 comprehension questions about the paragraph.

Standardized test results for Subject C are listed in Table 3. Subject C was diagnosed with receptive and expressive language delay with a memory deficit. He was 6-6 at the time of the initial evaluation. Subject C performed within normal limits on the PPVT. Subject C received a raw score of 74, standard score of 89, percentile rank of 23, and age-equivalency of 6-8. Results from the TOLD-3 revealed 5 areas of deficits. Scores below average included the subtests of picture vocabulary = 6, relational vocabulary = 2, oral vocabulary = 3, sentence imitation = 6, and grammatic completion = 5 (mean = 10). A standard score of 68 on the spoken language composite score was significantly below average language performance. Four errors on the GFTA-2 were present and resulted in a standard score of 103, percentile rank of 39 and an age-equivalency of 5;6. Sounds in error included initial /z/, medial /θ/, final /θ/, and the blend /pl/. Phonological awareness performance as measured by the PAT was significantly

impaired. A raw score of 59 was achieved for the total test with an age-equivalency of 5-3. Scores were too low to obtain a standard score and percentile rank. Subject C demonstrated a limited reading ability as measured by the ESRI. Subject C read 1 word from the graded word list and 1 different word (e.g., "the" appears more than once in the passage) out of 32 words from a first grade level reading passage. When a grade level paragraph was read to him, he was able to answer 5 of 10 comprehension questions.

All subjects participating in the study had normal cognitive functioning with no deficits other than the previously mentioned speech and/or language impairments. The students did not have learning disability labels and did not receive special reading instruction (Reading Recovery/Title I) during the study.

Intervention Design and Procedure

A single subject multiple probe baseline across behaviors design was used to evaluate the effectiveness of intervention. Phonological awareness ability is highly correlated with later reading achievement, and instruction in phonological awareness has been proven to be effective in advancing the reading skills of normal and speech-language impaired children (Bradley & Bryant, 1983, 1985; Gillon, 2000; Hilgenberg, 2000; Korkman & Peltomaa, 1993; Lundberg, et al., 1988; Warrick, et al., 1993). Researchers have also demonstrated that sound-letter correspondence knowledge and phonics instruction positively contribute to reading performance when paired with phonological awareness training (Adams, 1990; Ball & Blachman, 1988; Blachman, 1991; Bradley & Bryant, 1985; National Reading Panel, 2000). These findings provide the foundation of the training program provided to the subjects in the study. The three-

part training program consisted of (1) phonological awareness, (2) phoneme-grapheme correspondence, and (3) decoding and spelling (blending).

Table 5 illustrates the structure and progression of the individualized phonological awareness program. A detailed description of the training procedures is listed in Appendix B.

Subjects received individual treatment three times a week for 30 minutes. Two sessions per week were conducted by a speech-language pathologist, and one session per week was conducted by the Reading Recovery teacher. The treatment program was originally intended to be implemented for eight weeks by the speech-language pathologists and Reading Recovery teacher. The first eight weeks were conducted as planned. The program was extended to ten weeks to provide an appropriate amount of Behavior III training for research/results purposes. Therefore, the remaining treatment sessions were conducted by the speech-language pathologists and a graduate student in speech-language pathology. The researcher collected baseline data three times before treatment began and weekly data each Friday until completion of treatment.

Behavior I: Phonological Awareness

Response Measure

Later developing phonological awareness skills of blending and segmenting phonemes served as the response measures. The blending dependent variable was the correct production of a CVC word when verbally presented with three phonemes separated by a one second pause between each phoneme. The segmenting dependent variable was the correct production of segmented phonemes when verbally presented with a CVC word. For data collection purposes, five CVC words for blending and five

CVC words for segmenting were randomly drawn from a pool of 60 untrained words. Each consonant phoneme in a CVC word had three possible points to be awarded. Accuracy of place, manner, and voicing were each worth one point. Correct production of vowels was awarded three points; incorrect productions received a score of zero. For Subject B, stimulable articulation errors /d, k, g/ were briefly produced (e.g., "Say the /d/ sound") prior to data collection to review correct articulation. During data collection, incorrect productions of these phonemes were scored according to place, manner, and voicing as described earlier. Distorted liquids /l, r/ were counted as correct because the subject used identifiable coloring. Total accuracy was calculated by dividing the number of points awarded to each subject by the total number of possible points. A percent accuracy of at least 75 percent in blending and segmenting in phonological awareness skills was required before a subject began the phoneme-grapheme correspondence portion of the program.

Table 5

Training Procedures

Behavior I: Phonological Awareness

1. Initial Consonant Sounds
2. Final Consonant Sounds
3. Phoneme Blending-onset-rime, CV, VC, CVC
4. Phoneme Segmenting

Behavior II: Phoneme-grapheme Correspondence

1. Introduce 2 phoneme-grapheme correspondences per session, one at a time

2. Introduce unknown phoneme-grapheme correspondence
    a. acoustic/articulatory postures
    b. tactile feedback from subject about how the sound feels
    c. further elaboration and vocal practice
    d. use of a mirror
3. Discriminate targeted sound from other sounds
4. Introduce the letter that corresponds to the sound
    a. Letter tiles
    b. My "S" Soundbox books
    c. Practice writing the letter
5. Identify pictures containing the sound
6. Games utilizing targeted phoneme-grapheme correspondences (e.g., Memory, Go Fish, etc…)

Behavior III: Decoding and Spelling

Decoding

1. Letter tiles representing one picture (choice of 5)
2. Use train cars to segment sounds after the word has been identified
3. Decode words on note cards
4. Little Books to further target difficult phoneme-grapheme correspondences

Spelling

1. Verbal presentation of CVC word with train cars and letter tiles as cues
    a. Segmentation
    b. Phoneme-grapheme correspondence

2. Fade use of train cars and letter tiles as skill is learned

---

Treatment: Phonological Awareness

Four types of phonological awareness skills were taught sequentially. A detailed description of training procedures is listed in Appendix B. First, the subject learned to identify initial consonant sounds. The instructor introduced initial sounds by asking the child to listen to auditory models of words while emphasizing the first sound of the word. The subject was shown a series of four picture cards and was asked to point to the picture that started with a certain sound. The subject was also required to provide the initial sound of words verbally presented by the instructor.

Second, the subject learned to identify final consonant sounds. The same procedures outlined above for identification of initial consonant sounds was followed with attention to the final sound in words rather than initial sound.

Blending phonemes together comprised the third portion of phoneme awareness training. Pictures utilized previously during initial and final sound training were presented to the subject in groups of five cards. Initially, the instructor said the onset separate from the rime (e.g., t...op). The subject was required to blend the onset and rime together and match the word with a corresponding picture. Picture cues were then progressively removed. Next, the instructor said the individual phonemes in a two phoneme word (CV or VC) and asked the subject to blend the sounds. To increase difficulty, the child progressed to blending three sounds (CVC).

The fourth part of the phoneme awareness training required subjects to segment two- and three-phoneme words, respectively. The instructor showed the child a picture

card previously introduced and the subject was asked to say the individual sounds that made up the word. Two or three colored blocks and a three-car train were used as visual aids during training, and the instructor provided examples as necessary.

The researcher provided training materials to the speech-language pathologists and Reading Recovery teacher. Materials consisted of 60 note cards containing pictures corresponding with Behavior I CVC words, three colored wooden blocks, and three train cars. The format of sessions remained consistent throughout the phonological awareness training. Once all four tasks were introduced, the instructor used his or her best judgment to review concepts throughout intervention until the child reached the 75 percent criterion for blending and segmenting at the time of end of the week (i.e., Friday) data collection.

Behavior II: Phoneme-Grapheme Correspondence

Response Measure

The dependent variable was correct production of a sound when given a letter. Each subject was taught all unknown consonant alphabet correspondences. Vowel sounds included only short sounds /æ, ɛ, ɪ, a, ʌ/ . A random order of ten phonemes was presented at each baseline segment. There was a possibility of three points awarded for each phoneme. One point was awarded for place, manner, and voicing of articulation. Each vowel was given a score of three if correct, and zero if incorrect. Total percent accuracy was calculated by dividing the number of points scored by each subject by the total number of possible points. A percent accuracy of at least 75 percent in phoneme-grapheme correspondence in two measures with clinician judgment of mastery was required before a subject began the decoding/spelling portion of the program.

Experimental Conditions

Baseline data was collected once each week while phonological awareness treatment was being provided (Behavior I). Weekly measures of phoneme-grapheme correspondence continued throughout Behavior II treatment as well as Behavior III treatment.

Treatment: Phoneme-Grapheme Correspondence

The researcher re-tested all phoneme-grapheme correspondences one week prior to Behavior II intervention to determine known and unknown phoneme-grapheme correspondences for each subject. Unknown phoneme-grapheme correspondences included any responses that were not 100% accurate. The number of unknown phoneme-grapheme correspondences for each subject were as follows: Subject A, 18; Subject B, 22, Subject C, 15. Each subject received treatment for all unknown consonant and/or vowel phoneme-grapheme correspondences in addition to the five lax vowels /æ, ɛ, ɪ, a, ʌ/. Consonants were presented in random order; vowels were randomly interspersed within the consonants. Two new phoneme-grapheme correspondences were introduced each session, and previously introduced targets were reviewed.

A detailed description of phoneme-grapheme correspondence training procedures is listed in Appendix B. Each Behavior II session began with the introduction of a new sound (phoneme) until all phonemes were introduced. To introduce a phoneme, the instructor described the acoustic properties and articulatory posture. The subject was then asked to produce the phoneme and describe how his/her mouth felt when producing the targeted phoneme. The clinician and subject then engaged in practicing and explaining the phoneme. Further description from the instructor incorporated the

subjects' reflections about the phoneme. A mirror was also available to discuss visual articulatory posture.

After introducing the phoneme, the child was required to auditorily and visually discriminate the target phoneme from other phonemes. The clinician produced and mouthed the sound clearly so that the articulatory posture was as visible as possible. The subject determined if the target phoneme or a different phoneme was produced by focusing on the clinician's mouth posture and verbal production.

Once a phoneme was introduced, the clinician introduced the letter (grapheme) that corresponded with the sound (phoneme). Then, the instructor and subject read a book containing several examples of the target phoneme (e.g., My S Sound Box) (Moncure, 1979). The instructor asked questions regarding the words in the book (e.g., Did you hear any words that began with the /s/ sound?). A written model was available so the subject could practice writing the letter and saying its corresponding sound.

Following the book activity, the subject separated picture cards according to the presence or absence of the target phoneme/grapheme correspondence. Picture cards were drawn from piles with phoneme-grapheme correspondences previously known, previously taught, or currently targeted. The instructor said the word and asked the child if the word contained the target sound. Games such as Go Fish and Memory were used to practice and review the skill.

The format of the sessions remained consistent throughout the phoneme-grapheme correspondence training. The researcher provided wooden blocks, letter tiles, alphabet paper, and 60 note cards containing pictures of CVC phonetically decodable

words for treatment materials. My "S" Soundbox books were provided by the researcher and one of the speech-language pathologists.

Behavior III: Decoding and Spelling

Response Measure

The dependent variable for decoding was correct production of a word when presented with a note card containing a phonetically decodable CVC word. Five note cards were randomly selected from a pool of 60 untrained consonant-vowel-consonant (CVC) (e.g., can, top) words. The subject was allowed an unlimited amount of time to make a required attempt before moving on to the next word.

The dependent variable for spelling was correct spelling of a phonetically decodable CVC word when verbally presented with the word. Again, the child was allowed an unlimited amount of time to perform the spelling task. Five words selected from the pool of 60 untrained words were used for the task. The subject was provided with a sheet of lined paper containing the upper and lowercase letters of the alphabet in the top margin. The instructor told the child to look and listen for the sounds in the words, and the words were presented without emphasis or hesitation on the individual sounds. Then, the subject wrote every sound heard in the presented word. The subjects were given the opportunity to hear the word a maximum of three times. Furthermore, the subjects were required to make an attempt before moving on to the next word.

The decoding and spelling variables were scored using similar criteria. A possibility of three points was awarded for each consonant sound/letter, with one point each being awarded for the correct place, manner, and voicing of articulation. Therefore,

each correct consonant had a total value of three points. Correct vowels received a score of three points while incorrect vowels received a score of zero.

Experimental Conditions

Baseline measures for decoding and spelling were recorded once each week during phonological awareness and phoneme-grapheme correspondence training (Behaviors I and II). Weekly measures were also collected during Behavior III treatment. Once the previously specified criterion levels for Behaviors I and II were met, decoding and spelling treatment began.

Treatment: Decoding and Spelling

Decoding and spelling tasks were incorporated into game activities. The tasks progressively increased in difficulty. Furthermore, words appearing in training sessions were not used during baseline collection or weekly measurements. A detailed description of decoding and spelling training procedures is listed in Appendix B.

First, the instructor presented the child with three letter tiles. The subject was asked to say the sounds associated with the letters, and then he or she blended the sounds together to form a word that matched a corresponding picture card from a group of five picture cards. Pictures were gradually faded as the child gained confidence. Next, the instructor required the child to say the word and slowly move his fingers across a visual cue (e.g., train, letter tiles) as the phonemes were spoken. After blending the word, the instructor asked the child to segment the word into its individual sounds. Next, the instructor presented the child with cards containing phonetically decodable CVC words. The child was then asked to read the words by thinking of the associated sounds with the letters. During the final session of decoding training, the instructor and child read

Decodable Little Books (McCormick, 2000), which contain phonetically decodable words.

During the spelling portion of training, the instructor taught the subject to spell words by listening and thinking about the sounds in the words. The child was asked to spell a verbally presented word, and the instructor reminded the student to listen to the sounds and remember the letters that were associated with the sounds. Visual aids, letter blocks and a three-car train, were used initially to facilitate correct spelling. As the child progressed in ability, the aids were removed.

Sixty picture note cards corresponding with Behavior III CVC words, and 60 note cards containing Behavior III CVC words were provided to the instructors. The researcher also provided Decodable Little Books. The format of the sessions remained consistent throughout training.

Treatment Validity/Consistency

To ensure treatment validity and consistency throughout the training program, the investigator provided an initial training session for intervention procedures. All instructors attended a meeting in which treatment procedures and data collection were discussed. In addition, the instructors were given the opportunity to contact the investigator if questions arose. All treatment materials were developed and provided by the researcher. The researcher also conducted weekly visits during the program implementation to collect data, ensure program consistency, and answer questions. Three therapy sessions were observed by the researcher during the study. Two sessions were performed by a speech-language pathologist and one session was performed by the Reading Recovery teacher. During the observation, the researcher provided feedback and

demonstration of treatment procedures. Further explanation, clarification, and demonstration of therapy procedures was provided when needed or requested. Treatment implementation was discussed at least weekly.

Reliability

For reliability purposes, a second scorer listened to audiotape recordings of the subjects and re-scored 10 percent of the weekly measurements. Point by point reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements. Interjudge reliability was 94 percent for blending and segmenting, 100 percent for phoneme-grapheme correspondence, and 95 percent for decoding and spelling. In addition, the researcher re-scored 10 percent of the weekly measurements and had an intrajudge reliability of 99 percent for blending and segmenting, 100 percent for phoneme-grapheme correspondence, and 99 percent for decoding and spelling.

CHAPTER IV

Results

The purpose of the current study was to determine the effectiveness of individual phonological awareness training program for first grade children with speech and/or language impairments who participated in a whole-class kindergarten phonological awareness training program with little benefit. More specifically, the present study investigated the effectiveness of phonological awareness training, letter-sound correspondence training, and decoding and spelling training.

The subjects included three children with speech and/or language deficits. All subjects received ten weeks of individual therapy that consisted of three sessions per week for 30 minutes each. Certified speech-language pathologists provided therapy for two sessions per week while a Reading Recovery teacher provided therapy for one session per week. A graduate student in speech-language pathology replaced the Reading Recovery teacher and provided therapy for one session each week during the final two weeks of the program.

Behavior I: Phonological Awareness

Three daily baselines were collected before beginning Behavior I treatment. Once Behavior I treatment began, data were taken weekly by the investigator. Eight weekly phonological awareness measurements were obtained for Subjects A, B, and C throughout the study. The measure was the percent accuracy for phoneme blending and the percent accuracy for phoneme segmenting. One point was awarded for each correct place, manner, and voicing of the consonant phoneme with a total possible point value of three per consonant phoneme. A correct vowel was awarded three points while an

incorrect vowel was awarded zero points. Blending and segmenting baseline tasks consisted of five CVC words; thus, each word was worth eight points. One bonus point was awarded for each CVC word blended or segmented correctly with no errors and no addition of sounds. Therefore, the blending and segmenting baseline tasks were each worth 50 points ([3 points x 10 consonant phonemes] + [3 points x 5 vowels] + [1 bonus point x correct response]). The percent accuracy was calculated by dividing the number of points scored by the number of possible points.

Results indicate that individual phonological awareness training was effective in teaching phoneme blending and segmenting tasks. The magnitude of improvement in phonological awareness skills was different for each subject, as each student began treatment with different abilities. Subjects first learned identification of initial and final consonant sounds and then progressed into blending and segmenting skills. Subject A reached part of the phonological awareness criterion (75% accuracy in blending and segmenting) prior to initial training. Blending skills were above the criterion; however, segmenting skills were substantially lower. Therefore, treatment of Behavior I was continued to insure that phonological awareness skills were learned, with a total of nine Behavior I treatment sessions. Subject A's initial daily baselines ranged from 66.0% to 92.0% in phoneme blending and 24.0% to 30.0% percent in phoneme segmenting before Behavior I treatment. Scores improved with treatment and ranged from 74.0% to 100% in phoneme blending and 30.0% to 100% in phoneme segmenting. The higher, more consistent measurements following Behavior I treatment indicated that phoneme segmentation skills improved. Figure 1 illustrates Subject A's phonological awareness

measures before, during, and after treatment. See Appendix C for all percentage measurements of Behavior I, II, and III for all subjects.

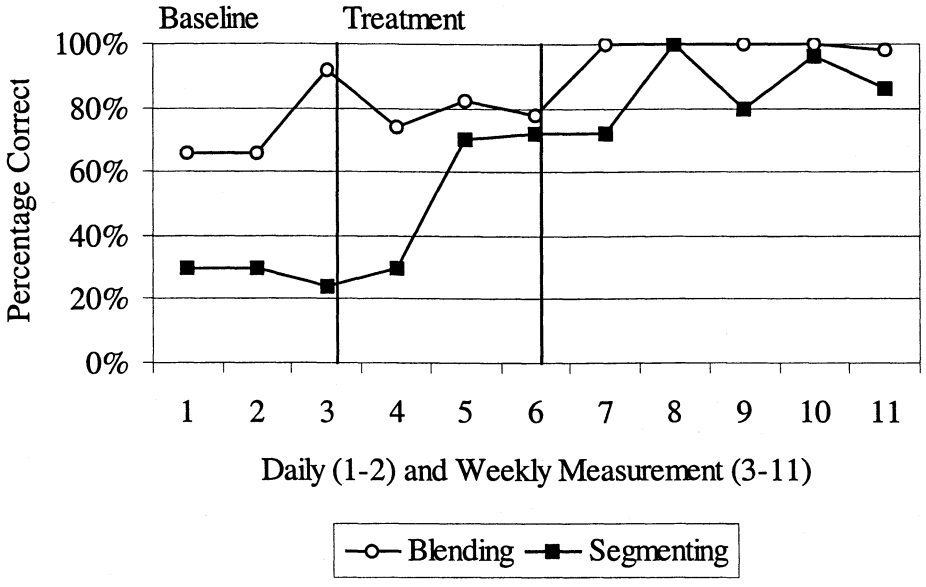

Figure 1. Subject A blending and segmenting measurements.

Subject B completed eight sessions of phonological awareness training as determined by the previously stated criterion with pre-treatment daily baselines ranging from 14.0% to 72.0% accuracy for phoneme blending and 0.0% to 36.0% accuracy for phoneme segmenting. Figure 2 illustrates Subject B's performance before, during, and after phonological awareness treatment. Following Behavior I treatment, Subject B improved accuracy of blending and segmenting tasks by consistently scoring above 80% accuracy following treatment. Therefore, Subject B learned phonological awareness skills because consistency and improvement in scores occurred.

Eleven sessions of phonological awareness training were provided to Subject C to follow criterion guidelines and insure learning of the phonological awareness skills (see

Figure 3). Pre-treatment baselines ranged from 12.0% to 44.0% accuracy for phoneme blending and 0.0% to 36.0% accuracy for phoneme segmenting. Behavior I measures during and post-treatment had accuracy ranges of 44.0% to 100.0% for blending and 30.0% to 86.0% for segmenting. Daily measurements, which were not included in the figures, were taken prior to each session by the speech-language pathologist or Reading Recovery teacher. Although Subject C's accuracy did not reach the 75% criterion on Friday measures during weeks 4 through 7, he did meet the 75% criterion on 2 days when the speech-language pathologist and Reading Recovery teacher collected data. Therefore, Behavior I treatment terminated and the next portion of the program commenced. Subject C demonstrated consistently higher scores following the treatment phase, but inconsistent performance was noted throughout the study due to subject characteristics of memory impairment.

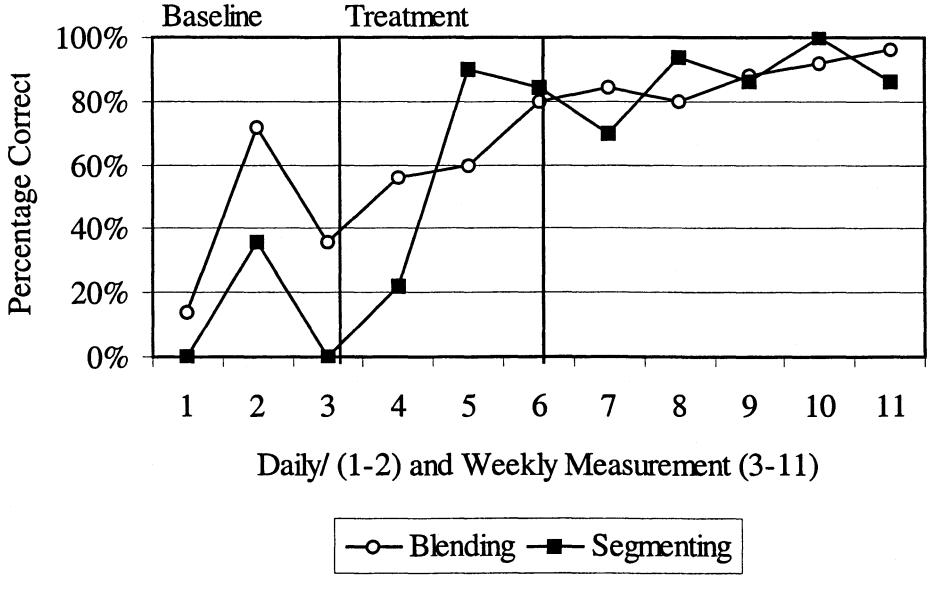

Figure 2. Subject B blending and segmenting measurements.

Behavior II: Phoneme-Grapheme Correspondence

Baseline data for Behavior II were obtained weekly during Behavior I treatment. A total of nine weekly measurements for Behavior II were obtained for Subjects A, B, and C, throughout the study. The measure was the percent accuracy for letter-sound correspondence. One point was awarded for each correct place, manner, and voicing of a consonant phoneme with a total possible point value of three per consonant phoneme. A correct vowel was awarded three points while an incorrect vowel was awarded zero points. Letter-sound correspondence tasks consisted of 10 randomly selected lowercase letters. Therefore, the sound-letter correspondence baseline tasks were each worth 30 points (3 points x 10 consonant and/or vowel phonemes). The percent accuracy was calculated by dividing the number of points scored by the number of possible points.

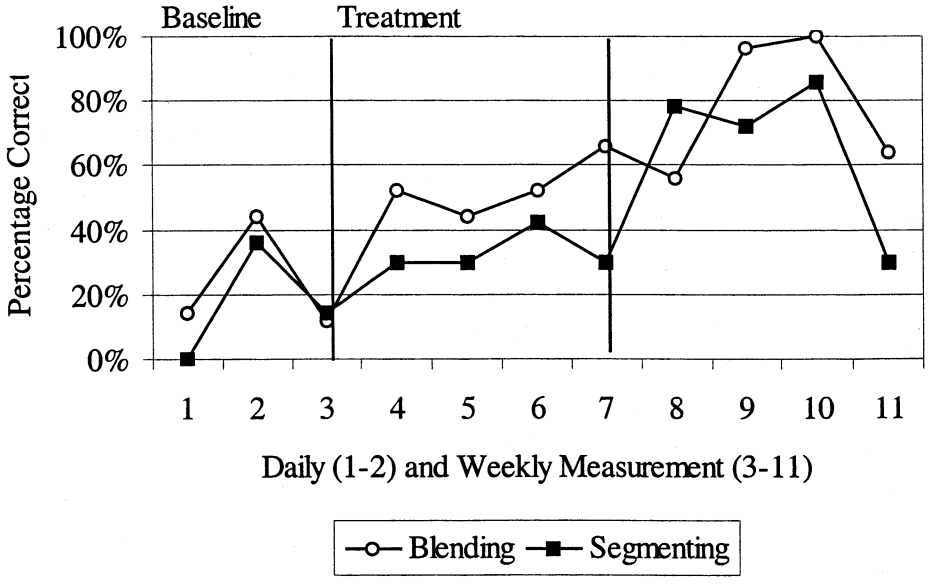

Figure 3. Subject C blending and segmenting measurements.

Results indicate that phoneme-grapheme correspondence training was effective in teaching the subjects that sounds (phonemes) were represented by letters (graphemes) or vice versa. All unknown letter-sound correspondences were taught by introducing articulatory postures of the phoneme, discriminating the phoneme from other phonemes, and introducing the corresponding grapheme through letter tiles, books, and games. The most challenging phoneme-grapheme correspondences were vowels for all subjects. Performances varied due to the abilities of the subjects as well as the random selection of easy or difficult graphemes. The number of sessions needed to meet criterion exceeded expectations for all subjects, which may possibly be attributed to the large amount of targeted phoneme-grapheme correspondences.

Subject A received 11 sessions of phoneme-grapheme correspondence (Behavior II) training to meet the previously determined criterion (75% accuracy in two measures with clinician judgment of mastery) (see Figure 4). Unknown phoneme-grapheme correspondences targeted during Behavior II treatment included 13 consonants and 5 vowels. Accuracy measures for phoneme-grapheme correspondence ranged from 33.3% to 60.0% before treatment of Behavior II. Behavior II skills improved with treatment as both post treatment weekly measurements remained at 96.6%. Phoneme-grapheme correspondences that were consistently most difficult for Subject A included the vowels i, o, and u and the consonants h, q, w, and y.

Subject B received 13 sessions of Behavior II training to meet treatment criterion (see Figure 5). Seventeen consonants and five vowels were targeted during Behavior II treatment. Weekly baselines before treatment ranged from 26.6% to 40.0% accuracy. The post treatment measurement was 90.0% accuracy. Subject B occasionally struggled

with vowels e, o, and u and consonants f, h, l, m, n, r, w, and y during the treatment phase and often asked the clinician for reminders of previously learned phoneme-grapheme correspondences.

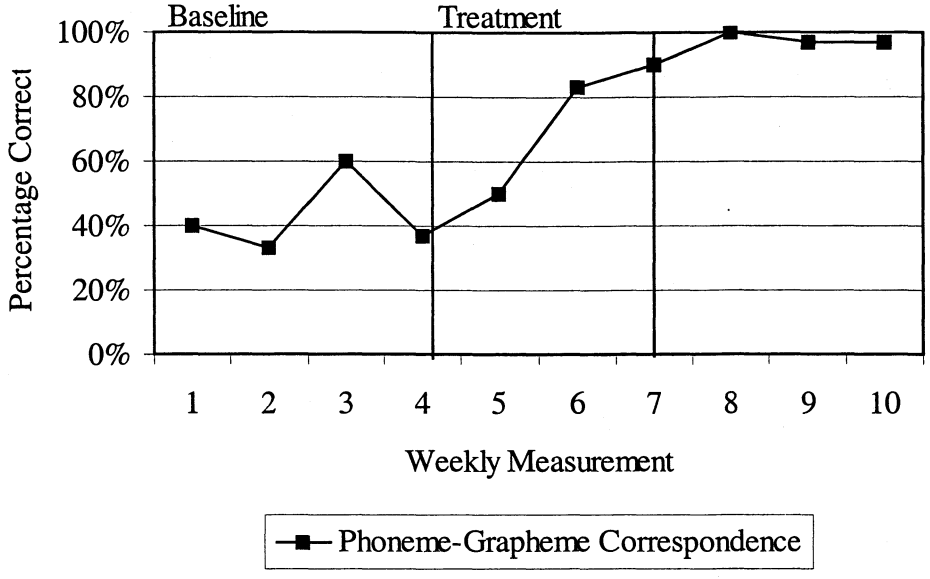

Figure 4. Subject A phoneme-grapheme correspondence measurements.

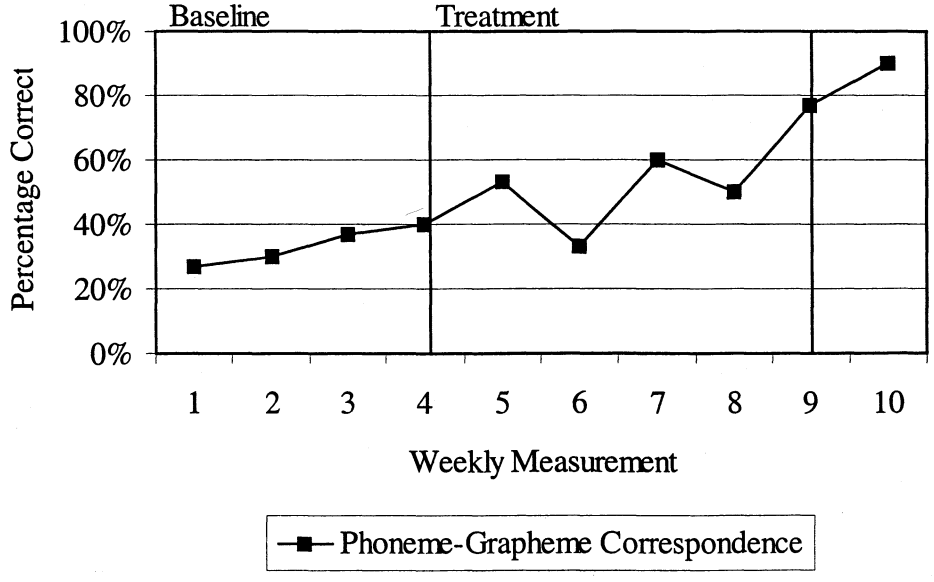

Figure 5. Subject B phoneme-grapheme correspondence measurements.

Nine sessions of phoneme-grapheme correspondence training were administered to Subject C (see Figure 6). Targeted phoneme-grapheme correspondences included 10 consonants and 5 vowels. Subject C's pre-treatment weekly baselines ranged from 26.6% accuracy to 60.0% accuracy. During treatment, Friday measures increased from 60% to 73% accuracy; however, measures taken immediately before treatment sessions by the speech-language pathologist and Reading Recovery teacher indicated an accuracy level that rose above the 75% criterion. Because a measure met the criteria, Behavior II treatment was terminated and Behavior III began. Post treatment weekly measurements for phoneme-grapheme correspondences were at accuracy levels of 76.6% and 83.3%. Phoneme-grapheme correspondences resulting with consistent difficulty included the vowels a, e, o, and u and the consonants c, h, j, l, w, and y.

Behavior III: Decoding and Spelling

Baseline data for Behavior III were obtained weekly throughout Behaviors I and II. Ten weekly measurements were obtained for Subjects A, B, and C throughout the study for decoding and spelling. The measure was the percent accuracy for decoding and the percent accuracy for spelling CVC words. One point was awarded for each correct place, manner, and voicing of the consonant phoneme with a total possible point value of three per consonant phoneme. A correct vowel was awarded three points while an incorrect vowel was awarded zero points. Decoding and spelling baseline tasks consisted of five CVC words; thus, each word was worth nine points. One bonus point was awarded for each CVC word decoded or spelled correctly with no errors and no addition of sounds. Therefore, the decoding and spelling baseline tasks were each worth 50 points ([3 points x 10 consonant phonemes] + [3 points x 5 vowels] + [1 bonus point x correct

response]). The percent accuracy was calculated by dividing the number of points scored by the number of possible points.

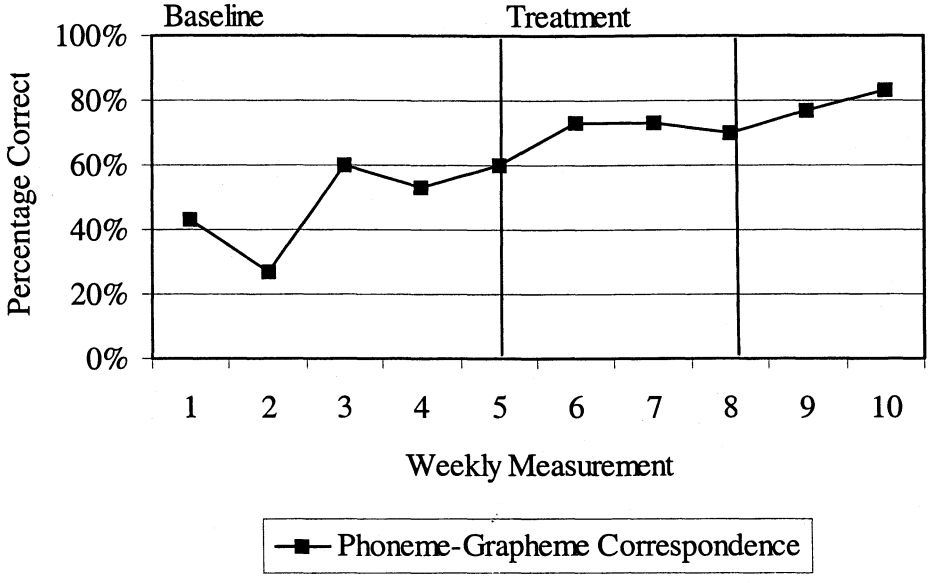

Figure 6. Subject C phoneme-grapheme correspondence measurements.

Results indicate that individual decoding and spelling training was effective in teaching reading and spelling tasks. Subjects first learned to decode by using letter tiles to match a CVC word with a corresponding picture. Picture cues were gradually faded away and treatment progressed from letter tiles to CVC words printed on flash cards. Spelling training consisted of a) verbal presentation of a CVC word, b) clinician guidance and picture cues and letter tiles to aid with segmenting the word into its three sounds and c) identification of phoneme-grapheme correspondence. As the child developed spelling skills, visual and verbal cues were withdrawn. Decoding and spelling performances for each subject demonstrated a gradual rise as baselines were gathered, reflecting independent transfer of skills and variability with decoding and spelling skills.

Subject A received five sessions of decoding and spelling training. Figure 7 illustrates decoding and spelling performance throughout the study. Initial baselines collected prior to the study's initiation ranged from 14.0% accuracy to 58.0% accuracy for decoding and 14.0% accuracy to 28.0% accuracy for spelling. The final measure for decoding was 80.0% while spelling was 96.0%. Subject B received four sessions of decoding and spelling training (see Figure 8). Accuracy baselines before Behavior III treatment ranged from 0.0% accuracy to 26.0% accuracy for decoding and 4.0% accuracy to 20.0% accuracy for spelling. The final decoding accuracy measure was 70.0%, and a spelling accuracy measure of 64.0% was obtained for the post treatment measurement. Finally, Subject C participated in five sessions of decoding and spelling training (see Figure 9). Baseline measurements prior to the treatment phase ranged from 8.0% accuracy to 36.0% accuracy for decoding and 18.0% accuracy to 76.0% accuracy for spelling. The post-treatment decoding measurement was at an accuracy level of 70.0%, and the post-treatment baseline measurement for spelling was at 84.0% accuracy. All of the subjects' performance in decoding and spelling improved to some degree before Behavior III treatment commenced. This phenomenon was not unexpected as explicit training in phonological awareness tasks and phoneme-grapheme correspondence may have independently transferred to decoding and spelling abilities without explicit instruction. The phoneme awareness taught early in treatment (90 minutes/week) may have influenced decoding and blending skills. Success with phoneme-grapheme correspondence performance may have also impacted improved decoding and spelling accuracies before treatment was initiated.

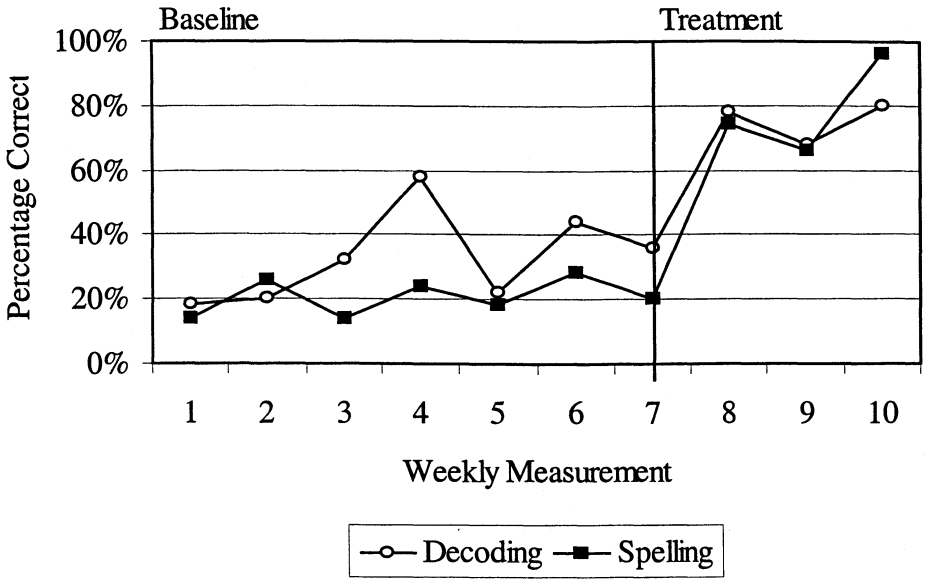

Figure 7. Subject A decoding and spelling measurements.

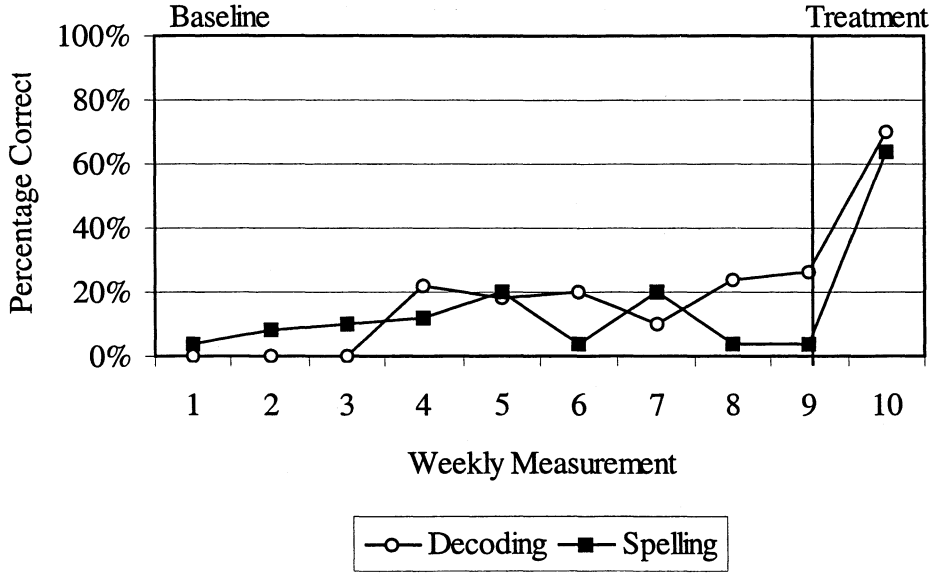

Figure 8. Subject B decoding and spelling measurements.

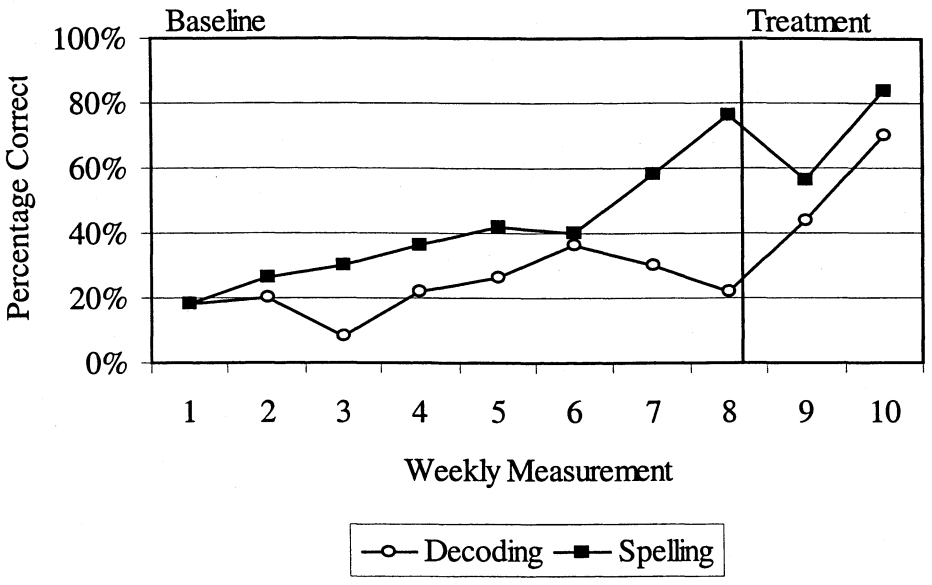

Figure 9. Subject C decoding and spelling measurements.

Phonological Awareness Skills

Results from the pre-test and post-test scores for Subjects A, B, and C on the Phonological Awareness Test (PAT) are reported in Table 6. Total test gains on the PAT ranged from 38 to 67 points following 10 weeks of the individual instruction.

Prior to initiating treatment, Subject A had a score of 100 points on the PAT. Post-test results revealed that Subject A improved phonological awareness skills following program implementation with a gain of 38 points and a post-test score of 138 points. Subject A increased the pre-test score by 38% during the training program. Substantial subtest improvement was noted on segmentation, isolation, substitution, graphemes, and decoding. Subject A scored higher on the pre-test than the other subjects and showed the smallest gain. Subject A's phonological awareness performance, however, remained above Subjects B and C at the time of post testing.

Subject B had a pre-test score of 54 points and a post-test score of 121 points with a total test gain of 67 points. Subject B increased the pre-test score by 124%. Subject B scored lowest of the three subjects on the pre-test and demonstrated the greatest gain. Areas of notable subtest improvement included rhyming, segmentation, isolation, blending, and graphemes.

The pre-test score for Subject C was 59 points. Post-tests results indicated a final score of 103 points with a gain of 44 points. Therefore, Subject C improved the pre-test score by 75%. Subject C demonstrated the lowest post-test performance in phonological awareness skills. Segmentation, isolation, deletion, blending, and graphemes subtests displayed remarkable gains.

Table 6

Pre-test, Post-test, and Gains for the Phonological Awareness Test Reported in Raw Scores and (Standard Scores)

Subtest		Subject A			Subject B			Subject C		
	Possible Points	Pre	Post	Gain	Pre	Post	Gain	Pre	Post	Gain
Rhyming	**20**	20 (110)	20 (109)	0	10 (81)	16 100)	6	16 (96)	15 (92)	-1
Segmentation	**30**	16 (86)	20 (95)	4	17 (98)	22 (110)	5	4 (*)	12 (77)	8
Isolation	**30**	15 (71)	28 (109)	13	0 (*)	28 (116)	28	9 (69)	27 (114)	18
Deletion	**20**	13 (91)	8 (6)	-5	9 (88)	12 (99)	3	5 (67)	10 (87)	5

Substitution	**20**	1	8	7	3	3	0	7	4	-3
		(72)	(86)		(89)	(89)		(100)	(90)	
Blending	**20**	17	17	0	10	15	5	9	13	4
		(94)	(85)		(77)	(96)		(67)	(85)	
Graphemes	**58**	18	24	6	5	22	17	9	21	12
		(62)	(52)		(70)	(91)		(63)	(80)	
Decoding	**80**	0	13	13	0	3	3	0	1	1
		(*)	(74)		(*)	(90)		(*)	(85)	
Total Test	**278**	100	138	38	54	121	67	59	103	
		(71)	(71)		(77)	(97)		(*)	(85)	

* Standard Score is below norms.

The three subjects' subtest gain on the PAT is illustrated in Figure 10. The largest amount of test gain was noted on the isolation, grapheme, and decoding subtests. Subtests showing minimal gain included blending and segmenting (word and phoneme levels), which may be attributed to previous learning during the kindergarten classroom phonological awareness training.

The spelling portion of the PALS was re-administered to all first grade classrooms following completion of the study. Results of the pre- and post-test scores of the spelling portion are shown in Figure 11. Out of a total of 20 possible points, Subjects A, B, and C obtained improved spelling scores and showed gains of 16, 12, and 10 points, respectively. Subject A had a spelling score of 17 and demonstrated performance

similar to the first grade class mean of 18.27. Subjects B and C both scored 12 on the spelling measure and remained greater than one standard deviation below the class mean.

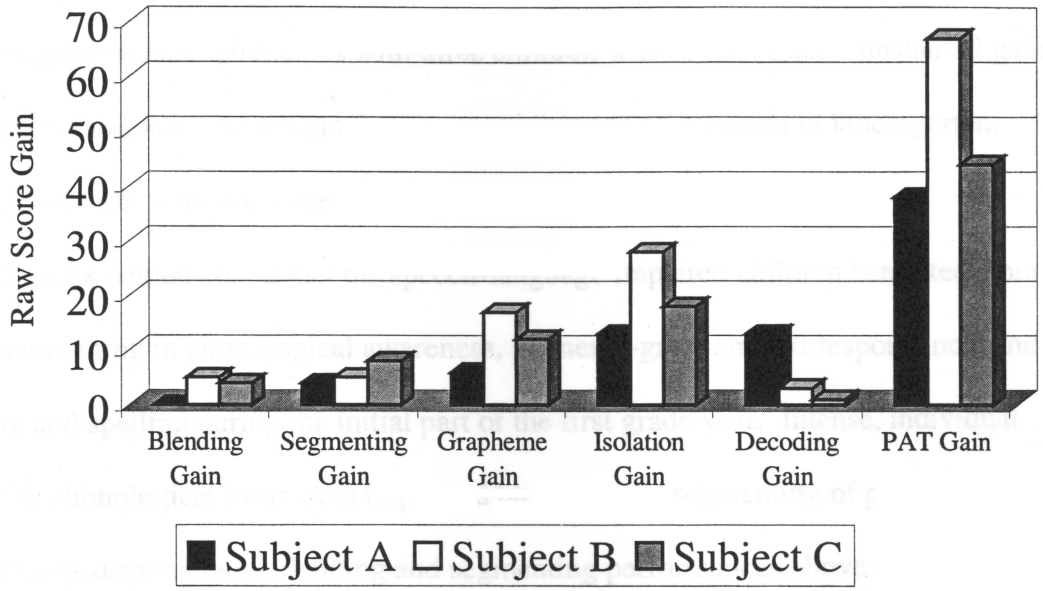

Figure 10. Subject A, B, and C raw score gains on the Phonological Awareness Test.

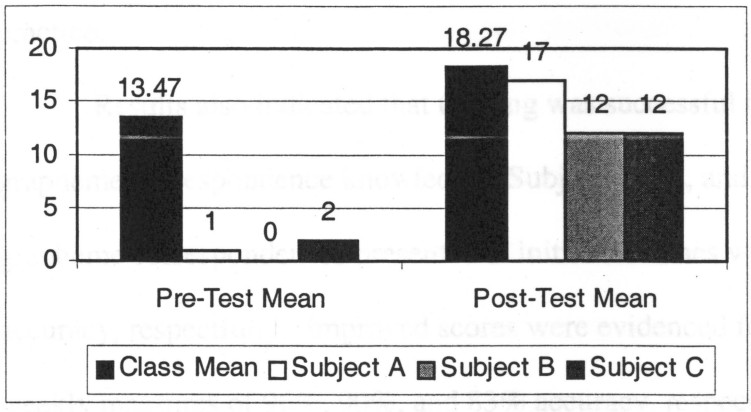

Figure 11. Class mean and Subject A, B, and C pre- and post-test spelling raw scores on the PALS.

CHAPTER V

Discussion

Summary of Results

The purpose of the current study was to determine the effectiveness of individual phonological awareness and phonics training emphasizing auditory, motoric, and alphabetic properties of phonemes with three children who did not make substantial gains following a classroom phonological awareness intervention program in kindergarten. The three subjects were diagnosed with speech and/or language disorders.

Results demonstrated that the speech-language impaired children benefited from individual training in phonological awareness, phoneme-grapheme correspondence, and decoding and spelling during the initial part of the first grade year. Intense, individual training in phonological awareness improved blending and segmenting of phonemes. All three subjects demonstrated blending and segmenting performances above 86% accuracy following direct phonological awareness intervention. Different magnitudes of improvement were noted, and variable percentages noted during baselines indicated that the phonological awareness tasks were emerging skills, which improved with individual practice.

Results also indicated that training was successful in improving phoneme-grapheme correspondence knowledge. Subjects A, B, and C identified phoneme-grapheme correspondences presented at initial baselines with 30% 52% and 66% accuracy, respectfully. Improved scores were evidenced following treatment with final weekly measures of 96%, 90%, and 83% accuracy, respectfully. All subjects improved phoneme-grapheme correspondence success following direct, individual intervention that

addressed phoneme-grapheme correspondences. The amount of improvement varied according to previous knowledge of phoneme-grapheme correspondences and individual subject characteristics, specifically memory abilities.

Finally, training resulted in improved abilities to independently read and spell. Two subjects decoded approximately 20% of the words and one subject decoded 0% of the words at initial baselines. All subjects decoded over 70% of the words following individual intervention that contained blending exercises. Some decoding gains were noted during Behavior II treatment, but the largest gains were noted during Behavior III treatment. Initial spelling baselines were below 20% accuracy at the beginning of the study. Each subject improved spelling accuracy, with Subject A at 96%, Subject B at 64% and Subject C at 84 %. Spelling scores improved for all three subjects following the direct intervention that taught the students to combine phonological awareness and phoneme-grapheme correspondence concepts. Similar to the phenomenon that occurred during decoding baselines, spelling baselines improved somewhat during Behavior II treatment, demonstrating a possible transfer effect before direct training. Additionally, earlier generalization of phonological awareness and phoneme-grapheme correspondence could have been influenced by first grade classroom instruction.

Interpretation/Explanation of Results

The success and improvement in phonological awareness skills evidenced by all three subjects is interesting to consider because they demonstrated less ability to learn these skills compared to peers following a classroom phonological awareness program in kindergarten. While Subject A demonstrated high performance in blending skills prior to treatment, segmenting skills were low and progress during treatment was evidenced for

segmenting phonemes. The Behavior I improvement demonstrated by Subject A may not have been completely attributed to intervention strategies as previous skills in one area were above treatment criterion. Furthermore, several possible reasons exist for the subjects' learning of phonological awareness skills. First, the training program implemented in this study provided structured, repetitive practice of phonological awareness skills individually, which allowed for more practice during tasks. Another possible factor is that the clinician could provide more direct feedback regarding the children's productions in an individualized setting as opposed to a group setting. Because speech and/or language impaired students often require increased amounts of time to process information and respond, the individualized format required the subjects to perform the tasks at their own pace whereas a classroom setting may have allowed other students to provide answers before the speech and/or language impaired subjects were able to formulate their own answers. The weekly measures collected upon termination of phonological awareness training also indicated that phonological awareness performance may improve after treatment is terminated. All subjects learned the blending and segmenting skills during the phonological awareness treatment; however, they perfected and improved their skills without direct intervention through application during subsequent measurements.

As students enter first grade curriculum, knowledge of phoneme-grapheme correspondence is expected. All subjects enrolled in the study displayed some prior knowledge of phoneme-grapheme correspondences, but were able to improve their skills through individual, direct intervention focusing on single phoneme-grapheme correspondences. Learning all phoneme-grapheme correspondences in a matter of weeks

is not realistic, but the Behavior II training provided a greater explanation of phoneme-grapheme correspondences by addressing motoric and acoustic properties not contained in the teachers' regular classroom instruction. Subject B demonstrated relatively stable performance of phoneme-grapheme correspondence knowledge during baseline measures; however, subjects A and C's performance fluctuated. Again, the effectiveness of Behavior II training must be examined cautiously as fluctuating performance during measurements was exhibited. Improvement noted during treatment of Behavior II may have been seen for a number of reasons. First, the individual training focused only on phoneme-grapheme correspondences in which the child was unsuccessful; therefore, crucial therapy time was not spent targeting learned correspondences. Increases in scores may also be attributed to more opportunities for individual practice as well as greater amounts of feedback from the clinician.

It is important to note a trend seen during baselines prior to Behavior II treatment. Subjects A and C displayed more variance in baseline performance than expected. The pattern exhibited by both subjects raises an important question. It is important to understand why the baselines varied before treatment. One possible explanation is that the subjects were performing an emerging skill. Because the skill of identifying all letter sounds was demanding compared to their abilities, inconsistent performance would be expected as the subjects remembered or forgot the phoneme-grapheme correspondences each week. Another possible explanation is that the students were learning some phoneme-grapheme correspondences during regular class instruction. Finally, by randomly choosing 10 phoneme-grapheme correspondences for each baseline, a complete picture of ability was not possible, causing some weekly baselines to be more difficult

while others were easier, due to letter choice. Only one subject (Subject A) mastered phoneme-grapheme correspondences with near perfect ability while Subjects B and C performed at a level near 80% accuracy. Prior knowledge may be one possible explanation since fewer correspondences needed to be addressed during therapy. In addition, Subject C demonstrated a mild memory deficit, which could further affect consistent performance on an emerging skill both prior to and following treatment.

All subjects displayed some degree of improvement in decoding and spelling before direct individual treatment of the behaviors began, particularly once phoneme-grapheme correspondence training began. While this phenomenon presented problems in the design of the study with regards to decoding and spelling training, it was promising to find that the subjects demonstrated generalization skills without explicit training. Decoding skills slightly improved during Behavior II treatment for all subjects, but the most substantial improvement occurred once Behavior III treatment began. The phenomenon of improvement before training may be occurred for several reasons. First, classroom instruction may have facilitated some additional abilities to decode words. Additionally, decoding requires a combination of phonological awareness skills (blending) and phoneme-grapheme correspondence identification. It is not surprising that decoding skills improved somewhat during Behavior II training because the subjects learned or were in the process of learning the two underlying components needed to decode words. The finding shows that all three subjects were beginning to apply their learned skills to decoding without explicit instruction. Once direct treatment of decoding skills began, the subjects were able to perform the skill with good accuracy because they were able to integrate the phonological awareness and phoneme-grapheme

correspondence concepts. Their increased abilities were possibly due to explicit instruction with numerous practice opportunities and greater amounts of feedback from the clinician.

The same pattern of improvement seen in decoding was also seen in spelling performance. All subjects demonstrated gains in spelling prior to Behavior III treatment. Again, this may be due to classroom instruction but is most likely explained by the subjects' independent integration of phonological awareness and phoneme-grapheme correspondence skills. Moreover, the greatest gains in spelling performance occurred once Behavior III treatment commenced. All subjects needed direct, individual training to apply their skills consistently. The individual training for decoding and spelling allowed for more practice and more feedback while integrating phonological awareness skills with phoneme-grapheme correspondence knowledge.

A major component of the Behavior III treatment was that of reassurance. The subjects were often reluctant to give an answer or afraid to make a mistake in a task in which they already knew they were struggling. Positive reinforcement for correct responses boosted all subjects' confidence levels and they became excited that they were reading and spelling correctly. One could argue that the success and feedback removed some of the pressures of learning to read and spell, allowing the subjects to perform tasks more comfortably.

The skills addressed in the individual training program not only improved performance on the dependent variables, but also transferred to skills measured on the PAT. Individual phonological awareness training facilitated improved performance for higher level phonological awareness tasks including blending, segmenting, isolation,

graphemes, and decoding. Reasonable gains on the PAT were evidenced by all three subjects, demonstrating that individual training contributed to improvement in attending to and manipulating phonemes contained in words. The improvement seen, however, is twofold. Although the subjects made remarkable improvements in phonological awareness, decoding, and spelling, their literacy abilities remained at levels slightly below age-commensurate expectations. This phenomenon is easily explained by examining the gap of performance between the subjects in the study and age-related peers. Initially, the gap in literacy skill performance was very large; however, upon completion of training, the subjects improved their skills to levels more commensurate with age-level peers. Although they were not performing at exactly the same level, the subjects made substantial improvements and performed at levels much closer to age-related peers.

Relations to Past Research

Some researchers believe that classroom-based intervention performed by regular education classroom teachers is effective for reading instruction (Blachman, 1991; Bradley & Bryant, 1983, 1985; Lundberg, Frost, & Peterson, 1988). Other researchers, however, believe that speech-language pathologists possess a unique knowledge in areas pertaining to phonological awareness and should be included in certain aspects of reading training and intervention (Catts, et al., 1998; Swank & Catts, 1994). Swank (1994) also promotes individual treatment for children who fail to show progress from classroom-based phonological awareness training. To establish the role of speech-language pathologists in reading intervention, ASHA (2000) recently added literacy to its scope of practice and stated that the prevention and remediation of language-based reading

difficulties should be responsibilities of speech-language pathologists. Results from the current study support the premise that speech-language pathologists should play an active role in phonological awareness intervention. Classroom-based phonological awareness instruction benefited the majority of students in kindergarten; however, three speech and/or language impaired children with phonologically based reading difficulties needed individual training in first grade to show noticeable benefits.

The inclusion of subjects with speech and/or language impairments in the current study supports previous research which has concluded that children with speech and language impairments are at risk for poor phonological awareness skills (Apel et at., 1992; Bird et al., 1995; Clark-Klein, 1991; Dominick et al., 1993). It is likely that speech-language pathologists would already be providing services to these children for other deficit areas, and phonological awareness skills could be addressed when needed by integrating tasks with other therapy objectives. The study also supports studies which conclude that individual treatment is effective. Warrick et al. (1993) and Gillon (2000) found that speech and/or language impaired children performed at levels similar to age-related peers following small group phonological awareness instruction. The current study supports the findings as evidenced by increased performance in phonological awareness skills following individualized training. The three subjects initially performed phonological awareness tasks at levels significantly below age-related peers, but upon completion of the study performed phonological awareness tasks at levels more congruent with age-related peers.

Methods for treating children with reading difficulties due to poor phonological awareness skills have been thoroughly scrutinized and debated. Results from the current

study support findings from Alexander et al. (1991), Brown and Fetton (1990), Gillon (2000), Hilgenberg (2000), and Lovett et al. (1994) who found that children with phonologically based reading difficulties experience significant improvement when training emphasizes functional alphabetic reading skills. Gillon (2000) reported successful results in 20 hours by using direct instruction in phonological awareness skills, phoneme-grapheme correspondence, and blending with letters. Hilgenberg (2000) was successful in 14 hours of training with direct instruction in blending and segmenting tasks and practice sounding out words. The current study supports Gillon (2000) and Hilgenberg (2000) by finding that direct individual training consisting of phonological awareness tasks, phoneme-grapheme correspondence, and decoding is successful for six-year old children with speech and/or language impairments. The current program differs from both Gillon (2000) and Hilgenberg (2000) because it incorporated spelling along with decoding.

The current study also found that performance of phoneme-grapheme correspondences improved with individualized training that included concepts from the Lindamood and Lindamood LIPS (1998) program. Intense instruction in phoneme-grapheme correspondences that includes use of acoustic and motoric cues may have been a valuable component in Behavior II training. Some research has documented great gains from incorporating the concepts (Alexander, et al., 1991; Skjelfjord, 1976) while others question its benefit (Kennedy & Backman, 1993). More research is needed to examine and compare the contribution that LIPS makes in phonological awareness interventions.

Clinical Implications

Several important conclusions may be drawn from this study. First, direct, individual intervention was successful in teaching reading skills to children with speech and/or language impairments. Direct intervention allows students more repetition and practice of literacy skills while providing appropriate feedback from a speech-language pathologist.

Integrating spelling into the training was likely beneficial because it incorporated an extra task utilizing phonological awareness and phoneme-grapheme correspondence skills. Without the design of the study, the speech-language pathologists may have addressed phonological awareness only 10 minutes per week while the Reading Recovery teacher focused on a whole language approach to reading goals. Professional coordination to provide systematic individual training provided an intensive, universal service to students while pursuing the same goal.

Another finding to recognize is that auditory skills of blending and segmenting are precursors to literacy skills, particularly decoding and spelling. Developing auditory skills may help children attend to parts of words and understand the process of decoding phonemes to form words. For most children this skill and connection may develop easily, but as the current study suggests, children with speech and/or language impairments may need explicit instruction to acquire the phonological awareness foundation that is critical to later reading abilities. In addition, incorporating auditory and visual cues and strategies to facilitate phoneme-grapheme correspondence training may be important to include as it provides deeper understanding and more exposure to the complexity of the targeted skills.

The age at which intervention commences is also a determining factor in the benefits of phonological awareness instruction. A relatively short period of intervention, 15 hours, was needed to see noticeable gains in reading performance of six-year olds. Therefore, the benefits of intervention that begins as the reading problem is first evidenced may provide relatively quick results, whereas postponing intervention may require substantially more time to attain similar benefits. It is also important to intervene as soon as a problem is suspected to prevent and alleviate reading difficulties before they become too severe. Immediate intervention as reading develops may eliminate or lessen the Matthew Effect often seen in children with reading difficulties. Future academic success will likely be positively impacted when intervention is not delayed. Moreover, intensive, coordinated service provided by multiple professionals may positively influence reading growth and performance.

Children experiencing early reading difficulties may benefit from numerous methods of intervention. Incorporating all aspects of sounds, such as acoustic and motoric properties of phonemes, may be beneficial. In addition, training and utilizing other reading professionals such as Reading Recovery teachers or reading specialists, may allow for additional practice when caseloads of speech-language pathologists are too large to provide individual treatment for all identified children. If reading instruction took precedence over other speech and/or language goals, it would also be possible to incorporate articulation and language practice during individual phonological awareness instruction.

Finally, the training program created a newfound confidence in reading and spelling for the subjects. Initially, the subjects were reluctant in attempting to decode or

spell words. As they received positive, corrective feedback, their reluctance transformed into confidence and they began to associate positive feelings with reading and spelling.

Limitations

One limitation of the study is the short period of time allowed for decoding and spelling training (Behavior III). Phonological awareness and phoneme-grapheme correspondence training required more time than initially anticipated. Consequently, the study only contained a minimal amount of decoding and spelling sessions. Additional decoding and spelling treatment may have resulted in greater transfer effects and more noticeable gains in decoding and spelling performance for all subjects.

Follow-up measures regarding the long-term effects of intervention were not obtained, which is another limitation of the study. Follow-up testing of reading abilities and decoding and spelling performance would have provided information regarding the application and development of reading skills during the first grade year. Performances with age-related peers could have also been compared to determine if the subjects remained at a similar level to their peers or whether they dropped to levels significantly below class means.

A limited number of subjects was available for the current study. A larger pool of subjects and a control group would have allowed for statistical comparisons and determination of significance.

Future Research

Phonological awareness training is a growing area in the practice of speech-language pathology, however several areas require further research. For the present study, future research should conduct follow-up testing of the speech and/or language

impaired children. A longitudinal study would determine the long-term effects and impact of training and determine if the students retain their performance levels or drop below class means when compared to age-related peers.

Future research should apply the same functional alphabetic skills training in a large study so that statistical comparisons are possible. A large-scale study employing training emphasizing phonological awareness, phoneme-grapheme correspondence, and decoding and spelling would be beneficial to compare progress made by speech and language impaired children with normal peers and with peers who are not speech and language impaired but perform below expectations.

The age at which intervention emphasizing phonological awareness, phoneme-grapheme correspondence, and decoding and spelling is most successful also needs to be examined. It is unclear as to the amount and magnitude of intervention a first grader needs in comparison to an older student. In addition, it is also unclear if the type of intervention provided in the current study would be as efficient for older students who have phonetically based reading difficulties.

Studies exploring small group instruction would also provide additional information to the research base. Currently, most studies have examined either classroom-based instruction or individual instruction. Limited amounts of small group studies are available.

Conclusion

The relationship of phonological awareness skills and later reading abilities has been well documented. Furthermore, research has begun to examine relationships between children with speech/language impairments and poor reading abilities.

Expanding the database with information regarding these individuals who have been previously identified as high-risk for reading difficulties will provide professionals with more information and strategies for the prevention and remediation of reading difficulties.

References

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Alexander, A. W., Anderson, H. G., Heilman, P. C., Voeller, K. K. S., & Torgesen, J. K. (1991). Phonological awareness training and remediation of analytic decoding deficits in a group of severe dyslexics. *Annals of Dyslexia, 41*, 193-206.

American Speech-Language-Hearing Association Ad Hoc Committee on Reading and Writing. (2000). *Roles and responsibilities of speech-language pathologists with respect to reading and writing in children and adolescents.*

Aram, D. M., Ekelman, B. L., & Nation, J. E. (1984). Preschoolers with language disorders: 10 years later. *Journal of Speech and Hearing Research, 27,* 232-244.

Ball, E. W., & Blachman, B. A. (1988). Phoneme segmentation training. Effect on Reading Readiness. *Annals of Dyslexia, 30,* 208-225.

Ball, E. W., & Blachman, B. A. (1991). Does phoneme awareness training in kindergarten make a difference in early word recognition and development of spelling? *Reading Research Quarterly, 26,* 49-66.

Bentin, S., & Leshem, H. (1993). On the interaction between phonological awareness and reading acquisition: It's a two-way street. *Annals of Dyslexia, 43,* 125-148.

Bird, J., Bishop, D. V. M., & Freeman, N. H. (1995). Phonological awareness and literacy development in children with expressive phonological impairments. *Journal of Speech and Hearing Research, 38,* 446-462.

Bishop, D. V. M., & Adams, C. (1990). A prospective study of the relationship between specific language impairment, phonological disorders and reading retardation. *Journal of Speech and Hearing Research, 38*, 446-462.

Blachman, B. A. (1989). Phonological awareness and word recognition: Assessment and intervention. In A. Kamhi & H. Catts (Eds.), *Reading disabilities: A developmental language perspective*, (pp. 133-158). Boston: Allyn & Bacon.

Blachman, B. A. (1991). Early intervention for children's reading problems: Clinical applications of the research in phonological awareness. *Topics in Language Disorders, 12*, 51-65.

Blachman, B. A., Ball, E. W., Black, R. S., & Tangel, D. M., (1994). Kindergarten teachers develop phoneme awareness in low-income, inner-city classrooms: Does it make a difference? *Reading and Writing: An Interdisciplinary Journal, 6*, 1-18.

Blachman, B. A. Tangel, D. M., Ball, E. W., Black, R. S., & McGraw, D. (1999). Developing phonological awareness and word recognition skills: A two-year intervention with low-income, inner-city children. *Reading and Writing: An Interdisciplinary Journal, 11*, 273-293.

Boudreau, D. M., & Hedberg, N. L. (1999). A comparison of early literacy skills in children with specific language impairment and their typically developing peers. *American Journal of Speech-Language Pathology, 8*, 249-260.

Bradley, L., & Bryant, P. (1983). Categorizing sounds and learning to read: A causal connection. Nature, 30, 419-421.

Bradley, L., & Bryant, P. (1985). *Rhyme and reason in reading and spelling*. Ann Arbor: University of Michigan Press.

Brown, I. S., & Felton, R. H. (1990). Effects of instruction on beginning reading skills in children at risk for reading disability. *Reading and Writing: An Interdisciplinary Journal, 2*, 223-241.

Calfee, R. C., & Norman, K. A. (1998). Psychological perspectives on the early reading wars: The case of phonological awareness. *Teachers College Record, 100*, 242-274.

Catts, H. (1993). The relationship between speech-language impairments and reading disabilities. *Journal of Speech and Hearing Research, 36*, 948-958.

Catts, H., Fey, M., Zhang, X., & Tomblin, B. (1998). Estimating the risk of future reading difficulties in kindergarten children: A research-based model and its clinical implementation. *Language, Speech, and Hearing Services in Schools, 32*, 38-50.

Catts, H., & Kamhi, A. (Eds.). (1999). *Language and reading disabilities*. Boston, MA: Allyn & Bacon.

Center, Y., Wheldall, K., Freeman, L., Outhred, L., & McNaught, M. (1995). An evaluation of reading recovery. *Reading Research Quarterly, 30*, 240-261.

Chall, J. (1983). *Stages of reading development*. New York: McGraw Hill.

Chall, J. (1996a). *Learning to read: The great debate*. New York: McGraw-Hill.

Chall, J. (1996b). *Stages of reading development* (2nd ed.). Fort Worth, TX: Harcourt-Brace.

Clarke-Klein (1991). Expressive phonological deficiencies: Impact on spelling development. *Topics in Language Disorders, 14*, 40-55.

Dahl, K. L., & Scharer, P. L. (2000). Phonics teaching and learning in whole language classrooms: New evidence from research. *Reading Teacher, 53*, 584-594.

Dudley-Marling, C., & Murphy, S. (1997). A political critique of remedial reading programs: The example of reading recovery. *Reading Teacher, 50*, 460-468.

Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test Third Edition.* American Guidance Service; Circle Pines, MN.

Ehri, L. (1979). Linguistic insight: Threshold of reading acquisition. In T.B. Waller & G. E. MacKinnon (Eds.), *Reading research: Advances in theory and practice, Vol. 1.* New York: Academic Press.

Fox, B., & Routh, D. (1980). Phonemic analysis and severe reading disability in children. *Journal of Psycholinguistic Research, 9*, 115-119.

Gillam, R. B., & Carlile, R. M. (1997). Oral reading and story retelling of students with specific language impairment. *Language, Speech, and Hearing Services in Schools, 28*, 12-29.

Gillon, G. T. (2000). The efficacy of phonological awareness intervention for children with spoken language impairment. *Language, Speech, and Hearing Services in Schools, 31*, 126-141.

Goldman, R., & Fristoe, M. (2000). Goldman Fristoe Test of Articulation-2. Circle Pines, MN: American Guidance Service, Inc.

Goldsworthy, C. (1996). *Developmental reading disabilities: A language-based reading approach.* San Diego, CA: Singular Publishing Group, Inc.

Gough, P., & Tunmer, W. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*, 6-10.

Hall, P. K., & Tomblin, J. B. (1978). A follow-up study of children with articulation and language disorders. *Journal of Speech and Hearing Disorders, 43*, 227-241.

Harbers, H. M., Paden, E. P., & Halle, J. W. (1999). Phonological awareness and production: Changes during intervention. *Language, Speech, and Hearing Services in Schools, 30*, 50-60.

Hatcher, P., Hulme, C., & Ellis, A. (1994). Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development, 65*, 41-57.

Helfgott, J. (1976). Phonemic segmentation and blending skills of kindergarten children: Implication for beginning reading acquisition. *Contemporary Educational Psychology, 1*, 157-169.

Hicks, C. P., & Villaume, S. K. (2000). Finding our own way: Critical reflections on the literacy development of two reading recovery children. *Reading Teacher, 54*, 398-413.

Hilgenberg, K. E. (2000). *Individual phonological awareness intervention for children with phonetically based reading difficulties*. Unpublished master's thesis, Eastern Illinois University, Charleston.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2*, 127-160.

Howard, M. (1988). Phonology first-A natural approach to beginning reading. *Idaho Reading Report, 31*, 123-134.

Invernizzi, M., & Meier, J. (1997). *Phonological Awareness Literacy Screening*. Charlottesville, VA: University of Virginia Press.

Iversen, S., & Tunmer, W. E. (1993). Phonological processing skills and the reading recovery program. *Journal of Educational Psychology, 85*, 112-126.

Jorm, A. F., & Share, D. L. (1983). Phonological recoding and reading acquisition. *Applied Psycholinguistics, 4*, 103-147.

Kennedy, K. M., & Backman, J. (1993). Effectiveness of the Lindamood auditory discrimination in depth program with students with learning disabilities. *Learning Disabilities Research and Practice, 8*, 253-259.

Korkman, M., & Peltomaa, A. K. (1993). Preventative treatment of dyslexia by a preschool training program for children with language impairments. *Journal of Clinical Child Psychology, 22*, 277-287.

Kozminsky, L., & Kozminsky, E. (1995). The effects of early phonological awareness training on reading success. *Learning and Instruction, 5*, 187-201.

Lapp, D., & Flood, J. (1992). *Teaching reading to every child* (3rd ed.). New York: Macmillan Publishing Company.

Levi, B., Capozzi, F., Fabrizi, A., & Sechi, E. (1982). Language disorders and prognosis for reading disabilities in developmental age. *Perceptual and Motor Skills, 54*, 1119-1122.

Lewis, B. A., & Freebairn, L. (1992). Residual effects of preschool phonology disorders in grade school, adolescence, and adulthood. *Journal of Speech and Hearing Research, 35*, 819-831.

Lewkowicz, N. K. (1980). Phonemic awareness training: What to teach and how to teach it. *Journal of Educational Psychology, 72*, 686-700.

Liberman, I. (1983). A language-oriented view of reading abilities and its disabilities. In Myklebust (Ed.). *Progress in Learning Disabilities, 5*, (pp. 81-101). New York: Grune & Stratton.

Lie, A. (1991). Effects of a training program for stimulating skills in word analysis in first-grade children. *Reading Research Quarterly, 26*, 234-250.

Lindamood, C. H., & Lindamood, P. C. (1979). *The LAC Test, Lindamood Auditory Conceptualization Test.* Hingham, MA: Teaching Resources Corporation.

Lindamood, P., & Lindamood, P. (1998). *The Lindamood Phoneme Sequencing Program for Reading Spelling, and Speech* (3rd ed.). Austin, TX: Pro-Ed.

Lovett, M. W., Borden, S. L., Deluca, T., Lacerennza, L., Benson, N. J., & Brackstone, D. (1994). Treating the core deficits of developmental dyslexia: Evidence transfer of learning after phonologically-and strategy-based reading training programs. *Developmental Psychology, 30*, 805-822.

Lovett, M. W., Warren-Chaplin, P.M., Ransby, M.J., & Borden, S. L. (1990). Training the word recognition skills of reading disabled children: Treatment and transfer effects. *Journal of Educational Psychology, 82*, 769-780.

Lundberg, I., Frost, J., & Peterson, O. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly, 23*, 263-284.

Lundberg, I., Olofsson, A., & Wall, S. (1980). Reading and spelling skills in the first school years predicted from phonemic awareness skills in kindergarten. *Scandanavian Journal of Psychology, 21*, 159-173.

Lyon, G. R., (1985). Research in learning disabilities: Contributions from scientists supported by the National Institute of Child Health and Human Development. *Journal of Child Neurology, 10*, 120-126.

Lyons, C. A., Pinnel, G. S., & DeFord, D. E. (1993). *Partners in learning: Teachers and children in reading recovery*. New York: Teachers College Press.

McCormick, C. (2000). *Decodable little books*. Parsippany, NJ: Good Year Books.

McGuiness, D., McGuiness, C., & Donohue, J. (1995). Phonological training and the alphabet principle: Evidence for reciprocal causality. *Reading Research Quarterly, 30*, 830-852.

Menyuk, P., & Chesnick, M. (1997). Metalinguistic skills, oral language knowledge, and reading. *Topics in Language Disorders, 17*, 75-87.

Moats, L. C. (2000). *Speech to print: Language essentials for teachers*. Baltimore, MD: Paul H. Brookes Publishing Co.

Moncure, J. B. (1979). *My S Soundbox*. Elgin, IL: Children's Press.

National Reading Panel. (2000). *Teaching children to read: An evidenced-based assessment of the scientific research literature on reading and its implication for reading instruction. Reports of the subgroups*. U. S. Department of Health and Human Services.

Newcomer, P. L., & Hammill, D. D. (1997). *Test of Language Development*. Austin, TX: Pro-Ed.

Perfetti, C. A. (1991). Representation and awareness in the acquisition of reading competence. In L. Rieben & C. A. Perfetti (Eds.), *Learning to read: Basic research and its implication* (pp. 33-44). Hillsdale, NJ: Erlbaum.

Pinnel, G. S. (1991). *Restructuring beginning reading with the reading recovery approach.* Bloomington, IN: Phi Delta Kappa Educational Foundation.

Pinnel, G. S., Lyons, C. A., Deford, D. E., Bryk, A., & Seltzer, M. (1994). Comparing instructional models for the literacy education of high-risk first graders. *Reading Research Quarterly, 29*, 8-39.

Robertson, C., & Salter, W. (1997). *The Phonological Awareness Test.* East Moline, IL: LinguiSystems, Inc.

Schuele, C. M. (2001, February). *Phonological awareness training: An intensive program for kindergarteners and first graders.* Presentation at the Annual Convention for the Illinois Speech-Language Hearing Association.

Shanahan, T., & Barr, R. (1995). Reading recovery: An independent evaluation of the effects of an early instructional intervention for at-risk learners. *Reading Research Quarterly, 30*, 958-996.

Share, D. (1995). Phonological recoding and self-teaching: Sine qua non of reading acquisition. *Cognition, 55*, 155-218.

Share, D., & Stanovich, K. (1995). Cognitive processes in early reading development: Accommodating individual differences into a model of acquisition. *Issues in Education, 1*, 1-57.

Skjelfjord, V. J. (1976). Teaching children to segment spoken words as an aid in learning to read. *Journal of Learning Disabilities, 9*, 297-305.

Snowling, M., & Hulme, C. (1989). A longitudinal case study of developmental phonological dyslexia. *Cognitive Neuropsychology, 6*, 379-401.

Stackhouse, J. (1997). Phonological awareness: Connecting speech and literacy problems. Ch. 7 in Hodson, B. and Edwards, M. (Eds.). *Perspectives in applied phonology*. (pp. 154-190).

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 27*, 360-406.

Stark, R. E., Bernstein, L. W., Condion, R., Bender, M., Tallal, P., & Catts, H. (1984). Four year follow-up study of language impaired children. *Annals of dyslexia, 34*, 49-68.

Stuart, M. (1999). Getting reading for reading: Early phoneme awareness and phonics teaching improves reading and spelling in inner-city second language learners. *British Journal of Educational Psychology, 69*, 587-605.

Swank, L. K., & Catts, H. W. (1994). Phonological awareness and written decoding. *Language, Speech, and Hearing Services in Schools, 25*, 9-14.

Swartz, S. L., & Klein, A. F. (Eds.). (1997). *Research in reading recovery*. Portsmouth, NH: Neinemann.

Torgesen, J. K. (2001). Intensive remedial instruction for children with severe reading disabilities: Immediate and long-term outcomes from two instructional approaches. *Journal of Learning Disabilities, 34*, 33-59.

Torgesen, J. K., & Davis, C. (1996). Individual difference variables that predict response to training in phonological awareness. *Journal of Experimental Child Psychology, 63*, 1-21.

Torgesen, J. K., Morgan, S., & Davis, C. (1992). The effects of two types of phonological awareness training on word learning in kindergarten children. *Journal of Educational Psychology, 84*, 364-370.

Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Lindamood, P., Rose, E., Conway, T., et al. (1999). Preventing reading failure in young children with phonological processing disabilities: Group and individual responses to instruction. *Journal of Educational Psychology, 91*, 579-593.

Troia, G. A. (1999). Phonological awareness intervention research: A critical review of the experimental methodology. *Reading Research Quarterly, 34*, 28-52.

Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (1994). Development of reading-related phonological processing abilities: New evidence of bi-directional causality from a latent variable longitudinal study. *Developmental Psychology, 30*, 73-87.

Warrick, N., Rubin, H., & Rowe-Walsh, S. (1993). Phoneme awareness in language-delayed children: Comparative studies and intervention. *Annals of Dyslexia, 43*, 153-173.

Wasik, B. A., & Slavin, R. E. (1993). Preventing early reading failure with one-to-one tutoring: A review of five programs. *Reading Research Quarterly, 28*, 179-200.

van Kleeck, A., Gillam, R. B., & McFadden, T. U. (1998). A study of classroom based phonological awareness training for preschooler with speech and/or language disorders. *American Journal of Speech-Language Pathology, 7*, 65-76.

Appendix A

Research Participation Authorization

RESEARCH PARTICIPATION AUTHORIZATION

Children with speech-language disorders are at a higher risk for developing reading difficulties. Mrs. Lacy Houska and Mrs. Marsha Maxedon, the speech-language pathologists at Shelbyville Elementary School, will be participating in a research project with an Eastern Illinois University graduate student. Mrs. Houska and Mrs. Maxedon, along with the school's Reading Recovery teacher Mrs. Ann Campbell, will be providing phonological awareness and early reading instruction for thirty minutes three times a week during your child's regularly scheduled speech-language intervention times to develop important reading skills. The intervention is expected to last approximately eight to twelve weeks. Two associate professors from Eastern Illinois University, Dr. Rebecca Throneburg and Mrs. Jean Smitley, are also working with Mrs. Houska and Mrs. Maxedon to assess the effectiveness of these lessons. I authorize permission for

_____, who is my _____ to participate
(child's name, birth date) (relationship)
in this project. I give my permission for researchers to have access to my child's school records and to use the data collected during the instruction for teaching and publications. I understand that my child's name will not be used in any descriptions or reports of data.

_____ _____
(parent signature) (parent names)

_____ _____
(address)

_____ _____
(city) (state) (zip) (phone)

_____
(date)

Appendix B

Training Procedures

Behavior I: Phonological Awareness

1. Initial Consonant Sounds
   - Emphasize the first sound of words by prolonging the first sound
     - Use a sound that you can prolong /f, s, sh, v, z, r, l, m, n/
     - Do not say the schwa after a sound
     - Refer to handout for focusing on initial sound
     - See below for helpful comments/elaboration
   - Lay 4 picture cards in front of child, say the sound, have the child point to the correct picture that matches the initial sound
     - Continue to emphasize initial sound when child is still learning
     - Use motivators (games) to maintain interest
   - Use your judgment to gradually fade out the use of pictures. Say a word and ask the child to tell you the first sound heard in the word.
2. Final Consonant Sounds
   - Follow same procedure as above, but emphasize the final sound of a word
3. Phoneme Blending
   - Place 5 picture cards in front of child. Say the word by separating the first sound from the rest of the word. (see below for example) Ask the child to say the two parts closer together and point to the picture that matches the spoken word
   - Remove picture cues as the child develops the above skill
   - Say two sounds (Consonant Vowel (CV) or Vowel Consonant (VC)) separately and ask the child to blend the two sounds together. Use plain blocks to represent the individual sounds.
   - Progress to blending three sounds together (CVC). Begin with presenting the three segmented sounds verbally using the plain blocks. Ask the child to say the sounds closer together to make a word. If the child needs additional visual cues at first, place picture cards from the decoding pile in front of the child to provide indication of the word. Gradually fade out pictures.
4. Phoneme Segmenting
   - Use the plain blocks to visually represent that words can be separated into sounds. Model VC and CV words by putting the blocks close together and saying the word, then pulling the blocks apart and saying the two separate sounds.
   - Verbally present the child with a CV or VC word. Ask him or her to say the two sounds heard in the word. Use plain blocks, and have the child point to each block as he or she says the corresponding sound.
   - Place 5 cards from the decoding pile in front of the child. Verbally present the child with a CVC word from the selection. Demonstrate using the train that the word has three separate sounds by placing a block on each car of the train while you say the word. Have the child point to corresponding picture. Gradually fade out the use of pictures by verbally presenting the word and asking the child to say the three separate sounds

(the train and blocks may still be used). Gradually fade out the use of the visual aids.

Elaborating correct/incorrect answers (examples)

- Yes, the word _____ begins with /__/ sound. (emphasize the targeted sound by separating and prolonging it slightly from the rest of the word)
- No, the word _____ starts with the /___/ sound. Listen closely to the sound. Say the sound. Try to find the picture that starts with the /__/ sound.
- No, the word _____ starts with the /___/ sound. Listen closely to the sound. Say the sound. Now you say the sound. Tell me what each picture is and see if the beginning sound matches the sound we are talking about.

You may use blocks as a visual aid if the child struggles to understand the concept of first or last sound.

Reinforcement may be used as an additional motivator

Blending-Onset/rime pronunciation examples

t------ime d------ime st-----op pl------ate str------ing

Behavior II: Phoneme-Grapheme Correspondence

1. Determine unknown sound-letter correspondences (including lax vowels)
2. Introduce an unknown sound-letter correspondences (make sure that lax vowels are interspersed equally)
    - Describe acoustic/articulatory postures (see chapter 6 handout)
    - Ask child to produce phoneme and say how it feels
    - Provide further elaboration and practice, following the child's description
    - Use a mirror to help the child see his or her mouth movements
3. Discriminate the sound from other sounds (verbally and visually)
    - Say different phonemes while instructing the child to look and listen to what you are saying. Have the child tell you whether the sound was the targeted sound or a different sound.
4. Introduce the letter that corresponds with the sound
    - Show the child the letter tile that matches the sound
    - Read "My S Soundbox" while emphasizing the acousting/articulatory and graphic representation of the sound. Have the child find examples in the story.
        - "Did you hear the /s/ sound?"
        - "Please show me the letter that makes the /s/ sound on this page."
    - Have the child practice writing the sound
        - Provide special alphabet paper
        - Have them say the sound as they write it, elaborate as they write
5. Place 5 picture cards in front of child and ask him or her to identify the picture(s) that contain the targeted sound.
6. Play Memory or Go Fish using sound-letter correspondences that were previously known, previously introduced, or currently targeted.
    - e.g., "do you have a letter that says "/s/"

**Introduce 2 sounds per session. Introduce the second sound after step number 5. Perform step 6 after both sounds have been introduced.

**Once all sound-letter correspondences are introduced, review correspondences that the child is experiencing difficulty.

Behavior III: Decoding and Spelling

Decoding Baseline

Begin with decoding baseline by choosing 5 CVC words from the green baseline cards. Write the word in the left hand column. Transcribe what the child says in the middle column.
Directions: "I want you to read these words. Remember to think about the sounds that each letter makes." If student is reluctant to respond, urge them to take a guess. Provide neutral, positive praise as needed.

Spelling Baseline

Begin with spelling baseline by choosing another 5 CVC words from the green baseline cards. Write the word in the left hand column. Give the child the alphabet sheet and a pencil. Say the word and have the child write the word. Give him as much time as needed.
Directions: "I want you to spell some words. Remember to think about the sounds that each letter makes."

Training Procedures

Decoding

1. Place 5 pictures from the decoding picture cards in front of the child. Present child with 3 letter tiles that represent one of the words of the pictures. Ask the child to blend the sounds together and point to the picture that corresponds with the word. Having the child move his fingers across the tiles as he says the sounds may help him blend the words. Remove pictures as the child gains confidence.
    - Use words that contain known sound-letter correspondences to insure initial success.
2. Place the train with 3 letter blocks (representing a word from the decoding cards) in front of the child. Ask the child to slowly say the sounds of the letters while moving his or her hand across the train. Have the child say the word, then ask the child to segment the word into its individual sounds.
3. Present child with written CVC words from the yellow or pink flash cards. Tell him to think of the associated sounds with the letters and ask him to read the word.
4. Read Little Books together. Talk about sound-letter correspondences for those letters that the child is having difficulty.

Spelling

1. Verbally present a CVC word from the decoding picture cards. Tell the child to think about the sounds that he or she hears when saying the word. Place the 3 train cars or blocks in front of the child to represent the three sounds. With the

letter tiles laid out in alphabetic order, ask the child to place the letters in the correct order on the train.

- Initially, you may have to verbally segment the sounds in the word to help the child understand each separate sound. Fade the prompt as the child displays understanding.
- Use words that contain well-known letter-sound correspondences to insure success.
- As the child develops the skill, remove the train and letter tiles and have the child write the word on the special alphabet paper.

**Provide verbal praise throughout training

Appendix C

Percentage Measurements for Subjects A, B, and C

Subject A

Percentages for Daily Baselines and Weekly Measurements

Blending	66	66	92	**74**	**82**	**78**	100	100	100	100	98	-
Segmenting	30	30	24	**30**	**70**	**72**	72	100	80	96	86	-
P-G Corr.	40	53.3	40	33.3	60	36.6	**50**	**83.3**	**90**	100	96.6	96.6
Decoding	16	18	18	20	32	58	22	44	36	**78**	**68**	**80**
Spelling	2	12	14	26	14	24	18	28	20	**74**	**66**	**96**

Note. Bold typeface indicates measurements collected during treatment.

Subject B

Percentages for Daily Baselines and Weekly Measurements

Blending	14	72	36	**56**	**60**	**80**	84	80	88	92	96	-
Segmenting	0	36	0	**22**	**90**	**84**	70	94	86	100	86	-
P-G Corr.	30	30	26.6	30	36.6	40	**53.3**	**33.3**	**60**	**50**	**76.6**	90
Decoding	0	0	0	0	0	22	18	20	10	24	26	**70**
Spelling	0	10	4	8	10	12	20	4	20	4	4	**64**

Note. Bold typeface indicates measurements collected during treatment.

Subject C

Percentages for Daily Baselines and Weekly Measurements

Blending	14	44	12	**52**	**44**	**52**	**66**	**56**	96	100	64	-
Segmenting	0	36	14	**30**	**30**	**42**	**30**	**78**	72	86	30	-
P-G Corr.	66.6	66.6	43.3	26.6	60	53.3	60	73.3	**73.3**	**70**	76.6	83.3
Decoding	20	26	18	20	8	22	26	36	30	22	**44**	**70**
Spelling	18	20	18	26	30	36	42	40	58	76	**56**	**84**

Note. Bold typeface indicates measurements collected during treatment.