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A phonological awareness intervention for at-risk preschoolers: the effects of supplemental, intensive small-group instruction

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A PHONOLOGICAL AWARENESS INTERVENTION FOR AT-RISK
PRESCHOOLERS: THE EFFECTS OF SUPPLEMENTAL,
INTENSIVE, SMALL-GROUP INSTRUCTION

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

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by

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ABSTRACT

Results from phonological awareness research on assessment and intervention support two major suppositions. First, findings from correlational studies revealing that young children's phonological sensitivity is related to the future development of reading skills (Lonigan et al., 1998) validate early screening of phonological awareness to identify children who may be at risk for encountering reading difficulties. Second, experimental studies examining the effectiveness of phonological awareness instruction demonstrate that young children's phonological sensitivity can be promoted, thereby altering patterns of initial weaknesses (Bentin & Leshem, 1993; O'Connor et al., 1995b; Torgesen & Davis, 1996; Warrick et al., 1993).

The purpose of this study was to investigate the effects of small-group instruction designed to enhance whole-class phonological awareness instruction delivered to preschoolers. Intensive small-group instruction, which supplemented phonological awareness activities conducted with large classroom groups 3 times each week, was provided biweekly to students who demonstrated weaknesses in phonological awareness on pre-treatment measures. The contrast group of low-performing students participated in the whole-class phonological awareness instruction, but received no additional small-group instruction. All students enrolled in 4 different preschool classes participated in phonological awareness instruction delivered to intact classes of 17 to 20 students. Data collected on students participating in the low-skilled treatment and contrast groups and on a sample of average- to high-skilled students, serving as an additional contrast group, were analyzed to examine the effects of supplemental, intensive, small-group

phonological awareness instruction delivered to low-skilled preschoolers.

The effectiveness of supplemental, intensive, small-group phonological awareness instruction for preschoolers with little awareness of the phonological structure of language was not supported by the results of this study. Analyses of post-intervention scores revealed that the experimental treatment did not promote subjects' phonological awareness to levels significantly higher than those of the low-skilled contrast students, who participated only in phonological awareness instruction delivered to the whole class. The supplemental small-group instruction also did not promote subjects' phonological awareness to levels similar to those of the average- to high-skilled contrast students.

CHAPTER 1

INTRODUCTION

One of the most important insights into the teaching of beginning reading skills that has surfaced during the last two decades is the realization that sometimes children have trouble learning to decode because they are completely unaware of the fact that spoken language is segmented (Williams, 1987). Since phonemes are coarticulated during speech it is difficult for young children to gain access to these phonemic segments. Therefore, an awareness of the phonological segments in words and their relationship to print cannot be taken for granted in the preliterate child (Blachman, 1991). The term phonological awareness is used to describe the ability to access and manipulate the subunits of language – words, syllables, and phonemes, the smallest units of sound. A wide variety of tasks have been used to operationalize the concept of phonological awareness and to assess individual differences in phonological sensitivity (Yopp, 1988; Lonigan, Burgess, Anthony, & Barker, 1998). There is now a substantial body of evidence that measures of phonological awareness administered to children in the early grades are moderate to strong predictors of the speed with which they acquire reading fluency, which contributes to comprehension (Bryant, MacLean, Bradley, & Crossland, 1990; Share, Jorm, MacLean, & Mathews, 1984; Stanovich, Cunningham, & Cramer, 1984; Wagner & Torgesen, 1987; Wagner, Torgesen, & Rashotte, 1994).

Questions concerning the early measurement of phonological sensitivity in preschool-age children are becoming increasingly important based on findings from longitudinal studies. Torgesen, Wagner, and Rashotte (1994) followed the same group of children from kindergarten through second grade and were able to learn that individual differences in phonological processing abilities are remarkably stable from kindergarten

through second grade. They warned that such consistency might make it difficult to alter the course of phonological awareness. The stability of individual differences in young children's phonological processing abilities highlights the value of early screening of phonological sensitivity to identify children who may be at risk for reading difficulties. We are challenged to learn more about tasks that are sensitive to lower levels of phonological awareness so that children who exhibit little awareness of the phonological structure of language can be recognized early in their school careers. Adams (1990) explained that children acquire an awareness of words, then syllables, and finally phonemes. Each stage is more difficult and attained later in development. Studies that have sought to measure the phonological sensitivity of preschool-age children have considered the developmental progression of phonological awareness.

Assessing Multiple Levels of Phonological Awareness

Analyses of sensitivity to larger sound units, such as syllables, can reveal emergent levels of phonological awareness. Lonigan et al. (1998) reviewed studies that examined phonological sensitivity in preschool-age children. Convergent findings supported the concept of similar phonological processing abilities at different levels of linguistic complexity. Anthony (2001) corroborated the notion of one underlying phonological processing ability. He compared the performances of 2-, 3-, 4- and 5-year-old children on tasks that assessed word-, syllable-, onset/rime-, and phoneme-level skills, and demonstrated that children were able to handle more linguistically complex tasks as they matured. However, he concluded that preschool-age children's sensitivity to words, syllables, onsets, rhymes, and phonemes represent the same phonological ability.

The early assessment of phonological sensitivity can provide important information to be used in the development of strategies that effectively facilitate growth

in phonological awareness for all children. From their examination of correlational studies, Lonigan et al. (1998) concluded that phonological sensitivity measured during the preschool period is related to the later development of reading skills. In Felton's (1992) acknowledgment of the importance of research findings revealing strong correlations between phonological processes and reading, she cautioned that such correlations do not "provide a sufficient basis for the classification of individual children as at risk for purposes of intervention" (p. 214). Felton seems to challenge educators to discover ways to carefully use information from measures of phonological sensitivity administered to children early in their school careers to guide instructional decisions.

Promoting Phonological Awareness

Recent phonological awareness intervention studies conducted with children before they enter first grade have provided evidence that the consequences of the stability of phonological processing abilities might not be as far-reaching as Torgesen et al. (1994) hypothesized (Bentin & Leshem, 1993; O'Connor, Jenkins, & Slocum, 1995b; Torgesen & Davis, 1996; Warrick, Rubin, & Rowe-Walsh, 1993). Torgesen and Davis (1996) found that phonological awareness training had a significant impact on the pattern of individual differences in phonological sensitivity. O'Connor et al. (1995b), Warrick et al. (1993), and Bentin and Leshem (1993) found that when children with low pre-training scores on measures of phonological awareness, as well as children with general language delays, were provided with phonological awareness instruction, their levels of phonological sensitivity and early reading skills were brought to levels similar to those children with high levels of initial phonological sensitivity.

Other researchers have examined how instruction designed to promote phonological awareness affects young children attending kindergarten or preschool. Extensive experiments have been conducted to explore the effects of phonological awareness instruction on children before they enter first grade. However, their instructional focuses and the sizes of their instructional groups differed. The majority of phonological awareness interventions with prereaders instructed students in small groups of 3 to 7 (Ball & Blachman, 1991; Byrne & Fielding-Barnsley, 1991; Cunningham, 1990; Fox & Routh, 1984; O'Connor et al., 1995b; Tangel & Blachman, 1992; Torgesen, Morgan & Davis, 1992; see exhaustive list in Table 1). Most of these researchers limited their investigations to the effects of training in phoneme-level skills, such as identity, analysis, synthesis, or a combination of instruction in both blending and segmenting. Only five groups of researchers instructed whole classes (Brady, Fowler, Stone & Winbury, 1994; Haddock, 1976; Lundberg, Frost & Petersen, 1988; O'Connor, Notari-Syverson & Vadasy, 1996; Schneider, Kuspert, Roth, Vise & Marx, 1997). With the exception of the study conducted by Haddock (1976), all of the whole-class interventions included instructional activities that focused not only on phoneme-level tasks, but also on the manipulation of phonological units larger than the phoneme, such as syllables. Table 2 provides descriptive information on whole-class phonological awareness intervention studies.

Table 1

Small-Group Phonological Awareness Interventions

Study	<u>N</u>	Description
Ball & Blachman, 1992 (Phoneme Segmentation)	89	Kindergartners – readers and (Table 1 continued)

Table 1 continued

			children scoring 1.5 <i>SD</i> below the mean on PPVT-R were eliminated.
Bentin & Leshem, 1993 (Phoneme Segmentation)	81		Kindergartners, those scoring within the lowest quartile on pre-treatment measures of phonological awareness.
Byrne & Fielding-Barnsley, 1991 (Phoneme Identity)	126		Preschoolers
Castle et al., 1994 (Phoneme Analysis and Synthesis)	Exp.1 30 Exp.2 51		Kindergartners – children who scored 1.5 <i>SD</i> below the mean on PPVT-R were eliminated, as were those with a pre-treatment score on a test of phonemic awareness of 20 out of 42.
Cunningham, 1990 (Phoneme Analysis and Synthesis)	84		42 kindergartners and 42 first-graders.
Ehri & Wilce, 1987 (Phoneme Identity)	30		Kindergartners, children were eliminated if they were readers

Table 1 continued

		or if they could not name most letters or did not know at least 7 of 9 consonant sounds.
Fox & Routh, 1976 (Phoneme Synthesis)	40	Preschoolers
Fox & Routh, 1984 (Phoneme Analysis and Synthesis)	31	Kindergartners who could not segment syllables into phonemes.
Hohn & Ehri, 1983 (Phoneme Segmentation)	24	Kindergartners- subjects were able to name letters but unable to phonetically segment or read preprimer words.
Korkman & Peltomaa, 1993 (Multiple Levels of P. A.)	46	Male children with language impairments attending a preschool treatment program the year before they entered first grade.

Table 1 continued

Murray, 1998 (Phoneme Analysis and Synthesis)	48	Kindergartners
O'Connor et al., 1993 (Phoneme Analysis and Synthesis)	47	4-, 5-, or 6- year-olds with developmental delays – 80% had significant language delays; some had additional disabilities such as physical handicaps or mental retardation or behavior disorders. Children who scored higher than 30% on a measure of phonemic categorization were eliminated.
O'Connor et al., 1995a (Phoneme Segmentation)	10	5-and 6-year-old kindergartners eligible for special education under the category of developmental delays.
O'Connor et al., 1995b (Multiple Levels of P. A.)	67	Kindergartners – those who scored between 0 – 30% on pretests of phonological awareness. (25

Table 1 continued

		students from those scoring above 50% served as an additional contrast .)
Tangel & Blachman, 1992 (Phoneme Segmentation)	147	Kindergartners – readers and children who scored 1.5 <i>SD</i> below the mean on PPVT-R, or who could not demonstrated 1 to 1 correspondence, or who had severe articulation problems, were eliminated.
Torgesen et al., 1992 (Phoneme Analysis and Synthesis)	51	Kindergartners – those who scored between 15% - 50% on pretests of phonological awareness; students with poor attendance, behavior problems, or attended special classes were eliminated.
Torgesen et al., 1996 (Phoneme Analysis and Synthesis)	100	Kindergartners – children who scored below 80% on a short

Table 1 continued

		measure of phonological awareness.
Ukrainetz et al., 2000 (Phoneme Identity and Segmentation)	36	31 kindergartners and 5 preschool students attending early childhood centers.
Warrick et al., 1993 (Multiple Levels of P. A.)	42	28 kindergartners with language delays; 14 kindergartners without language delays served as one contrast group.

Table 2

Whole-Class Phonological Awareness Interventions

Study	<u>N</u>	Description
Brady et al., 1994 (Multiple Levels of P.A.)	42	Kindergartners – students whose scores on spring administration of PPVT-R were below 80 were eliminated (3 eliminated from training and 5 from contrast).

(Table 2 continued)

Table 2 continued

Haddock, 1976 (Phoneme Synthesis)	64	Preschoolers
Lundberg et al., 1988 (Multiple Levels of P.A.)	390	Kindergartners
O'Connor et al., 1996 (Multiple Levels of P.A.)	107	Kindergartners with and without disabilities (57 in regular classrooms; 19 in transition classrooms; 14 with disabilities integrated in regular classrooms; 17 in a self-contained class)
Schneider et al., 1997 (Multiple Levels of P.A.)	371	Kindergartners

Convergent research findings gathered from a review of these intervention studies support two major conclusions. First, phonological awareness instruction significantly contributed to growth in young children's phonological sensitivity. Second, this heightened phonological awareness positively impacted their reading abilities. Positive results were found for both large- and small-group instruction, whether training

covered the broad range of phonological awareness or was restricted to phoneme-level activities.

Findings from these intervention studies supply educators with a wealth of information regarding phonological awareness instruction; however, at least four important questions remain to be answered. The first two questions relate to children at risk for developing reading difficulties. First, one goal of future research should be to develop methods to determine which children will require extensive support in order to acquire higher levels of phonological awareness and subsequent reading skills. O'Connor et al. (1996) and Brady et al. (1994) noted that some children do not demonstrate appreciable growth in their phonological awareness from whole-class instruction and may require supplemental help in the form of extra instruction. Second, other questions remain to be answered regarding the type and amount of instructional support these students may need. The third question addresses the needs of preschoolers. Cunningham (1990) proposed that at a certain age, instruction might be more critical to the development of phonological awareness than a child's developmental level. Only 4 of 24 phonological awareness intervention studies contained in the National Reading Panel's (2000) phonemic awareness database and reviewed in Chapter 2 (see Tables 1 and 2) included preschoolers as subjects (Byrne & Fielding-Barnsley, 1991; Fox & Routh, 1976; Haddock, 1976; Ukrainetz, Cooney, Dyer, Kysar, & Harris, 2000). Additional research needs to examine the effects of phonological awareness on preschoolers. Finally, although Brady et al. (1994), Haddock (1976), Lundberg et al. (1988), O'Connor et al. (1996), and Schneider et al. (1997) found that phonological awareness instruction incorporated into existing whole-class routines effectively promoted students'

phonological sensitivity, no study has investigated the comparative effectiveness of whole-group to small-group instruction.

Purpose of the Study

In summary, phonological awareness research on assessment and intervention supports two major suppositions. First, findings from correlational studies which indicated that young children's phonological sensitivity is related to later development of reading skills (Lonigan et al., 1998) validate early screening of phonological sensitivity to identify children who may be at risk for reading difficulties. Second, experimental studies of the effectiveness of phonological awareness training revealed that young children's phonological awareness can be promoted, thereby altering patterns of initial weaknesses (Bentin & Leshem, 1993; O'Connor et al., 1995b; Torgesen & Davis, 1996; Warrick et al., 1993).

Additionally, three tentative conclusions may be drawn regarding instruction designed to promote the phonological awareness of students before they enter first grade. First, children with low initial levels of phonological awareness can be brought to reading levels similar to those children with high levels of initial phonological awareness (Bentin & Leshem, 1993; O'Connor et al., 1995b; Warrick et al., 1993). Second, training that combined blending and segmenting instruction seemed to be more effective than training limited to identity, analysis or synthesis (Fox & Routh, 1984; Murray, 1998; Torgesen et al., 1992). Finally, classroom teachers can effectively incorporate phonological awareness instruction into whole-group routines (Haddock, 1976; Lundberg et al., 1988; Schneider et al., 1997). However, some children may require more intensive instruction than that delivered to the entire class (Brady et al., 1994; O'Connor et al., 1996).

The purpose of this study was to investigate the effects of small-group instruction that was designed to enhance whole-class phonological awareness instruction delivered to preschoolers. Intensive small-group instruction was provided to students who demonstrated weaknesses in phonological awareness on pre-treatment measures. This small-group instruction was delivered 2 times each week for 6 weeks and supplemented the phonological awareness instruction delivered to the whole class 3 times each week. The investigator conducted all whole-class and small-group instructional sessions for 15 to 20 minutes. The contrast group of low-performing students participated in the whole-group phonological awareness instruction conducted in their classrooms, but received no additional small-group instruction. Although these two groups of students identified by low scores on pre-treatment measures of phonological awareness were the primary focus of this study, average- and high-skilled students also participated in the phonological awareness instruction delivered to intact classes of 20 students. Data were also collected on a sample of these average- to high-skilled students, so they could serve as an additional contrast group. Treatments were based on the oral language activities developed by Adams, Foorman, Lundberg & Beeler (1998), which were modeled after the program originally conducted and validated by Lundberg et al. (1988).

Research Questions

This study addressed two questions.

Question One

Can supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers promote their phonological sensitivity to levels significantly higher than those of low-skilled preschoolers who participate only in phonological awareness instruction delivered to the whole class?

Question Two

Can supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers promote their phonological sensitivity to levels similar to their average- or high-skilled classmates who participate only in phonological awareness instruction delivered to the whole class?

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter presents a comprehensive review of the literature on phonological awareness intervention studies whose subjects were students attending kindergarten or preschool. Three major conclusions can be drawn from this literature review. First, studies showed that both phonological awareness and reading can be positively impacted through phonological awareness instruction with varying instructional focuses, whether training included activities to manipulate phonological units larger than the phoneme or was restricted to phoneme-level activities (Brady et al., 1994; Byrne & Fielding-Barnsley, 1991; Cunningham, 1990; O'Connor et al., 1996; Warrick et al., 1993). Second, studies demonstrated that growth in phonological awareness and reading skills can be accomplished through both small-group and whole-class phonological awareness instruction (Fox & Routh, 1984; Lundberg et al., 1988, Schneider et al., 1997; Torgesen et al., 1992). Finally, studies revealed that students initially low in phonological awareness can be brought up to average levels in reading after phonological awareness instruction (Bentin & Leshem, 1993; O'Connor et al., 1995b; Warrick et al., 1993). This chapter provides (a) background information on the levels of phonological awareness; (b) a brief description of the process I used to locate relevant studies; (c) findings from small-group phonological awareness intervention studies organized according to instructional focus; and (d) findings from whole-class phonological awareness intervention studies.

Levels of Phonological Awareness

Adams (1990) proposed that phonological awareness, which describes the ability to access and manipulate the subunits of language, progresses through levels of difficulty

She noted that linguistic awareness appears to be tied to the capacity to actively attend, and claimed that for purposes of learning to read or write, the subunits of language – words, syllables, and phonemes – must be “dug out of . . . normal, subattentional status” (p. 294). Adams claimed that in order to attend to these subunits children must “push their attention down from the level of comprehension” and that “the deeper in the system they must push, the harder it is to do” (p. 295). She presented a phonological hierarchy based primarily on the relative correlations between children’s reading acquisition and their awareness of spoken words, syllables, and phonemes, explaining that children acquire an awareness of words, then syllables, and finally phonemes. Each stage is more difficult and attained later in development.

The question, “What kind of child could be unaware of words?” was addressed by Adams as she related findings from Karpova’s 1955 study on word awareness and subsequent studies conducted by Ehri on emerging reading abilities. The youngest child who Karpova studied focused on the number of idea units that each sentence conveyed. At the next stage, children were able to segment propositions into subject and predicate terms. Children did not begin to break sentences into individual words until the third level. However, researchers have demonstrated that it is fairly easy to train children to attend to words. Adams acknowledged that most children do not require formal training to learn about words. Many learn through exposure to print.

Compared with words, syllables are further away from meaning, but closer to the smallest subunits of language – the phoneme. Adams questioned why the level of syllabic awareness required for detection and counting is important to predicting early reading skills. One explanation might be that “the capacity to know when one has a good, familiar syllable . . . may be an essential mediator of the child’s ability to sound out

visually unfamiliar words” (p. 302). As Adams reported, Blachman’s (1984) work with low-readiness kindergartners and first graders revealed that although the correlation between rhyme production and phonemic segmentation was close to zero, they were both strongly correlated with the children’s ability to tap out syllables. Adams explained these results by stating that “syllabic awareness constitutes an essential link between that seemingly easy-to-acquire ability underlying our sensitivity to sound similarity and rhyme and that hard-to-acquire capacity to recognize individual phonemes “ (p. 303).

Adams supported her claim that there might exist a “psychologically real level of analysis that sits between the syllable and phonemes” (p. 307) with the fact that it is so much more difficult for a child to develop an awareness of phonemes than syllables. She explained that the syllable can be divided into two parts: the onset and the rime. The rime consists of the vowel and any consonant sounds that come after it. If there are any consonant sounds that precede the vowel they make up the onset. Treiman and Zukowski (1991) described findings from research that supported the notion that it is relatively difficult to break either the onset or rime into its phonemic components, although it is fairly easy to break the onset away from the rime.

Literature Search

To select studies for this review of phonological awareness intervention studies, I first looked at the studies included in the National Reading Panel’s (NRP) phonemic awareness database (National Reading Panel, 2000). In their Reports of the Subgroups, the NRP described their processes for selecting relevant research. PsychINFO and ERIC databases were searched for studies focused on phonemic awareness and children’s reading development and published in English in a refereed journal. To be included in the NRP analyses, the studies had to meet the following criteria: study participants and

interventions had to have been carefully described, and outcome measures had to have been fully described. Additionally, the methods sections had to have provided readers enough information to allow judgments about instruction fidelity. Based on these criteria I believed that the information obtained from these research studies would be valid.

My focus was limited to an examination of studies whose subjects were kindergartners or preschoolers, so I eliminated any NRP study whose participants were first- or second-graders. The NRP reviewed 31 studies that examined how kindergarten or preschool students were impacted by phonological awareness instruction. I did not include in my review the one study that investigated the effects of computer-aided instruction. Nine of the remaining 30 journal articles were unavailable (see Appendix A for a listing of these articles). This effort generated a total of 21 articles (Ball & Blachman, 1991; Bentin & Leshem, 1993; Brady et al., 1994; Byrne & Fielding-Barnsley, 1991; Castle, Riach, & Nicholson, 1994; Cunningham, 1990; Ehri & Wilce, 1987; Fox & Routh, 1976, 1984; Haddock, 1976; Hohn & Ehri, 1983; Korkman & Peltomaa, 1993; Lundberg et al., 1988; Murray, 1998; O'Connor & Jenkins, 1995a; O'Connor et al., 1995b; O'Connor et al., 1996; Schneider et al., 1997; Tangel & Blachman, 1992; Torgesen et al., 1992; Warrick et al., 1993). I located 3 additional articles from a supplementary search of the ERIC database using the descriptor, "phonemic awareness." These studies appeared to meet the NRP's selection criteria (O'Connor, Jenkins, Leicester, & Slocum, 1993; Torgesen & Davis, 1996; Ukrainetz et al., 2000). See Tables 1 and 2 for descriptions of the subjects in each study.

Analysis of this body of literature is important to expanding our understanding of effective methods to promote young children's phonological awareness. This knowledge should lead to improved instructional practices. The purpose of this chapter is to describe

research related to the proposition that phonological awareness training can facilitate the development of young children's phonological awareness and subsequent reading abilities. Some of the phonological awareness interventions were conducted with small groups of students and some with large classroom groups. First, I describe those phonological awareness interventions that were conducted with small groups of students. The instructional focuses of these small-group studies varied. Some examined the effects of instruction that combined experiences blending and segmenting phonemes, while others investigated training in only phoneme segmenting, phoneme blending, or phoneme identity. A few considered the developmental progression of phonological awareness in their instructional designs.

Findings of Small-Group, Multiple Level Studies

Warrick et al. (1993), O'Connor et al. (1995b), and Korkman and Peltomaa (1993) included activities that engaged students in the manipulation of phonological units larger than the phoneme, such as syllables, as well as phoneme-level tasks in their instruction. Their reasons for covering a broad range of phonological awareness tasks differed somewhat. Both Warrick et al. (1993) and Korkman and Peltomaa (1993) were interested in how phonological awareness instruction would impact children with language impairments. Since these children with language delays were experiencing difficulty with some of the early developing phoneme analysis tasks, activities at the level of syllable awareness were introduced first. O'Connor et al. (1995b) did not limit their phonological awareness instruction to children with language delays. They included children from both regular and special education classes. The purpose of their study was to compare the effects of two variations of phonological awareness instruction. Convergent findings from these three studies support the conclusion that both

phonological awareness and reading can be positively impacted through phonological awareness intervention.

Studies Supporting Growth in Phonological Awareness and Reading

Warrick, Rubin and Rowe-Walsh (1993)

Methodology. The purpose of this study was to determine if changes could be made in the linguistic awareness of children with language delays and what effect, if any, these changes might have on subsequent reading and writing development. In this study 14 children with language delays participated in 20-minute training sessions twice weekly for 8 weeks. Fourteen normally developing and 14 children with language delays served as controls. All children scored within the average range on at least one of the non-verbal subtests of the Wechsler Preschool and Primary Scale of Intelligence. The fourteen treated children were trained in groups of 7 by the same experimenter. Activities at the level of syllable awareness were introduced first. Phoneme analysis training began at the level of initial phoneme segmentation and started by using iteration, teaching the children to repeat the initial phoneme in a word (e.g., *w-w-wag*). The other target areas included rhyming and explicit phoneme segmentation.

Results. The phonological awareness pretests were readministered after the training period. The students with language delays who participated in the training group made significantly greater gains on repairs, manipulations, rhymes and final segmentation than the students with language delays who formed the control group. The findings to which educators should pay special attention are those that revealed no significant differences between the normally developing control group and the language-delayed training group on any of the phonological awareness tasks following the intervention.

All subjects were tested one year following the intervention, at the end of first grade, on measures of real-word and non-word reading. The Woodcock word identification and word attack subtests were administered. The children with language delays who had received training scored significantly better than the control group with language delays on both reading subtests and did not score significantly different from the second control group, comprised of children with normally developing language skills, on these reading measures.

O'Connor, Slocum and Jenkins (1995b)

Methodology. The purpose of this study was to examine the effects of two variations of phonological awareness instruction, phoneme blending and segmenting or a global array of phonological tasks. Their participant pool included 268 kindergarten students from 4 elementary schools. Sixty-seven children were randomly selected for the low-skilled experimental group based on pretest scores of 0 – 30% on two phonological subtests, blending and segmenting single-syllable words from and into onset-rime. None of the children for whom English was their primary language were excluded based on scores from the PPVT-R. Children who scored above 50% on the phonological measures were categorized as high-skilled children. Fourteen high-skilled children were eliminated because they were identified as readers. Twenty-five of the high-skilled non-readers across all four schools served as the highly skilled comparison group.

Two treatment groups were included in this study. Training was done on a pullout basis, apart from classroom instruction, in groups of 3 to 5 children for 15 minutes twice per week for 10 weeks. The blending-segmenting treatment began with stretched blending (*sssack*) in onset-rime format, weeks 1 – 3, then progressed to phoneme blending using picture cues. Instruction in segmentation also began with onset-rime, then

phoneme segmentation with Elkonin boxes. During the last 5 weeks, 3 minutes of instruction on 8 letter-sound relationships was added.

The second treatment group was considered a global treatment. It combined many different types and examples of phonological manipulation. The first sessions consisted of word in sentences and syllable in words manipulation and progressed to phoneme manipulation in the second week. By the third week each global lesson included a focus “word of the day” (e.g., *sat*), and the teacher guided children through several distinct manipulations with the target word – blending, segmenting, counting, isolating, and deleting phonemes, as well as producing rhyming words and identifying words that do not rhyme. Letter-sound instruction began in week 5.

Results. O’Connor et al. (1995b) compared the post-intervention scores of treated children on measures of phonological awareness to both groups of control students, high- and low-skilled. The first analysis compared the three low-skilled conditions (both treatments and the control). Among blending, segmenting, rhyme production, rapid letter naming, and syllable deletion, only blending and segmenting yielded significant differences. Both treatment groups outperformed the control group on measures of blending and segmenting; however, the treatment groups did not differ from each other. The second analysis involved a comparison of the two groups of treated low-skilled children with the comparison group of 25 high-skilled children, who received no training. Children in the low-skilled treated groups were brought to levels similar to the high-skilled students in blending and segmenting.

These researchers also administered the *Lindamood Auditory Conceptualization Test (LAC)* to estimate transfer of learned phonological skills to a broader, more generalized, phonological context. On the *LAC*, children who participated in both low-

skilled treatment groups significantly outperformed students in the low-skilled control group. Treated children also scored comparably on the *LAC* to the students with initial high levels of phonological awareness, who received no treatment.

O'Connor et al. (1995b) also examined the impact that phonological awareness training had on children's abilities to learn to decode words. They conducted reading analog tests immediately following the intervention and reported the number of learning trials a student required to read all of the words correctly (maximum of 25 trials permitted). The treated groups significantly outperformed the low-skilled control group on the reading analog tests. Of extreme importance is the fact that the treated students' performances on the reading analog tests were similar to those of students in the high-skilled control group. O'Connor et al. (1995b) did note that, although there were no significant differences between the scores of students in the two treated groups, the blending-segmenting children required fewer trials to reach criterion on the reading analog tests than the children who participated in the more global phonological awareness treatment. They proposed that this finding suggested that the more global treatment, which included activities at multiple levels of phonological awareness, was not more effective than the treatment that limited instruction to phoneme level activities.

Study Supporting Growth in Reading, but not Phonological Awareness

Korkman and Peltomaa (1993)

Methodology. Like Warrick et al. (1993), Korkman and Peltomaa (1993) were also interested in how phonological awareness instruction would impact children with language impairments. The purpose of this study was to investigate the effects of a phonological awareness training program on children with language impairments. Male children who had subnormal performances on at least three of seven neuropsychological

language tests, but normal intelligence as measured by the Wechsler Preschool and Primary Scale of Intelligence, served as the participant pool for this study. Twenty-six children were randomly selected to receive training, and a group of 20 boys was drawn from the original pool of children with language impairments to match the experimental group statistically with respect to age, SES, intelligence, and performance on the neuropsychological tests. Small groups of 2 to 5 children participated in the training of phonological awareness and grapheme-phoneme conversions during one 45-minute session per week. The number of weeks included in the intervention period was not noted in this article. Exercises to enhance phonological analysis of words and speech were based on Lundberg et al.'s (1988) training program.

Results. At the end of their first school year, one year after training, the children were reexamined with all neuropsychological tests that had been employed as pretreatment tests and with reading and spelling tests. The differences between the groups on the neuropsychological assessment only reached significance on the Relative Concepts and Naming Token tests. On the posttreatment reading and spelling measures, a standardized Finnish test, the Screening Test of Reading and Spelling, Grades 1 and 2, the experimental group performed significantly better than the control group on measures of reading comprehension and spelling, but not on the mechanical reading test.

Summary of Findings from Small-Group, Multiple Level Studies

Convergent results from these small-group intervention studies, which included lessons that focused on the manipulation of larger phonological units, as well as phoneme-level activities, demonstrated that such instruction significantly contributed to growth in children's phonological sensitivity, which positively impacted their reading abilities. Of particular importance, is the additional finding that on post-intervention

measures of phonological awareness treated students in studies conducted by Warrick et al. (1993) and O'Connor et al. (1995b) performed similarly to control students with high levels of initial phonological awareness. Similar results were also found on post-treatment reading measures.

Findings of Small-Group Phoneme Blending and Segmenting Studies

Six studies examined the effects of training in both phoneme analysis and synthesis. These research findings also support the conclusion that both phonological awareness and reading can be positively impacted through phonological awareness instruction. Only O'Connor et al. (1993) failed to find significant treatment results. The remaining experiments demonstrated the statistically significant impact that phoneme blending and segmenting training can have on children's phonological awareness. Cunningham (1990), Fox and Routh (1984), and Torgesen et al. (1992) also found that treated children significantly outperformed children in control groups on reading measures. Fox and Routh (1984), Torgesen et al. (1992), and Murray (1998) found that instruction that combined both blending and segmenting skills was more effective than phoneme identity training, or training in blending or segmenting only.

Studies Supporting Growth in Phonological Awareness and Reading

Cunningham (1990)

Methodology. In this study, Cunningham investigated the effectiveness of instruction in phoneme blending and segmenting, compared to no treatment. She also added an interesting dimension to her study. She included a metalevel instructional group at each grade level, where children were trained to reflect on their thinking about phonemic awareness and link it to reading skills. The purpose of this study was two-fold: (a) to determine whether training in phonemic awareness influences kindergarten and

first-grade children's subsequent reading ability; and (b) to specify the components of instruction that would affect the acquisition of phonemic awareness. Forty-two kindergartners and 42 first-grade students participated in this study. Groups of 3 were formed, matched on the basis of age and pretest scores from achievement and aptitude tests (Metropolitan Reading Achievement Test, readiness level 1 and primer, and Otis-Lemon School Ability Test, primary), and randomly assigned to 2 experimental groups or the control group. There were three groups of 14 kindergartners and three groups of 14 first-grade students.

Training lasted 10 weeks. Students were trained in groups of 4 or 5, twice per week, for 15 to 20 minutes. The experimental groups focused on phonemic awareness, and the core of each program was identical in regard to the acquisition of phonemic awareness. The control group received a different form of instruction. They listened to stories and answered questions. Students in both treatment groups received instruction in phonemic segmentation and blending. Analysis was introduced first, and children used wooden chips to count the phonemes in words. They were taught to recognize first, last and medial sounds in words. Synthesis was taught after analysis was introduced. First a puppet would say the first sound of the word, then the remaining part (blending at the onset/rime level). Finally, he would say all of the sounds in a word. One experimental treatment was described as skill and drill. The second treatment provided students with phonemic awareness instruction at a metalevel. In the metalevel treatment, after the phonemic awareness skill was taught it was linked to the activity of reading. Children reflected on their thinking regarding phonemic awareness and how they could use the skill when they came across a word they didn't know.

Results. The experimental groups performed significantly better than the control groups in both grades on all three measures of phonemic awareness. Treatment effects were larger for the groups of kindergartners, possibly due to ceiling effects for first-graders. The type of phonemic awareness instruction (skill and drill or metalevel) did not make a significant difference in children's levels of phonemic awareness. An interesting comparison was made between the scores of treated kindergartners on three measures of phonemic awareness and those of the first-grade control group taken at the same time. The trained kindergartners performed markedly better on all three tasks of phonemic awareness. The dramatic difference in the growth of phonemic awareness between the untrained first-graders and the trained kindergartners illustrated the fact that an awareness of phonemes does not appear to develop fully without some instruction. Cunningham (1990) concluded that at a certain age, instruction might be more critical to the development of phonemic awareness than a child's developmental level.

Results from the Metropolitan Achievement Test revealed that training in phonemic awareness facilitated reading performance. Experimental groups performed significantly better than the control groups on this reading test. The type of phonemic awareness instruction (skill and drill or metalevel) made a significant difference in first-grade students' reading achievement. The knowledge learned via a metalevel approach seemed to generalize to a more global measure of reading achievement. The metalevel instruction appeared to be more important for first-graders, who were expected to transfer phonemic awareness skills to reading tasks, than for kindergartners.

Fox and Routh (1984)

Methodology. Like Cunningham (1990), Fox and Routh (1984) also investigated the effectiveness of instruction in both blending and segmenting. They not only compared

the effects of instruction in phoneme analysis and synthesis to no instruction. Fox and Routh examined how a combination of instruction in blending and segmenting compared to phoneme segmentation training only. The purpose of this study was to examine the effects of phonemic analysis and synthesis on a reading analog task. Forty-one kindergarten students participated in this study. Thirty-one kindergartners who could not segment syllables into phonemes were randomly assigned to one of three conditions. Ten participated in segmenting training and 10 were trained in segmenting and blending. Eleven students served as a control group of nonsegmenters. Ten children who had obtained high scores on the Fox-Routh phoneme segmentation task served as a second control group. The children assigned to either of the experimental groups received training in groups of 5 or 6. They were trained for 15 minutes, 4 or 5 days per week, for 5 weeks. All students in the experimental groups received letter-sound training.

Results. Students were posttested using the Fox-Routh phonemic segmentation task and the Roswell-Chall blending task. Children in both experimental groups performed significantly better than the control group of nonsegmenters on the phonemic segmentation task. The students who were trained in segmenting and blending significantly outperformed those trained in segmenting alone. Even after training, all of the nonsegmenters ($n = 31$) scored appreciably below the segmenters ($n = 10$) on the Roswell-Chall blending test. Between the 3 groups of nonsegmenters, the group given segmentation training did not differ significantly in blending scores from the control group, but the blending and segmenting group performed significantly better than the group given segmenting training alone.

Fox and Routh (1984) also examined the post-intervention reading performances of students. Those children trained in segmenting and blending outperformed the group

trained in segmenting alone and the control group on a word learning task. Performances on the word learning task of students trained in segmenting alone were not significantly different from the students in the control group. Furthermore, the performances of the nonsegmenters trained in segmenting and blending on the word learning task were not significantly different in number of trials or errors from the control group of segmenters.

Torgesen, Morgan and Davis (1992)

Methodology. This study was very similar to Fox and Routh's (1984); however, Torgesen, Morgan and Davis (1992) compared instruction in both analysis and synthesis to instruction in blending alone. The purpose of this investigation was to provide a direct test of the relative effectiveness of a training program that involved both analysis and synthesis in comparison with one that involved training in synthesis only. Fifty-one kindergartners were selected from a pool of 143 in 7 different classes. They were administered the screening version of the Test of Phonological Awareness (STOPA). The students chosen to participate in this study scored between 15% - 50% on the STOPA. Based on information supplied by teachers, children who had poor attendance, behavior problems, or attended special classes were eliminated from participation in this study. Seventeen triplets were formed, matched by age and vocabulary, and randomly assigned to three groups.

The two experimental groups were an analysis and synthesis training and a synthesis training only. The third group was a language experience group that participated in instruction that was meaning oriented. Groups of 3 to 5 children met with trainers in 20-minute sessions, 3 times per week, for 7 weeks. Training for both the analysis and synthesis and synthesis only groups was preceded by 4 warm-up sessions with rhyming and beginning sound games. Students in the analysis and synthesis group

were instructed to identify beginning, middle, or ending sounds in 2- and 3-phoneme words; then to pronounce all of the sounds separately (analysis); and then to pronounce words after hearing their phonemes presented in sequence (synthesis). Students in the blending group were trained to identify the words represented by sequences of separately presented phonemes. Children were asked to identify the word that had been pronounced in its segmented form from a set of two or three pictures. Both groups were trained with the same set of seven words.

Results. Students were posttested with tests of phoneme segmentation and phoneme blending. Gain scores were computed for students in all three groups. Six students were unable to learn letter sounds and were eliminated from the final data analysis, leaving 15 students in both the analysis and synthesis and synthesis only groups, and 12 students in the language experience control group. Students in the analysis and synthesis group significantly outperformed the students in the control group and those in the synthesis only group on the test of segmentation. Students in both experimental groups significantly outscored the control group on the test of phoneme blending.

Reading tests also supported the effectiveness of this phonological awareness intervention. Students in the analysis and synthesis group significantly outperformed the control group on a reading analog test. There were no significant differences between the synthesis only and control groups on the reading analog test. Torgesen et al. (1992) concluded that the strong blending skills reached by the synthesis only group were not sufficient to produce reliable differences in their word-learning abilities.

Studies Supporting Growth in Phonological Awareness, but not Reading

Murray (1998)

Methodology. Like the studies conducted by Fox and Routh (1984) and Torgesen et al. (1992), Murray (1998) compared the effects of training in phoneme manipulation, both analysis and synthesis, to an alternative phonological awareness treatment. The alternative treatment was a more limited phonological awareness instruction, phoneme identity. Murray's second contrast treatment involved indirect language experiences. The purpose of this study was to discover if children learn better about the phonemic structure of words through instruction in generalized manipulation skill, through instruction in particular phoneme identities, or through indirect language experiences. Forty-eight kindergartners were randomly assigned to one of three treatment conditions. Children whose raw scores on the Peabody Picture Vocabulary Test were below 37 did not participate in this study.

Participants in all three treatment conditions – phoneme manipulation, phoneme identity, or indirect language experiences – were individually taught the letter-phoneme correspondences for eight letters that would appear on posttest materials. The phoneme identity treatment was designed to familiarize participants with a limited set of phonemes. Students learned to identify target phonemes in both the initial and final positions in words. The identity group engaged in some phoneme manipulation activities, but only to blend or segment the target phoneme. The activities included in the manipulation treatment involved the manipulations of blending and segmentation, first as onset and rime activities and later using the complete phoneme sequence. The activities of the language experience group did not include explicit instruction in phoneme awareness.

Results. Results from the TPM, an experimenter-constructed test to measure the ability to manipulate phonemes, revealed that both phoneme awareness instructional groups significantly outscored the language group. The manipulation group tended to outperform the identity group, although differences only approached statistical significance. The blending effect size for the manipulation group relative to the indirect language group was .85, a large effect; whereas, the identity group registered a small effect, .19.

Results from post-intervention reading measures were inconclusive. The ability to generate pronunciations of written words was measured by tests of phonetic cue reading and decoding. Students who participated in the identity treatment group significantly outperformed students in the manipulation group on a post-treatment measure of phonetic cue reading ability. The test of decoding showed no statistically significant difference between instructional groups.

Castle, Riach and Nicholson (1994)

Methodology. Castle, Riach and Nicholson (1994) also compared instruction in phoneme blending and segmenting to alternative forms of instruction, “process writing” or semantic categorization. The purpose of this study was to examine the effects of providing phonemic awareness instruction on the reading and spelling progress of 5-year-old children. These researchers conducted one experiment that focused on spelling acquisition and the second that focused on reading acquisition. Children with low initial phonemic awareness were selected for participation in both experiments. Those children who scored 1.5 standard deviations below the mean on the Peabody Picture Vocabulary Test – Revised were excluded from the study.

In the first experiment, 15 children were trained in two 20-minute lessons in phonemic awareness skills for 10 weeks. A matched group of 15 children was trained in “process writing.” Phonemic awareness lessons included phoneme segmentation, phoneme substitution, phoneme deletion and rhyme. Sound-letter instruction was also included in these lessons. The children in the control group were given the same amount of time but were involved in process writing activities, such as writing their own stories and inventing their own spellings.

In the second experiment, 17 children were trained for 15 weeks in phoneme analysis and synthesis skills and in letter-sound correspondence. They were taught for 20 minutes each week. A matched group of 17 students was trained with the same instructional materials, but most of the activities involved semantic categorization rather than phonemic analysis. The 17 children in the control group received no training. The skills taught during phonemic training included alliteration and segmentation activities using the Elkonin technique. Children were also taught to blend sounds (e.g., *mmmo oo – moo*) and how to delete sounds. Later in the training program, counters were replaced with letters in sound games. The training in the alternative group focused on the meanings of words, rather than on their phonemic structure.

Results. In Castle et al.’s first experiment, the overall post-training results showed that both groups made significant gains in phonemic awareness. However, the phonemic awareness group significantly outperformed the alternative treatment (“process writing”) on two of the four measures of spelling skill, the standardized *WRAT* spelling test and an experimental spelling test. Nonsignificant results were found for the dictation test and writing vocabulary measures. Follow-up analyses of the subtest results for the informal

spelling test indicated that the main difference between the groups was in their ability to spell pseudowords.

In the second experiment, the posttest measures of phonological awareness and reading revealed no significant differences among the three groups. The phonemic training group's scores on three measures, phonemic awareness, pseudowords, and dictation, were superior to that of the other two groups. There were no differences between the control group and the alternative training group on any of the measures.

Study Not Supporting Growth in Phonological Awareness or Reading

O'Connor, Jenkins, Leicester and Slocum (1993)

Methodology. This study was much more limited than the other small-group phoneme analysis and synthesis studies. O'Connor, Jenkins, Leicester, and Slocum (1993) limited the subjects in their study. Only children who qualified for special education services participated in this experiment. The purpose of this study was to investigate the effect of training specific phonological manipulation with groups of young children who might be expected to experience difficulties learning to read. Forty-seven 4-, 5-, and 6-year-old children classified as developmentally delayed participated in this study. Children were randomly assigned to one of three treatments or the control group. The three experimental groups were blenders, segmenters, and rhymers.

Results. Results were examined on two types of tests: (a) tests of items used during instruction (mastery of trained items), and (b) tests of items that did not appear during instruction (generalizations to novel items and transfer to untaught tasks). The most interesting information that can be gathered from these test results deals with the correlation between mental age and posttraining phonological awareness. Mental age accounted for a significant amount of posttest variance for the trained subjects on only

three of the nine posttests (blending onset-rime, segmenting first sound, and rhyme oddity). Children who were not trained showed a different pattern of variance. For children in the control group, mental age accounted for significant variance on all of the blending posttests and all of the rhyming posttests. Floor effects on the segmenting posttests prohibited a similar regression procedure for these measures.

O'Connor et al. (1993) acknowledged that their short-term training of specific phonological skills did not produce generalization to skills within the same class, nor did it produce appreciable generalizations to other classes of phonological skills. However, the range of mental age examined in this study did not appear to seriously limit learning phonological skills. For their subjects, training seemed to have changed the pattern of correlations among phonological measures, age, and cognitive level.

Summary of Findings of Small-Group Phoneme Blending and Segmenting Studies

Three of these studies supported growth in both phonological awareness and reading (Cunningham, 1990; Fox & Routh, 1984; Torgesen et al., 1992), and 2 of the remaining 3 supported growth in phonological awareness, but not reading (Castle et al., 1993; Murray, 1998). Castle et al.'s (1993) treatment effects on children's phonological awareness were most apparent in their first experiment, which focused on spelling acquisition. O'Connor et al.'s (1993) study was the only small-group phoneme blending and segmenting study that did not support growth in phonological awareness or reading. Their study was more limited than the other small-group phoneme analysis and synthesis studies. They limited their subjects to students who qualified for special education services.

Fox and Routh (1984), Torgesen et al. (1992), and Murray (1998) found that instruction that combined instruction in both blending and segmenting skills more

effectively supported growth in phonological awareness than phoneme identity training, or training in blending or segmenting alone. Fox and Routh found that although children in both experimental groups performed significantly better than the control group on the phonemic segmentation task, the group given segmentation training only did not differ significantly in blending scores from the control group. Torgesen et al. found similar results when they compared the effects of instruction in blending and segmenting to those of blending training alone. Students in both experimental groups significantly outscored the control group on the test of phoneme blending. However, students in the analysis and synthesis group significantly outperformed the students in the synthesis only group on the test of segmentation. Murray found that students in the manipulation group tended to outperform the identity group on a measure of students' ability to manipulate phonemes.

Treated children in studies conducted by Cunningham (1990), Fox and Routh (1984), and Torgesen et al. (1992) significantly outperformed children in control groups on reading measures. Cunningham obtained significant results on standardized reading tests. Fox and Routh administered a word learning task to students after treatment. They found that children trained in segmenting and blending significantly outperformed the group trained in segmenting alone and the control group on the word learning task. Performances on the word learning task of students trained in segmenting alone were not significantly different from those of the control students. Students in Torgesen et al.'s analysis and synthesis group also significantly outperformed the synthesis only and control groups on a reading analog test. There were no significant differences among the performances of the synthesis only, the language experience, or control groups on the post-treatment administration of the reading analog test.

Findings of Small-Group, Phoneme Segmentation Studies

As was the case with the small-group multi-level and small-group blending and segmenting interventions described above, the conclusion that both phonological awareness and reading can be positively impacted through phonological awareness intervention was supported by five small-group phoneme segmentation studies (Ball & Blachman, 1991; Bentin & Leshem, 1993; Hohn & Ehri, 1983; O'Connor & Jenkins, 1995a; Tangel & Blachman, 1992). Only O'Connor and Jenkins (1995a) were unable to find statistically significant differences in children's acquisition of auditory blending or segmentation skills after training. In four of the five studies, students in the trained groups significantly outperformed control groups on measures of phonological segmentation administered after treatment. Differing results were discovered for reading measures, depending upon the type of instrument and the time of administration. O'Connor et al.'s (1995a) study was the only small-group phoneme segmentation study to find significant reading results on a standardized reading test administered directly after the phonological awareness instruction. Ball and Blachman (1991) and Tangel and Blachman (1992) did not find statistically significant reading results on standardized tests. Their findings from nonparametric and experimenter-constructed reading measures did support growth in reading from phoneme segmentation training. Bentin and Leshem (1993) administered reading tests after their subjects had received approximately 4 months of reading instruction. They also discovered results that are particularly important for educators interested in the prevention of reading difficulties.

Studies Supporting Growth in Phonological Awareness and Reading

Bentin and Leshem (1993)

Methodology. Bentin and Leshem (1993) included two additional dimensions in their study examining the effects of phoneme segmentation. They added a second treatment group to explore the impact of letter-sound instruction and determine whether alphabet letters facilitate the acquisition of phoneme segmentation skills. They also included an additional control group of children who were initially high in segmentation skills. The purpose of this study was to examine the effect of training kindergarten students in phonemic segmentation skills on the speed and efficiency of reading acquisition in first grade. The subjects for this study were selected from 508 children who attended 15 different kindergartens. No children who received special education services were included in the participant pool. Those children who scored low on a battery of seven phonological awareness tests and two experimenter-constructed reading tests were considered for inclusion in this study. A total of 91 boys participated in the treatment.

Four intervention groups were formed by randomly assigning children to the different training treatments. The groups were matched for age, initial phonological awareness ability and general intelligence, as assessed by Raven Colored Matrixes. A fifth group ($n = 17$) was selected among the children who were in the upper end of the phonological awareness distribution to serve as one control group. The training included two 30-minute sessions per week in small groups for 10 weeks. The phonemic segmentation group was trained to recognize phonemes in words. The second group, phonemic segmentation + letter shapes, was trained identically to the first group except they were also exposed to letters. The general language skills group was trained for comprehension and vocabulary. The 4th group serves as a second control group. The

children in this group had an equal amount of time in small groups with the training teachers, but their training included an additional normal kindergarten curricular activity.

Results. After training the children were re-tested using the seven tests of phonological awareness. Phonological awareness improved in the first two groups, where phonemic segmentation ability was explicitly trained, but not in the general language skills or control groups. Children in the two phonemic segmentation groups significantly outperformed students in the general language or control groups on measures of phonological segmentation. Additionally, a comparison between the post-training phonological awareness results of the children who were trained in phonemic segmentation and children who were initially high in segmentation skills revealed that the two groups were not significantly different.

Bentin and Leshem (1993) administered reading tests to students after they had received four months of reading instruction, in the middle of their first-grade year. The reading measure was experimenter-constructed and consisted of four subtests, two included words and two had nonwords. The reading performances of children who were trained in phonemic segmentation only and those who were also trained in letters were similar. The children who were trained in phonemic segmentation significantly outperformed those children trained in general language skills or who received no training on this reading test. Furthermore, the reading scores of treated children were comparable to the control students who had initially scored high on measures of phonological awareness. Those students who performed poorly on the initial tests of phonological awareness and were not trained to improve their phonological skills did not do well on reading tests. These findings support the premise that improving the

phonological skills of children who are initially low in phonological awareness facilitates reading acquisition.

Ball and Blachman (1991)

Methodology. Like Bentin and Leshem (1993), Ball and Blachman (1991) also examined the effects of phoneme segmentation training on kindergarten students. They did not, however, consider instruction in letter-sound associations as a separate independent variable. The purpose of their study was to explore whether kindergarten children can be taught to segment words into phonemes and to explore the effect of segmentation training in kindergarten on early reading and spelling abilities. Eighty-nine children were randomly selected from 3 schools (30 from each school – 1 eliminated due to absences) from a pool of 151 kindergartners from 6 classrooms. Children who scored 1.5 standard deviations below the mean on the Peabody Picture Vocabulary Test – Revised and all reported readers, students who had raw scores greater than 3 on the Woodcock word identification subtest, were eliminated from this study. Students were grouped by gender and scores on the PPVT-R and randomly assigned to form three equivalent groups, two experimental and one control.

Children in each of the two treatment groups, phoneme awareness and language activities, were trained outside the classroom in groups of 5 for 20 minutes 4 times per week for 7 weeks. The phoneme awareness activities included “say-it-move-it”, other segmentation-related activities and letter-name and letter-sound training. The say-it-move-it activities progressed from single phonemes to 2 and 3. Students who participated in the language activities were engaged in a variety of language activities and received identical training in letters and sound as the other experimental group.

Results. Positive results were found on post-intervention measures of phonological awareness. After training, the phoneme segmentation group performed significantly better than the other two groups on the phoneme segmentation test. There were no significant differences between the performances of students in the language activities and control groups. The two experimental groups scored significantly better than the control group on knowledge of letter sounds; however, there were no reliable differences on this measure between the phoneme awareness and language activities groups. These researchers concluded from the above findings that letter-sound knowledge by itself does not improve segmentation skills.

Ball and Blachman used a developmental spelling score as an additional measure of phonemic awareness. They assessed the students' abilities to spell 5 words – *lap*, *sick*, *pretty*, *train*, and *elephant*. Two scores were calculated for this measure: the simple number of words spelled correctly and a developmental score. The developmental score was used to evaluate the extent to which an unconventional spelling captured the phonetic structure of the word. The phoneme awareness group scored significantly higher on this spelling measure than the other two groups, whose scores did not differ significantly.

Nonparametric tests had to be conducted for reading measures because the scores were not normally distributed. There was a significant difference between the groups in the number of readers. The following percentages convinced Ball and Blachman that increased phoneme awareness did have an immediate impact on the ability to read words. Thirty-four percent of students in the phoneme awareness group, 13% of the language activities group, and 7% of the control group read 4 or more words on the Woodcock Reading Mastery word identification subtest.

Tangel and Blachman (1992)

Methodology. The main difference between this study and the one conducted by Ball and Blachman one year earlier is the fact that Tangel and Blachman (1992) trained classroom teachers or teaching assistants to conduct the instruction. The purpose of this study was to create a reliable scoring system to evaluate the invented spelling produced by kindergartners and to use the scoring system to explore the influence of instruction in phoneme awareness on the quality of the children's invented spelling. Kindergarteners were selected for participation in this study from 18 all-day kindergarten classrooms in 4 low-income, inner-city schools. Treatment and control students were selected from different schools. Two schools served as treatment schools and two others served as controls. Children who could read or who scored 1.5 standard deviations below the mean on the PPVT-R were eliminated from this study. Additionally, children were eliminated from participation if they could not demonstrate 1 to 1 correspondence in sound counting or had severe articulation problems. Seventy-seven children formed the treatment group, and 72 served as controls. Prior to treatment the two groups were comparable regarding age, sex, race, and other pretest measures.

There was only one treatment group included in this study, and the teacher or teaching assistant completed the phoneme awareness activities in the regular kindergarten classroom. During the second half of kindergarten, treatment children participated in 11 weeks of phoneme awareness training. Children met in groups of four or five, 4 times per week for 15 to 20 minutes. Teachers and assistants did participate in 7 two-hour training sessions prior to implementation. Say-it-move-it, sound categorization, and letter-sound activities were the core of this phonemic awareness instruction.

Results. The treatment group significantly outperformed the control group on post-treatment measures of phonemic segmentation. The phoneme segmentation group also demonstrated developmentally superior spelling than the control group after training.

No significant difference was found between the groups on the Woodcock word identification subtest. However, significant differences between the scores of treated and control students were found on an experimenter-constructed reading measure. This test consisted of four subtests, two included words and two had nonwords.

Study Supporting Growth in Phonological Awareness, but not Reading
Hohn and Ehri (1983)

Methodology. Hohn and Ehri's (1983) study was similar to Bentin and Leshem's (1993). The purpose of their study was to examine the contribution of phonetic segmentation skill to the acquisition of decoding skill. They also sought to determine whether alphabet letters facilitate the acquisition of phonemic segmentation skill. From a pool of 62 kindergartners, children who were able to name alphabet letters but unable to phonetically segment or to read preprimer words or nonsense words were retained for this study. Eight triplets were formed from the 24 students selected for participation based on similar scores on the letter-name task and the Peabody Picture Vocabulary Test.

Members of the triplets were randomly assigned to one of the three treatment groups.

To test the assumptions that phonemic segmentation skills are best learned in the oral mode and that teaching segmentation with alphabet letters confuses learners, two treatment groups were formed. The children in the letter group were taught to segment words using letter tokens. Students in the non-letter group were taught to segment words using tokens with no letters. The third group served as the control and received no treatment. The children were trained individually for 20 minutes per day.

Results. Students were posttested to measure their abilities to segment nonsense words into phonemes and delete phonemes in nonsense words. Students in both experimental groups significantly outperformed the control group on these phonological awareness posttests. The performances of students in the two treatment groups were comparable.

Hohn and Ehri (1983) also administered an experimenter-constructed reading test to measure a child's ability to decode nonsense words. They found no significant differences between groups. These researchers interpreted this finding as an indication that neither segmentation training, with or without letters, was sufficient to enable subjects to decode nonsense syllables. They concluded that blending instruction might be required to enable subjects with letter sound knowledge to decode successfully.

Hohn and Ehri (1983) also examined how readily experimental and control subjects could learn to decode nonsense words when instruction and practice were provided. The main effects of treatment group fell short of significance, although the means favored the experimental groups.

Study Supporting Growth in Reading, but not Phonological Awareness

O'Connor and Jenkins (1995a)

Methodology. This study was much smaller than the other four small-group phoneme segmentation studies. The purpose of this study was to test whether the application and transfer of segmentation and letter knowledge to reading could be encouraged by teaching spelling alongside code-based reading instruction. Ten 5- and 6-year-old kindergartners who were eligible for special education services under the category of developmentally delayed participated in this study. These researchers hypothesized that giving children with disabilities practice using letters to represent the

phonological features of words (spelling) might contribute to reading over and above the knowledge of sound/symbol relationships and the alphabetic principle.

In the spelling treatment children received individual spelling instruction daily for 10 minutes during 20 sessions conducted during the month of May of the kindergarten year. Trainers provided the children with phonemic segmentation instruction if they had difficulty spelling word. The children in the reading control group received the same amount of reading exposure.

Results. After training the children were administered a 15-item blending and segmenting test. The test results revealed that the segmentation/spelling treatment did not produce significant differences in children's acquisition of auditory blending or segmentation skills. Children who received the month of additional spelling/segmentation practice did improve their spelling abilities, as measured by a spelling test consisting of 25 words drawn from the children's spelling curriculum.

Reading measures were also administered after the instruction. Students who participated in the treatment surpassed the control children in reading words drawn from their classroom curriculum (*Reading Mastery*) and pseudowords. They also significantly outperformed the control group on the word identification subtest of the Woodcock Reading Mastery Test. However, their scores on the word attack subtest were not significantly different from the control students'.

Summary of Findings of Small-Group Phoneme Segmentation Studies

Findings from four of these five studies demonstrated the statistically significant impact that phoneme segmentation training can have on children's phonological sensitivity. The impact of segmentation training alone on children's reading abilities was not as evident from these research results as was the effect on phonological awareness.

The only small-group phoneme segmentation study that obtained significant results on a standardized reading test administered immediately following segmentation training was conducted by O'Connor et al. (1995a). O'Connor et al.'s sample size was limited ($n = 10$), with only 5 children participating in the treatment and control groups. Results from standardized reading tests administered by Ball and Blachman (1991) and Tangel and Blachman (1992) were not significant; however, significant differences between the scores of treated and control students were found on experimenter-constructed and nonparametric tests. Bentin and Leshem (1993) discovered a significant difference between the reading scores of treated and control students on an experimenter-constructed test administered to students after they had received four months of reading instruction.

Bentin and Leshem (1993) concluded that phoneme segmentation skill facilitates the acquisition of decoding skills. Their findings are also important for those children at-risk for experiencing reading difficulties. Like Warrick et al. (1993) and O'Connor et al. (1995b), Bentin and Leshem (1993) found that children with low levels of initial phonological sensitivity who received phonological awareness training performed similarly to control children with high levels of initial phonological awareness on post-treatment measures reading, as well as phonological awareness.

Findings from Phoneme Blending Studies

Two studies reviewed in this chapter examined the effects of training in phoneme blending alone. Neither study directly measured phonological awareness after training, administering only reading measures after treatment. Only 1 of the 2 supported the conclusion that children's reading abilities can be positively impacted by phonological awareness instruction. Both Haddock (1976) and Fox and Routh (1976) investigated the

effectiveness of phonological awareness instruction on 4- and 5-year-old preschoolers. Haddock (1976) conducted her study in existing preschool classrooms. Fox and Routh (1976) instructed small groups of students.

Study Supporting Growth in Reading

Haddock (1976)

Methodology. Haddock (1976) investigated whether classes of prereaders could be taught to blend outside of a laboratory situation. Another purpose of her study was to determine what type of instruction would be most effective in enabling preschoolers to pronounce unfamiliar words – the auditory task or the auditory-visual task. Individual preschool classes of 4- and 5-year-old children were separated into three treatment groups. Random assignment was not used in this study; however, the 3 treatment groups were matched by age, sex, and results from pretest measures. The fact that there were several teachers for each treatment condition minimized the potential for teacher bias toward one method or another. Thirty-three students participated in the auditory treatment, and 31 received auditory/visual training. Thirty students formed the control group. The control children were somewhat older to counter the theory that maturation is a factor in the acquisition of blending skills.

Training was given for 10 minutes per day. All groups received training in letter-sound correspondences. In the auditory group the letter cards and all visual material was put away before training began. Training words were segmented in sound patterns that isolated either the initial or final consonant. For example, to train auditory blending of the consonant *k*, the teacher asked children if they recognized the word “*k – eep*” or “*fee – k*”. Letter cards were used in the auditory/visual group. When training the children to blend the initial consonant *k*, the teacher showed the children a card on which the word

feep was written and explained that the word as “*feep*”. She would then put the letter card *k* over the initial *f*. During the 10-minute period each day when the experimental groups were receiving instruction in blending, the control groups practiced sound-letter associations.

Results. Results from posttesting revealed that students in the treatment groups significantly outperformed students in the control group on a measure of nonsense-word reading. The posttest was an experimenter-constructed test to assess children’s ability to read nonsense words. There was a significant difference in the number of words blended among the three groups. Children taught to blend by the auditory-visual method blended significantly more synthetic words than those taught by an auditory method and those in the control group. Students who participated in the auditory training significantly outperformed those children in the control group on blending measures.

Study Not Supporting Growth Reading

Fox and Routh (1976)

Methodology. Unlike Haddock (1976), Fox and Routh (1976) instructed students in small groups. Forty preschoolers participated in Fox and Routh’s study. Twenty were randomly assigned to the treatment group, and 20 formed the control group. On the basis of pretesting, children were categorized as either proficient or nonproficient segmenters. Within the treatment group, 10 children were considered proficient at segmenting phonemes, and 10 were not. Fox and Routh sought to compare the effects of phonemic blending training on the word decoding abilities of children who varied in their phonemic analysis abilities

Results. The treated children performed similarly to the control children on post-treatment measures of word reading. The reading test was constructed by the

experimenters and consisted of two word lists. Although children's reading scores could not be differentiated on the basis of their participation in the phoneme synthesis treatment, one significant difference was discovered. Children who were considered proficient segmenters before training significantly outperformed non-segmenters on post-treatment word reading tasks.

Summary of Findings from Phoneme Blending Studies

Results from these two studies conducted with preschoolers (Haddock, 1976; Fox & Routh, 1976) do not demonstrate the impact that phoneme blending instruction can have on children's phonological awareness. Neither study directly measured phonological awareness. Haddock (1976) discovered significant reading results from her whole-class phoneme blending instruction. She administered an experimenter-constructed reading measure. Fox and Routh's (1976) study did not support growth in reading from training in phoneme blending.

Findings of Small-Group Phoneme Identity Studies

All three of the studies that examined the effects of training students to identify phonemes in words discovered positive research results. One study (Byrne & Fielding-Barnsley, 1991, 1993) supported the positive impact that phonological awareness intervention can have on both phonological awareness and reading. Since Ehri and Wilce (1987) administered only reading measures, their study only supported a positive reading effect. Ukrainetz et al. (2000) embedded their phoneme identity lessons in other literacy activities and demonstrated the positive effect that their "sound talk" activities had on children's phonological awareness.

Study Supporting Growth in Phonological Awareness and Reading

Byrne and Fielding-Barnsley (1991)

Methodology. The purpose of this study was to evaluate a program designed to teach young children to recognize and identify phonemes in the initial and final positions in words. These researchers randomly assigned 16 students from four preschools to a treatment or control group. Sixty-four children participated in the experimental treatment, and 62 served as controls. The two groups had equal numbers of subjects in each of the four preschools, equivalent mean Peabody Picture Vocabulary Test scores, and equivalent mean phonological awareness test scores. The children were trained in small groups of 4 to 6 once per week for 12 weeks. Each lesson lasted 25 – 30 minutes. Researchers used a phonemic awareness program entitled *Sound Foundations* to train students to identify nine phonemes in the initial and final positions in words. They acknowledged that their decision to focus on a subset of phonemes represented a choice for intensity, rather than breadth. They hypothesized that once children acquire the principle of phoneme identity, they are able to generalize it to other sounds. The children in the control groups were also trained in small groups for the same amount of time. Their instruction focused on story reading and semantic categorization activities.

Results. On measures of phonological awareness, the performances of the students in the phoneme identity group on the test of phoneme identity increased significantly more from pretest to posttest than did the scores of the students in the control group. The experimental group improved significantly on trained, as well as untrained, phonemes.

An experimenter-constructed test of reading was also administered post-training. Twelve test items were constructed with the words *sat, mat, pam, lam, tap, sap, map, pat,*

lap, and *pal*. Researchers described this as a “word-choice” test and asked, for example, if the word *sat* printed on a card “said” *sat* or *mat*. On the word-choice test, the experimental group averaged 8.1 ($SD = 1.1$), and the control group averaged 6.1 ($SD = 1.3$), a significant difference in means.

Byrne and Fielding-Barnsley (1993)

Results. The data for this investigation was collected on the same children described in Byrne and Fielding-Barnsley (1991) one year later, toward the end of their first year in elementary school. In this study the word identification subtest of the Woodcock Reading Mastery Test and a test of pseudoword identification were administered. The experimental group performed significantly better than the control group on the test of pseudoword identification. However, there were no significant differences between the groups on real-word reading, as measured by the Woodcock word identification subtest.

Study Supporting Growth in Reading

Ehri and Wilce (1987)

Methodology. The children who participated in this study were one year older than Byrne and Fielding-Barnsley’s (1991) preschool students. Ehri and Wilce (1987) examined the effects of a type of phoneme identity training, cipher reading, on kindergarten students. The purpose of this study was to determine how phonetic-cue reading differs from cipher reading. Thirty kindergartners were selected to participate in this study from a pool of 89 students. Twenty-one children failed to qualify because they read too many words, and 32 were ineligible because they did not know at least 7 of 9 consonant letter-sound pairs. Pairs of students were matched based on the results of pre-tests and randomly assigned to one of two experimental treatments. The 15 students who

participated in the cipher-training procedure were taught to read *cvc* words having different final consonants. They also learned words with varied initial consonants. Vowels within word sets were uniform. Cue-trained subjects were taught to produce isolated sounds for each of the nine consonant letters included in the spellings of words taught to cipher students. They were also taught to say real words beginning with the sounds associated with the letters.

Results. Cipher readers decoded significantly more nonsense words than did cue readers at posttesting. On the word learning task, cipher readers learned to read most of the words, whereas cue readers learned only a few.

Study Supporting Growth in Phonological Awareness

Ukrainetz, Cooney, Dyer, Kysar, and Harris (2000)

Methodology. The purpose of this study was to examine the effects of teaching phonological awareness by embedding sound talk within meaningful literacy experiences and shared reading activities. Thirty-six 5- and 6-year-old children from 4 early childhood centers participated in this study. Five children were not yet in kindergarten. Twelve of the children were identified as having lower literacy levels based on a combination of letter-name knowledge, first sound awareness, and teacher concerns. The 12 children with lower levels of literacy and the 24 children with higher levels of literacy were randomly assigned to the treatment or no-treatment conditions. These researchers sought to discover if children with lower language and literacy abilities are able to learn from explicit phonemic awareness activities embedded in literacy activities. They were also interested in discovering if children can learn both easier and more difficult phonemic awareness tasks within the same teaching session.

Children participated in 30-minute sessions 3 times per week for 7 weeks. The treated children were divided into 6 groups of 3. One child with a low-literacy level and two children classified as having high literacy were included within each group. Instructional sessions alternated between two components. Twice each week activities involved conversations during bookreading. Once a week conversations took place during writing activities. Storybooks were selected for rhythmic line (some rhyming and alliteration) and interest value. Sound talk episodes were incorporated during storybook reading once after every second page. These researchers stressed the fact that sounds were discussed, not letters. They did acknowledge that some incidental letter discussion took place. Trainers began sound talk episodes by identifying rhyming or alliteration words, then moved on to one or more of the four target skills – identification of first sound, identification of last sound, sound segmentation, and sound deletion. During the writing activities, instructors and children drew pictures about the story. First, the instructor wrote from the students' dictation. Then, the children wrote about their own drawings. The talk focused on identification of sounds and aligning the number of letters with the number of sounds.

Results. The treated children demonstrated significantly greater growth in phonological awareness than did children in the control group. The change was based on differences between pre- and post-treatment testing. An effect size of .74 was obtained for this difference. The results were more dramatic for the low-literacy group. An effect size of .91 was obtained when the growth in phonological awareness was compared between the low-level literacy treatment and control students. Treatment-specific learning showed large improvement at posttesting for three of the four tasks. Children's

performances on the sound deletion tasks were low initially and did not improve significantly due to treatment.

Summary of Findings of Small-Group Phoneme Identity Studies

Byrne and Fielding-Barnsley (1991, 1993), Ehri and Wilce (1987), and Ukrainetz et al. (2000) all found positive results from their phoneme identity training. In their follow-up investigation, Byrne and Fielding-Barnsley (1993) discovered that after one year of school the treated children performed significantly better than the control group on the test of pseudoword identification. There was no significant difference between the groups on real-word reading. Ehri and Wilce (1987) found that children trained in phoneme identity decoded significantly more nonsense words than children in the control group on an experimenter-constructed reading test. Ukrainetz et al. (2000) discovered that treated children demonstrated significantly greater growth in phonological awareness than did children in the control group.

Findings from Whole-Class Multiple Level Studies

In addition to Haddock (1976), four other studies investigated the effectiveness of phonological awareness interventions conducted in existing preschool or kindergarten classrooms (Brady et al., 1994; Lundberg et al., 1988; O'Connor et al., 1996; Schneider et al., 1997). All of these studies demonstrated the positive effects that phonological awareness intervention can have on both phonological awareness and reading. In these studies classroom teachers, who had received varying amounts of training, conducted all phonological awareness lessons. A consideration of the developmental progression of phonological awareness was evident in their instructional activities. These training programs included lessons to promote word, syllable, and phoneme awareness, as well as activities at the onset/rime level of analysis.

Studies Supporting Growth in Phonological Awareness and Reading

Lundberg, Frost and Petersen (1988)

Methodology. Lundberg, Frost and Petersen's (1988) study was much larger than Haddock's whole-class intervention study. Their students were also one year older. The purpose of this study was to discover if training can develop phonological awareness before reading instruction starts, and if this training facilitates reading and spelling acquisition. In this study, 235 students from 12 kindergarten classes participated daily in 15 – 20 minute sessions of metalinguistic games throughout the school year. A control group of 155 children were randomly selected from 10 kindergarten classes located in a different geographical region from the 12 classes participating in the experiment. The program, conducted by classroom teachers who had received extensive training the prior school year, began with listening games (nonverbal as well as verbal sounds). Rhyming games were then introduced, and sentences and words were introduced a couple of weeks later. During the second month syllables were introduced through games and clapping activities. By the middle of the third month activities began to focus on phonemes, beginning with phonemes in the initial position. Students were introduced to phonemes within words in the fifth month. Games introduced early were to some extent maintained over the rest of the period. The program did not include teaching letters.

Results. Students were pre- and posttested on 7 metaphonological tasks: (1) rhyme test; (2) segmentation of sentences into words; (3) syllable synthesis; (4) syllable segmentation; (5) deletion of initial phoneme; (6) phoneme segmentation; and (7) synthesis of phonemes. Students in the treatment group significantly outperformed students in the control group on all measures of phonological awareness at posttesting. Lundberg et al. applied a confirmatory factor analysis with the LISREL VI technique to

investigate the factorial structure of the 7 metalinguistic tests. The rhyme test was not included in the analysis. A confirmation of the model was obtained for the remaining 6 subtests. Based on the results of this analysis, Lundberg et al. subdivided the tasks in order to locate the more trainable dimensions. The most dramatic effect was at the phoneme level. There were modest, yet significant, effects on word and syllable manipulation and rhyme recognition.

At the beginning of first grade, 3 months after posttests, metaphonological transfer tests were administered to the treatment and control groups to assess the permanence of the effects. The experimental group significantly outperformed the control group. The task requiring phoneme segmentation yielded the strongest difference. Virtually no phonemic segmentation ability was indicated by scores of 0 to 1, out of 9. In the experimental group, only 6% of the children scored 0 or 1; whereas, 37% of the control group scored that low.

One year after the program was completed, at the time when the children had completed first grade, the experimental group significantly outperformed the control group in phonemic awareness measures and in spelling, but not in reading. However, at the end of second grade, the children were tested again, and the children who had participated in the training two years earlier scored significantly better than the control group in both reading and spelling.

Schneider, Kuspert, Roth, Vise and Marx (1977)

Methodology. These researchers conducted two training studies to replicate and extend the study by Lundberg et al. (1988). They selected their subjects (205 – treatment and 166 – control in Study 1; 191 – treatment and 155 – control in Study 2) in a manner similar to Lundberg et al. However, they acknowledged that their children were

considerably younger than Lundberg et al.'s subjects due to different age requirements for school entry. German children enter school at the age of 6, which means that they are about a year younger than Scandinavian children during their last year of kindergarten. The training program used in these two studies was almost identical to Lundberg et al.'s. The classroom teachers conducted the metalinguistic games. One notable difference from Lundberg et al.'s 1988 study was the amount of training teachers received before being asked to implement the program. This was one aspect that was modified in Schneider et al.'s second study. The second study was also modified to add a greater variety of phoneme-level tasks to the program. Schneider et al. felt that in their first study too much emphasis was placed on relatively easy tasks such as sentence to word segmentation and that more attention should be focused on analysis and synthesis of phonemes.

Results. In both studies, the experimental group outperformed the control group on all measures of phonological awareness. In the first study, however, the results were not as significant as those obtained by Lundberg et al. The most disappointing results were those from the metalinguistic transfer tests. Significant group differences were found only for the subtests identification of word length and phoneme analysis. These researchers hypothesized that toward the end of the school year teachers did not find the time to pay sufficient attention to the most difficult and important segments of training, phoneme analysis and synthesis. The results from Study 2 were similar to those obtained in Study 1. However, the results of the metalinguistic transfer tests for this second study were more like those reported by Lundberg and his colleagues.

One year after training, the treatment group significantly outperformed the control group on two reading measures, the total number of items completed and the number of items correct. However, they did not differ reliably from the control students

in the percent of words read correctly (out of the number attempted). The reading test was a standardized test used in Germany.

Brady, Fowler, Stone and Winbury (1994)

Methodology. Brady, Fowler, Stone and Winbury (1994), who conducted their phonological awareness intervention in the United States, did not implement their instruction in as many classrooms as did Lundberg et al. (1988) and Schneider et al. (1997). The purpose of their study was to determine whether effective phonological training could be conducted in ordinary classrooms. The subjects in this study were inner-city kindergartners enrolled in 4 different classes. Twenty-four students participated in the training, and 37 were in the control group. Data analyses were conducted on 21 members of the treatment group and 21 control group members, who were matched on the basis of their pretest scores on the Peabody Picture Vocabulary Test – Revised. Children whose scores on the PPVT spring testing fell below 80% were excluded from data analyses.

The phonological awareness instruction was conducted by classroom teachers 3 times per week for 20 minutes. Phase I activities, weeks 1 – 4, focused on phonological awareness tasks above the level of the phoneme. These activities included rhyme tasks, alliteration and syllabication. Researchers chose to begin instruction with more easily accessible units to introduce students to the tasks – segmenting, categorizing, and identifying. During the 5th through 10th weeks, Phase II, the students were involved in activities that focused on isolating phonemes. These activities were modeled after those procedures outlined in *Lindamood's Auditory Discrimination in Depth*. Phase II activities, conducted during weeks 11 – 18, concentrated on the internal structure of the

syllable. Children were instructed in phoneme segmentation using techniques such as “say-it-move-it” with Elkonin boxes.

Results. The training group significantly outperformed the control group on post-intervention measures of phonological awareness and reading. The trained students performed significantly better than the control students on two phonological awareness measures, the rhyme generation and the phoneme segmentation task. There was a marked, but not significant, difference between the two groups on the phoneme deletion task. The following spring, the 42 children were located and re-tested. These students had gone on to 12 different schools. The training group performed significantly better on the word identification subtest of the Woodcock Reading Mastery Test and had higher scores on the word attack subtest.

Brady et al. (1994) made another interesting comparison between the treatment and control groups. Promotion statistics for the 42 students were explored. Only 3 of the 21 treatment children were enrolled in pre-one classes rather than first grade. The comparison between this figure and the fact that 10 of the 21 students from the control group were not promoted demonstrates the far-reaching impact of phonological awareness instruction.

O’Connor, Notari-Syverson and Vadasy (1996)

Methodology. Like Brady et al. (1994), O’Connor, Notari-Syverson and Vadasy (1996) conducted their phonological awareness intervention with a small number of kindergarten classes. The purpose of this study was to determine the effects of phonological awareness instruction incorporated into whole-group classroom routines. These researchers also sought to discover if there were differential effects of treatment for children across risk categories for reading failure. The students who participated in

this study were kindergartners enrolled in 3 different types of classes – general, transition (repeating), and self-contained special education. Some children with disabilities were integrated into the general and transition classes. A total of 72 children were included in the treatment groups and 35 served as controls.

Classroom teachers conducted a six-month intervention. In the general education classroom these daily 15-minute sessions were conducted with groups of 21 and 25 children. Small groups of 3 to 6 students were instructed in the self-contained class. Activities during the first two months focused on word and syllable awareness. During the third and fourth months, rhyming, first sound isolation and onset-rime blending and segmenting were introduced. Phoneme segmentation and blending, as well as letter-sound instruction, were added the last two months.

Results. Like those of Brady et al. (1994), positive results were found for both phonological awareness and reading. Students in the treatment groups significantly outperformed students in the control groups on measures of phoneme blending and segmenting. These researchers explained that ceiling effects were discovered for first sound, rhymes and syllable deletion, except for the children with disabilities. Treated children also scored significantly better than the control children on the letter-word identification and dictation subtests of the Woodcock-Johnson Tests of Achievement.

Two additional analyses revealed interesting findings. Most student x treatment effects were not significant, indicating that children across abilities made similar growth. Disability type did not inhibit phonological growth when instruction was provided. The student effect was most obvious on measures of blending and segmenting phonemes. O'Connor et al. (1996) concluded that to make large and lasting differences in the reading trajectory of children with disabilities, instruction might need to be more intense

than that delivered to large classroom groups. They explained that the teachers who participated in this study reported preferring activities with fewer materials – songs to isolate phonemes in words, representing phonemes with finger cues, or guessing games, but noted that some children may require small group instruction with more materials. O’Connor et al. (1996) also explored the possibility of a phonological skills threshold. They created two combined scores: a phonological skills index of blending and segmenting posttest scores and a literacy index of combined raw scores from the reading and writing subtests of the Woodcock-Johnson. To reach higher than 27 on the literacy index (reading and writing words rather than individual letters), children had to demonstrate the ability to blend and segment spoken words beyond the level of onset-rime, and toward an awareness of the internal structure of words.

Summary of Findings from Whole-Class Multiple Level Studies

These four whole-class studies support the conclusion that phonological awareness instruction positively impacts growth in phonological awareness and reading. Findings revealed that classroom teachers were able to effectively deliver the instruction. Treated students in all four studies performed significantly better than control students on measures of phonological awareness and reading at post-treatment testing. Standardized tests were used to assess children’s reading skills. Brady et al. (1994) administered the word identification and word attack subtests from the Woodcock Reading Mastery Test, and O’Connor et al. (1996) used the letter-word identification and dictation subtests of the Woodcock-Johnson Tests of Achievement. Lundberg et al. (1988) and Schneider et al. (1997) relied on standardized reading tests administered in their countries.

O’Connor et al. (1996) and Schneider et al. (1997) recognized that the most difficult segments of phonological awareness training were phoneme analysis and

synthesis. Schneider et al. modified their second study to increase the amount of instructional time devoted to training in phoneme analysis and synthesis. Although O'Connor et al. found that children across risk categories (students repeating kindergarten and those with mild disabilities) benefited from participating in activities designed to promote phonological awareness, they did note that student effect was most obvious on measures of blending and segmenting phonemes. They proposed that instruction for some children might need to be more intense than that delivered to large classroom groups. Brady et al. (1994) also felt that some children did not grasp phonological concepts as quickly as others do and may require supplemental help in the form of extra instruction.

Summary of Findings of Phonological Awareness Intervention Studies

The studies analyzed in this chapter provide important information about phonological awareness instruction for students attending kindergarten or preschool. First, convergent findings from these studies revealed that both phonological awareness and reading can be positively impacted through phonological awareness intervention with varying instructional focuses. Treated children significantly outperformed control students on post-intervention measures of phonological awareness in 17 of the 21 studies that directly measured phonological awareness. Significant reading results were found in 8 of the 10 studies that administered standardized reading tests after the phonological awareness intervention. Additionally, in 7 studies, children who received phonological awareness instruction scored significantly better than control students on measures of reading phonetically regular words and pseudowords, or on reading analog tests. Only 4 of the 22 studies that included post-treatment reading measures were unable to demonstrate statistically the impact that phonological awareness training can have on

children's reading skills. Regardless of the differences in instructional focuses, positive intervention results were found. Some studies investigated the effects of instruction that included the manipulation of phonological units larger than the phoneme. Other researchers limited their investigations to the effects of phoneme segmentation training or training in phoneme blending, while others instructed students in both phoneme blending and segmenting.

Second, studies demonstrated that growth in phonological awareness can be accomplished through both small-group and whole-class instruction. Classroom teachers effectively incorporated phonological awareness instruction into whole-group routines in 5 of the 24 studies reviewed in this chapter (Brady et al., 1994; Haddock, 1976; Lundberg et al., 1988; O'Connor et al., 1996; Schneider et al., 1997). Treated children in all five studies performed significantly better than control students on post-intervention measures of phonological awareness and reading. These convergent findings suggest that most children may not need more individualized phonological awareness instruction. However, O'Connor et al. (1996) and Brady et al. (1994) proposed that some children might require more intensive instruction than that delivered to large groups of children.

The effects of instruction designed to promote young children's phonological awareness may be of particular importance for children with low initial levels of phonological awareness. O'Connor et al. (1995b), Warrick et al. (1993), and Bentin and Leshem (1993) found that children with low levels of phonological awareness can be brought to reading levels similar to those children with high levels of initial phonological awareness. From these findings, Bentin and Leshem (1993) concluded that improving the phonological skills of children who are initially low in phonological awareness facilitates reading acquisition. They discovered that children who performed poorly on initial tests

of phonological awareness and were not trained to improve their phonological skills did not do well on reading tests. Furthermore, Torgesen and Davis (1996) found that phonological awareness instruction affected changes in patterns of individual differences in phonological sensitivity. Their findings revealed that correlations between scores on pre- and post-training tests of segmenting and blending were significantly stronger for the control group than for the treatment group. These findings have far-reaching implications for educators who are now determined to “leave no child behind.”

Implications for Future Research

Although the studies analyzed in this chapter provide important information about phonological awareness instruction for prereaders, there is a need for future research in four major areas. Two need areas are of particular importance for those children at risk for experiencing difficulties learning to read. First, there is a need to recognize children who exhibit little awareness of the phonological structure of language early in their school careers. One goal of future research should be to develop methods to determine which children will require extensive support in order to acquire higher levels of phonological awareness and subsequent reading skills. Two assessment methods that could be explored are pretests and measures that indicate responsiveness to instruction, such as curriculum-based measurement. After recognizing that 16% of the children who received phoneme identity training in preschool were identified as disabled readers in 5th grade, Byrne, Fielding-Barnsley, and Ashley (2000) re-examined performance differences between the disabled and nondisabled readers 5 and 6 years earlier. They acknowledged that reading problems were becoming evidence already in kindergarten. These researchers devised a measure of responsiveness to the original phonological awareness instruction (SLE – session of last error). They determined that SLE accounted

for significant variance in post-training phonological awareness and continued to influence reading development throughout the elementary years.

The second area in need of additional research is determining how best to meet the needs of those children who do not grasp phonological concepts as quickly as others. Recognizing that some children may require additional support in order to achieve higher levels of phonological awareness and subsequent reading skills is only half the battle. Other questions remain to be answered regarding the type and amount of instructional support these children might require. Byrne, Fielding-Barnsley, and Ashley (2000) discovered that even small-group phonological awareness instruction delivered to preschoolers did not provide them with “immunity from later reading problems” (p. 662). In addition to limiting the size of the instructional group, lessons could be intensified through instructional scaffolding. Wanzek, Dickson, Bursuck, and White (2000) described four types of scaffolding for instruction in phonological awareness, content, task, materials and teacher.

The third research area should focus on the effects of phonological awareness instruction on preschoolers. Cunningham (1990) proposed that at a certain age instruction might be more critical to the development of phonological awareness than a child’s developmental level. Only 4 of the 24 phonological awareness intervention studies reviewed in this chapter included preschoolers as subjects (Byrne & Fielding-Barnsley, 1991; Fox & Routh, 1976; Haddock, 1976; Ukrainetz et al., 2000). Finally, no study has investigated the comparative effectiveness of whole-class to small-group phonological awareness instruction.

CHAPTER 3

METHOD

Measures

Pretest - Posttest

Two measures were used to select and describe students. They were the Test of Awareness of Language Segments (TALS) and the DIBELS-Initial Sound Fluency Test (ISF) (Sawyer, 1987; Good & Kaminski, 2002). These tests were also administered post-treatment to generate data on the dependent variable of phonological awareness. The TALS and ISF have been found to be both reliable and valid (see discussion below).

Test of Awareness of Language Segments (TALS)

TALS is an individually administered test consisting of 3 parts (Sawyer, 1987). The first part, Part A, assesses the child's awareness of words in sentences. The difficulty of the items presented to the child in the second part, Part B, "Words-to-Syllables", progresses from awareness of words in compound words to awareness of syllables in 2 to 3 syllable words. The final portion of the test, Part C, assesses the child's awareness of sounds in 2 and 3 phoneme words. Parts A through C of TALS reflect the developmental progression toward mastery of phonemic segmentation. Instructions for test administration include criteria for discontinuing testing during any one of the three parts based on student responses.

Tests of reliability and validity of the TALS involved both entire populations and selected samples from a school district of approximately 3,000 students (K – 12) adjacent to Syracuse, New York. Test-retest reliability studies involved random samples of preschool, kindergarten, and first grade students. Sawyer (1987) explained that approximately 250 children entered kindergarten each year during the course of her

investigation. Internal consistency and predictive validity studies involved entire populations of children for whom other test information was available. Sawyer stated that the socioeconomic status and parental educational backgrounds of the population sample were quite broad. Family incomes across the district ranged from below \$5,000.00 to above \$75,000.00. Parents' education ranged from less than eight grades to the completion of doctoral studies.

One estimate of reliability reported for the TALS was internal consistency. Cronbach's Alpha coefficients for administrations of TALS in July prior to kindergarten are as follows: Part A (.85), Part B (.74), Part C (.91), and Total (.86). The standard error of measurement obtained for this administration time was 1.68. The 95% confidence interval for individual TALS scores spans a fairly narrow band of raw scores (2.5 to 4 points in either direction on the scale). The strong alpha coefficient for the administration of TALS to children prior to entry into kindergarten suggests that TALS scores appear to be reliable estimates of segmenting abilities.

Children 4 and 5 years old enrolled in a prekindergarten program were tested during the weeks preceding and following the schools' April vacation to obtain an estimate of the test-retest reliability of TALS. The reliability coefficients are .86 for Part A, .76 for Part B, .80 for Part C, and .92 for the Total test. These reliability coefficients fall within the acceptable range.

The concurrent validity of TALS was measured by calculating correlations with other measures of phonological awareness, both analysis and synthesis, and with indexes of reading readiness and reading achievement. These correlations are adequate and are significant at the .05 level of confidence. Correlation coefficients with tests of auditory discrimination ranged from .55 to .75, and from .40 to .48 with tests of auditory blending.

Measures of how well the TALS correlated with the Gates-MacGinitie Readiness Skills Test (GMRST), and the Metropolitan Readiness Test (MRT) and the Murphy-Durrell Reading Readiness Analysis (MDRRA) obtained coefficients that ranged from .40 to .70.

A series of regression analyses were performed to examine how accurately performance on the TALS at different time points can predict performance on measures of reading achievement. The July administration of the TALS prior to a child's entry into kindergarten accounted for approximately 9 percent of the variance on the word recognition score on the Slosson Oral Reading Test administered at the end of kindergarten ($p < .01$). The amount of variance in 1st grade achievement scores accounted for by these TALS scores increased to 20 % and 23%, respectively, on the vocabulary and reading comprehension subtests of the ITBS.

DIBELS-Initial Sound Fluency (ISF)

The DIBELS-ISF is a standardized, individually administered measure of phonological awareness that assesses a child's ability to recognize and produce the initial sound in an orally presented word (Good & Kaminski, 2002). The examiner calculates the amount of time the child requires to identify/produce the correct sound and converts the score into the number of onsets correct per minute. This test has over 20 alternate forms intended to be used to frequently monitor progress. The ISF measure is a revision of the Onset Recognition Fluency (OnRF) measure with minor revisions (Good & Kaminski). Good & Kaminski used reliability and validity statistics calculated for the original Onset Recognition Fluency (OnRF) measure as estimates for DIBELS-ISF, inasmuch as this later version incorporated minimal revisions.

Evidence of reliability and validity for the OnRF measure is adequate. Alternate-form reliability of the OnRF measure is .72 in January of kindergarten. By repeating the

assessment four times, the resulting average is estimated to have a reliability of .91. The concurrent validity of OnRF administered in January of kindergarten is .36 with the Woodcock-Johnson Psycho-Educational Battery readiness cluster score and .48 with the DIBELS test of Phoneme Segmentation Fluency (PSF). Its predictive validity with respect to spring-of-first-grade reading on a curriculum-based measure of oral reading fluency (DIBELS-ORF) is .45, and .36 with the Woodcock-Johnson Psycho-Educational Battery total reading cluster score (Good & Kaminski, 2002).

Subjects

Student Selection

The participant pool included 74 students in their last year of preschool before kindergarten. They attended a public preschool in an urban school district located in a southern state. All 74 students were African-Americans and qualified for free or reduced lunch. These students were enrolled in one of 4 different classrooms. The 4 participating classes were selected by the district preschool director from a total of 7 housed in the same building. She selected teachers of differing levels of teaching experience and ethnicity for participation in this experiment.

Based on the results of pretests of phonological awareness ability, 48 students with low levels of phonological awareness and 13 students whose phonological awareness was average to high were selected from the pool of 74 preschoolers to participate in the treatment or contrast groups. Students were identified as low-skilled if they met at least one of the following two conditions. First, those students who obtained a score of 0 on the Test of Awareness of Language Segments (TALS) were considered low-achieving. Second, if a student scored less than 4 initial sounds on the DIBELS-Initial Sound Fluency Test (ISF), he/she was considered low-achieving. According to

Sawyer (1987), the performance criteria of scores between 0 – 11 on TALS for students entering kindergarten delineates the lowest performing 10% - 25% of the student population. Since 54% of the participant pool ($n = 40$) scored 0 on the TALS, I used that single low score for my selection criterion. Similarly, children in their first semester of kindergarten who score less than 4 initial sounds on the DIBELS-ISF comprise the lowest-performing 20% of students (Good & Kaminski, 2002).

Of the 48 students identified as low-skilled according to these criteria, 17 students were identified as low-skilled by their scores on both the TALS and ISF pretests. Twenty-three of the 48 students were selected strictly on the basis of their low TALS scores, and 8 from low ISF scores. These 48 students were randomly assigned to the low-skilled treatment or contrast group using a matched pair procedure. The children were ranked based on pretest scores. Ranking was done within each classroom to address possible teacher effects and for logistical/instructional purposes. Students were ranked according to their ISF scores because these scores represented a broader range than TALS scores. When ISF scores were the same, students were ranked secondarily by TALS scores. Low-scoring children within each classroom were paired based on rankings. Matched pairs were randomly assigned to the low-skilled treatment or contrast group.

A similar procedure was used to select an alternate contrast group from the remaining 26 students who did not demonstrate weaknesses in phonological awareness according to pretest results. These students were considered average- to high-skilled. The matched pairs within each classroom were randomly assigned to the alternate contrast group or to the group of children who were not posttested.

Pretest Comparisons

T-tests demonstrated that the levels of phonological awareness, as measured by the TALS and ISF, of the low-skilled treatment and contrast groups were not significantly different prior to the intervention. The p values obtained from the pre-TALS ($p = .912$) and pre-ISF ($p = .928$) verified the equivalence of the two low-skilled groups. The difference between the ages of the children participating in the treatment and low-skilled contrast groups approached significance ($p = .081$). Since age was not significantly correlated with scores on the TALS ($p = .243$) or ISF ($p = .591$), the small age difference between the two groups was not considered in data analyses. Pretest statistics are presented in Table 3.

Table 3

Pretest Equivalency of Low-Skilled Students

	Low-Skilled Treatment ($n = 24$) $M (SD)$	Low-Skilled Contrast ($n = 24$) $M (SD)$	$t(46)$
TALS	1.00 (2.62)	.92 (2.59)	.111
ISF	5.83 (6.84)	6.04 (8.98)	-.090
Age in Months	57.29 (3.91)	59.29 (3.87)	-1.781

T-tests were also conducted to support the equivalence of the two groups of average- to high-skilled students. The children who served as the alternate contrast group had levels of phonological awareness, as measured by TALS and ISF, comparable to the remaining 13 students who were not posttested. T-tests revealed no significant differences between the pre-TALS ($p = .266$) and pre-ISF ($p = .826$) scores of students

in the alternate contrast group and those who were not posttested. The ages of children in both groups were also comparable ($p = .227$). Table 4 provides pretest statistics.

Table 4

Pretest Equivalency of Average- to High-Skilled Students

	Average- to High-Skilled Contrast ($n = 13$) <i>M (SD)</i>	Average- to High-Skilled Not Posttested ($n = 13$) <i>M (SD)</i>	$t(24)$
TALS	8.92 (3.86)	10.46 (2.96)	-1.140
ISF	12.08 (5.81)	11.62 (4.72)	.222
Age in Months	60.62 (3.43)	59.00 (3.21)	1.239

Procedures

Testing

I served as the examiner for the administration of all tests. Before testing, I familiarized myself with the testing procedures discussed in the test manual published by the developer of the Test of Awareness of Language Segments (Sawyer, 1987), as well as the administration and scoring protocols for the DIBELS-ISF recommended by Good and Kaminski (2002). Retrieved November 3, 2002, from <http://dibels.uoregon.edu/>.

To ensure the fidelity of assessment procedures, testing sessions were videotaped, and my major professor reviewed 5 sessions each of my administrations of the TALS and ISF. I prepared a checklist of assessment protocols for administering the TALS from the procedures described in the test manual (see Appendix B). Test developers, Good and Kaminski (2002), include an Assessment Integrity Checklist on page 15 of their DIBELS-Initial Sound Fluency test materials. Retrieved November 3,

2002, from <http://dibels.uoregon.edu/>. This checklist was used to assess the fidelity of my ISF testing procedures.

I collected pre- and post-treatment data on two measures of phonological awareness, TALS and ISF. All 74 students were individually pretested. The two tests were administered on different days, so each student was tested in two sessions. Due to the young age of the students, testing was conducted in short sessions of no more than 10 minutes, including approximately 2 minutes spent establishing rapport with each child. I administered the TALS and ISF post-treatment to the 61 students selected to participate in the low-skilled treatment, low-skilled contrast, and average- to high-skilled contrast groups.

Treatment Group (Whole-Class with Supplemental Small-Group Instruction)

In addition to participating in the whole-group activities described in the following section, students in the treatment group also received phonological awareness instruction delivered by the researcher to small groups of 5 to 7 students twice per week for 6 weeks. These biweekly instructional sessions lasted 15 to 20 minutes. The additional small-group instruction allowed for participation from all students, as well as individualized teacher feedback. This supplemental instruction provided to small groups was intensified by the integration of materials and teacher scaffolds. Wanzek, Dickson, Bursuck, & White (2000) explained that “mediated scaffolding bridges the gap between the learner’s current ability and the goal of instruction by providing support during learning” (p. 227).

There are four types of scaffolding for instruction in phonological awareness, content, task, materials and teacher scaffolds (Wanzek et al., 2000). Task and content scaffolding, which involve sequencing instruction according to simplicity of task and

linguistic unit being manipulated, are easily incorporated into whole-class instruction. The two types of scaffolding that are more difficult to offer during whole-group instruction are materials and teacher scaffolds. Materials and teacher scaffolds can provide difficult-to-teach children with the extra support they require. Materials scaffolding involves the use of concrete manipulatives to help students focus their attention on phonological units. Although materials were used to support whole-class instruction, children participating in the supplemental small-group instruction were afforded more opportunities to individually manipulate materials.

According to Wanzek et al. (2000), teacher scaffolds are lacking in most phonological awareness programs. Teacher scaffolds involve explicit modeling and guided practice. Instruction delivered to students in small groups affords teachers more opportunities to monitor individual responses and provide appropriate modeling and corrective feedback. Students participating in the treatment group not only received additional instructional sessions, they were also provided with an increased amount of materials and teacher scaffolds.

Students participating in the treatment group received an average of 154 additional instructional minutes delivered in 10 sessions across 6 weeks. The lesson content and tasks were comparable to that provided during classroom instruction. Small-group instruction was conducted each Monday and Friday and usually involved pre-teaching and follow-up review of weekly instructional sessions delivered to the intact classes. Thirty-six minutes were spent promoting word awareness, and 34 minutes of instruction focused on developing syllable awareness. Phoneme-level tasks were the objectives during 84 minutes of small-group phonological awareness instruction.

Contrast Group (Whole-Class Instruction Only)

Students in all four preschool classes participated in phonological awareness instruction delivered by the researcher three times per week. The instructional groups were intact classes of 17 to 20 preschoolers. Students in both contrast groups (low-skilled and average- to high-skilled), as well students in the experimental group, were among the students receiving this phonological awareness instruction. Although all 74 students received the whole-class phonological awareness instruction, only the post-treatment scores on measures of phonological awareness for the students in the treatment and contrast groups ($n = 61$) were included in the data analyses.

The 15 – 20 minute phonological awareness instructional sessions consisted of metalinguistic games and exercises designed to guide children to discover and attend to the phonological structure of language. The activities, developed by Adams, Foorman, Lundberg and Beeler (1998), were based on a program originally developed and validated by Lundberg, Frost and Petersen (1988). The oral language exercises and games are sequenced in order of the linguistic unit being manipulated. All of the instructional sessions involve some level of active participation by the students.

The whole-class phonological awareness instruction averaged 273 total minutes. Each class received an average of 29 instructional minutes (2 sessions) on word awareness, 58 minutes (3 sessions) on syllable awareness, and 186 minutes (11 sessions) on phonemic awareness. Blending and segmenting syllables were modeled; however, these skills were not the primary focus of the instructional sessions. The common objective of all three of these sessions was to promote the students' awareness of syllables, as demonstrated by their syllable-counting. The 11 instructional sessions that focused on phoneme-level tasks were spent identifying, segmenting, and blending

phonemes. Five of these sessions engaged students in identifying initial and final phonemes in words. Three sessions engaged students in blending and segmenting onsets (initial phonemes) and rimes. In two sessions, students used Elkonin boxes to count phonemes. Blending at the individual phoneme level was explored in only one session as students blended two phonemes to pronounce words.

Adams et al. (1998) explained that the oral language activities presented in the book *Phonemic Awareness in Young Children* are designed so that teachers can assess their students' progress by informally observing their responses and involvement. Since it is difficult to monitor individual responses while instructing large groups of children, in 9 of the 16 whole-class sessions I provided students with picture cards to manipulate rather than responding verbally to my questions. I visually scanned the group to assess students' understanding, enhancing the use of corrective feedback. The provision of picture cards also supported the children. The picture cards limited their response choices and helped to ensure that they made their own choices instead of listening to a classmate.

Fidelity of Treatment

To ensure fidelity of treatment implementation, both whole-class and small-group instructional sessions were observed. Instructional sessions were videotaped. Twenty percent of the instructional sessions were randomly selected to be observed. Two college seniors majoring in elementary education, with a minor in special education, conducted the lesson fidelity observations. An observation checklist of appropriate student and teacher behavior was developed (see Appendix C). I modeled for the two observers how to use the checklist as we conducted one observation together to practice the procedure. Fidelity was defined as a compliance rate of at least 80% of the designated behaviors for both students and teacher. Inter-coder agreement was also calculated.

Research Design/Statistical Analyses

Data analyses were conducted to answer two research questions.

Question One

Can supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers promote their phonological sensitivity to levels significantly higher than those of low-skilled preschoolers who participate only in phonological awareness instruction delivered to the whole class?

Question Two

Can supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers promote their phonological sensitivity to levels similar to their average- to high-skilled classmates who participate only in phonological awareness instruction delivered to the whole class?

This investigation used a one-way between treatments (whole-group plus small-group low-skilled treatment vs. only whole-group low-skilled contrast vs. only whole-group average- to high-skilled contrast) design. Two one-way ANOVAS were conducted using scores from post-treatment measures of the dependent variable, phonological awareness: TALS and ISF. The Scheffe' method was used post hoc to determine specific differences on the dependent variable that existed among the three groups' post-TALS scores. Data were analyzed through SPSS 10.0 statistical procedures.

CHAPTER 4

RESULTS

Fidelity of Treatment

All instructional sessions were videotaped and 20% were randomly selected for fidelity observations. Of the 15 instructional sessions selected for fidelity observations, 8 were whole-class and 7 were small-group. Fidelity scores were the proportion of behaviors observed out of all those that should have occurred. Refer to Appendix C for a description of appropriate student and teacher behaviors. The percentages of appropriate behaviors observed by both observers ranged from 80% to 100%. The average percentage was 93.27%, which indicates that overall, fidelity of implementation was high. Inter-rater agreement was determined by dividing the number of times the observers agreed by the number of agreements plus disagreements ($A/(A + D)$). The average inter-rater agreement, 94.40%, was also high.

The majority of instructional behaviors that were not observed were teacher behaviors. The most frequent non-occurring behavior was repeating/modeling the correct response after every item. One observer noted this behavior missing 6 times. During 2 instructional sessions, one observer recorded that the children were not reminded to wait for the teacher's signal before responding. In 4 instructional sessions, both observers recognized that the majority of response opportunities were individual, rather than group. Three of the four instructional sessions were small group. They also observed no individual response opportunities in 1 session. More than 20% of the students were off-task in only 1 of the 15 instructional sessions. A description of off-task behavior is provided in Appendix C.

Both research questions addressed the effectiveness of supplemental, intensive, small-group instruction in promoting the phonological awareness of low-skilled students. The effects of the experimental condition were determined by comparing the post-intervention measures of phonological awareness of low-skilled treatment students to those of students in two contrast groups, a low-skilled and an average- to high-skilled contrast group. Two instruments measured the dependent variable, phonological awareness, the Test of Awareness of Language Segments (TALS) and the DIBELS-Initial Sound Fluency Test (ISF).

Post-Intervention Comparison of Low-Skilled Treatment and Low-Skilled Contrast Students

Test of Awareness of Language Segments (TALS)

A one-way analysis of variance (ANOVA) was conducted on students' scores from the post-treatment administration of TALS. The between factor was treatments (whole-group plus small-group low-skilled treatment vs. only whole-group low-skilled contrast vs. only whole-group average- to high-skilled contrast). The analysis of variance revealed a significant subject effect. Table 5 presents descriptive information on pre- and post-TALS scores and results from the ANOVA performed on mean post-TALS scores obtained by students in the low-skilled treatment, low-skilled contrast, and average- to high-skilled contrast groups.

The Scheffe' method was used to determine sources of differences. Results from the Scheffe' do not support the hypothesis that supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers can promote their phonological sensitivity to levels significantly higher than those of low-skilled

Table 5

Pre- and Post-TALS Scores and Comparison of Post-TALS Scores

	<u>Low-Skilled Treatment (n = 24)</u> M (SD)	<u>Low-Skilled Contrast (n = 24)</u> M (SD)	<u>Average- to High- Skilled Contrast (n = 13)</u> M (SD)	F(2,58)
PRE- TALS	1.00 (2.62)	.92 (2.59)	8.92 (3.86)	
POST- TALS	8.17 (2.28)	8.29 (3.33)	14.08 (2.53)	22.495*

* $p < .01$

preschoolers who participate only in whole-class phonological awareness instruction. The difference between the mean scores of students in the low-skilled treatment and low-skilled contrast groups on the TALS administered after the 6-week phonological awareness intervention was -.13. The p value obtained from the post hoc t test ($p = .988$) confirmed that this minute difference lacked statistical significance.

DIBELS-Initial Sounds Fluency Test

An ANOVA was also performed to analyze the variance among students' scores on the DIBELS-ISF administered after the phonological awareness intervention. As was the case in the comparison of post-TALS scores, the between factor was treatments. Results from the ANOVA revealed no significant treatment effect ($p = .113$), demonstrating that the mean post-ISF scores of students in the low-skilled treatment, low-skilled contrast and average- to high-skilled contrast groups were not significantly different from each other after the 6-week phonological awareness intervention. This finding does not substantiate the proposition that supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers can promote

their phonological sensitivity to levels significantly higher than those of low-skilled preschoolers who participate only in whole-class phonological awareness instruction. There was no significant difference between the ISF scores of students with low initial levels of phonological awareness who received only whole-class phonological awareness instruction (low-skilled contrast) and those who received an average of 154 additional minutes of phonological awareness instruction delivered to small groups of students. Pre- and Post-ISF scores for each group and results from the ANOVA are described in Table 6.

Table 6
Pre- and Post-ISF Scores and Comparison of Post-ISF Scores

	<u>Low-Skilled Treatment (n = 24)</u> <i>M (SD)</i>	<u>Low-Skilled Contrast (n = 24)</u> <i>M (SD)</i>	<u>Average- to High-Skilled Contrast (n = 13)</u> <i>M (SD)</i>	<i>F(2,58)</i>
PRE-ISF	5.83 (6.84)	6.04 (8.98)	12.08 (5.81)	
POST-ISF	23.63 (10.44)	21.17 (14.30)	31.08 (17.28)	2.266

Post-Intervention Comparison of Low-Skilled Treatment and Average- to High-Skilled Contrast Students

Test of Awareness of Language Segments (TALS)

As discussed above, the Scheffe' method was performed since the ANOVA conducted on students' post-TALS scores revealed a significant treatment effect (see Table 5). Results from this post hoc test did not verify the hypothesis that supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers can promote their phonological sensitivity to levels similar to average- to

high-skilled preschoolers who participate only in whole-class phonological awareness instruction. The difference between the mean post-TALS scores of students in the low-skilled treatment group and students in the average- to high-skilled contrast group (5.91 points) remained significant ($p = .000$) after the 6-week phonological awareness intervention.

DIBELS-Initial Sound Fluency Test

Post hoc testing was not performed on students' scores from the post-intervention administration of the ISF since the ANOVA conducted to analyze the variance among students' scores revealed no significant treatment effect (see Table 6). This finding seems to provide evidence to support the proposal that supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers can promote their phonological sensitivity to levels similar to average- to high-skilled preschoolers who participate only in whole-class phonological awareness instruction. A p value of .113 indicated that the mean post-ISF score of students in the average- to high-skilled contrast group was not significantly different from that of students in the low-skilled treatment group. But the nonsignificant result from the ANOVA also demonstrates that the mean post-ISF score of the average- to high-skilled contrast students was also not meaningfully different from that of the low-skilled contrast students.

CHAPTER 5

DISCUSSION

This study analyzed the effects of two treatment conditions, whole-class plus small-group and only whole-class instruction, designed to promote the phonological awareness of preschoolers. Although all children in 4 preschool classes participated in the whole-class phonological awareness instruction delivered by the researchers, the students identified by the TALS or ISF as having low levels of phonological awareness were the primary focus of this investigation. Data were also collected on a sample of the average-to high-skilled students, so they could serve as an additional contrast group. It was hypothesized that children who scored below cut-off points established to identify children at-risk for experiencing reading difficulties (Good & Kaminski, 2002; Sawyer, 1987) would require more intensive instruction than that delivered to large classroom groups. This hypothesis was based on findings from previous whole-class phonological awareness intervention studies conducted by Brady et al. (1994) and O'Connor et al. (1996), who found that some children do not grasp phonological concepts as quickly as others do. They concluded that some children might require extra help in the form of supplemental instruction. An additional supposition that prompted this experiment was derived from the findings of Bentin and Leshem (1993), O'Connor et al. (1995b), and Warrick et al. (1993). These researchers demonstrated that children with low levels of initial phonological sensitivity who received phonological awareness instruction performed similarly to contrast students with high initial levels of phonological awareness on post-intervention measures of phonological awareness and reading.

The following specific questions were addressed. First, could supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled

preschoolers promote their phonological sensitivity to levels significantly higher than those of low-skilled preschoolers who participate only in phonological awareness instruction delivered to the whole class? Second, could supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers promote their phonological sensitivity to levels similar to average- to high-skilled preschoolers who participate only in phonological awareness instruction delivered to the whole class?

Summary of Results

Measures of phonological awareness were administered pre- and posttreatment. The Test of Awareness of Language Segments (TALS) and the DIBELS-Initial Sound Fluency Test (ISF) were used prior to treatment to select and describe students. They were also administered after treatment to generate data on the dependent variable, phonological awareness. The TALS and ISF have been found to be both reliable and valid with populations of prereaders.

Question One

Preschoolers with low initial levels of phonological awareness who received an average of 154 minutes of supplemental, intensive phonological awareness instruction delivered to small groups of 5 to 7 students did not outperform low-skilled preschoolers who received only whole-class phonological awareness instruction on either measure of phonological awareness, the TALS or ISF. After the analysis of variance (ANOVA) detected a significant difference in post-TALS scores among the three groups of students, the Scheffe' method was used to compare mean scores. The Scheffe' revealed no significant difference between the TALS scores of students in the low-skilled treatment or contrast groups. Similar results were found from a comparison of post-ISF scores

obtained by these two groups of students. Post hoc testing of students' scores on the ISF was not necessary because the omnibus test, an ANOVA, revealed no significant differences among the 3 groups in their ISF scores after the 6-week phonological awareness intervention. Refer to Tables 5 and 6 for descriptions of posttest and ANOVA results. These results reveal that the additional small-group instruction did not improve phonological awareness more than whole-group instruction alone.

Question Two

The supplemental, intensive, small-group phonological awareness instruction also did not promote the phonological sensitivity of low-skilled preschoolers to levels similar to average- to high-skilled preschoolers. The analysis of variance (ANOVA) conducted on students' post-TALS scores revealed a significant treatment effect; therefore, the Scheffe' method was used to detect specific differences. The Scheffe' demonstrated that the difference between the mean post-TALS score of low-skilled preschoolers (who received supplemental, intensive, small-group phonological awareness instruction) and the mean post-TALS score of average- to high-skilled preschoolers (who participated only in phonological awareness instruction delivered to the whole class) was significant. The mean TALS score of low-skilled treatment students was 5.91 points lower than that of average- to high-skilled contrast students after the 6-week phonological awareness intervention.

Although the ANOVA performed to analyze the variance among students' post-ISF scores revealed no significant difference between the post-ISF scores of students in the low-skilled treatment group and students in the average- to high-skilled contrast group, this finding does not support the effectiveness of the supplemental, intensive, small-group phonological awareness instruction. Considered singularly, the lack of a

significant difference between the phonological sensitivity, as measured by the ISF, of the low-skilled treatment students and the average- to high-skilled contrast students seems to validate the supplemental small-group instruction. During the 6-week phonological awareness intervention the phonological sensitivity of the children who participated in the experimental treatment was promoted to levels comparable to their average- to high-skilled classmates. However, this improvement was also discovered for low-skilled contrast students who received only the phonological awareness instruction delivered to intact preschool classes.

Limitations

Limitations should be considered as conclusions are drawn from this study. Internal validity was threatened in two ways. First, pretest sensitization may have lead to increased scores on the post-intervention measures because the children were more familiar with the testing format and the examiner. In this study, testing could be considered a possible threat to internal validity since the time between pre- and posttesting was only 8 weeks. Onwuegbuzie (2000) contended that administration of cognitive tests pre-intervention may lead to increased scores on the post-intervention measure because the participants are more familiar with the testing format and condition, and are less anxious about the test on the second occasion. The second threat to internal validity, regression to the mean, is also related to testing. The term *regression to the mean* refers to the tendency for extreme scores to move toward the mean on subsequent measures. Because students in both the low-skilled treatment and contrast groups were selected on the basis of their low scores on preintervention measures, regression to the mean may have impacted scores from posttesting and threatened the internal validity of this study.

External validity may also have been threatened. First, the possibility exists that the effects demonstrated hold only for this unique population from which the experimental and contrast groups were jointly selected. This may be speculated inasmuch as the district preschool director volunteered to participate in this study. She may be more willing than other administrators to try new methods. Also, the participants were selected from the same preschool center. A second threat to the external validity of this study may have been due to experimenter personal-attribute effects. Because the experimenter personally conducted all of the phonological awareness instruction, it is possible that her characteristics or personality traits affected the study outcomes. This threat could be eliminated in future studies if classroom teachers implement the phonological awareness activities. Readers should consider these limitations when interpreting results.

Discussion of Results

My hypotheses regarding the potential effectiveness of supplemental, intensive, small-group phonological awareness instruction for preschoolers with little awareness of the phonological structure of language were not supported by the results of this study. Analyses of post-TALS and post-ISF scores revealed that the experimental treatment did not promote subjects' phonological awareness to levels significantly higher than those of the low-skilled contrast students. The supplemental, intensive, small-group phonological awareness instruction also did not promote subjects' phonological awareness to levels similar to those of the average- to high-skilled contrast students. The low-skilled treatment students' scores on the post-intervention administration of the TALS were not comparable to those of the average- to high-skilled contrast students. Although there was no significant difference between the mean post-ISF score of the low-skilled treatment students and the average- to high-skilled contrast students, the capacity of the

supplemental small-group instruction was not supported by this finding. This acknowledgment is based on the additional finding that the mean post-ISF score of the low-skilled contrast students was also comparable to that of average- to high-skilled contrast students.

Although the small-group instructional sessions did not promote the phonological awareness of low-skilled treatment students to levels comparable to the average- to high-skilled contrast students, useful post-intervention findings were discovered. These positive results are comparable to those found by Bentin and Leshem (1993), O'Connor et al. (1995b), and Warrick et al. (1993). Their phonological awareness interventions promoted the phonological sensitivity of low-skilled students to levels comparable to control students with high initial levels of phonological awareness. In the present study, findings from a comparison of the pre-TALS scores of the preschoolers in the average- to high-skilled contrast group to the post-TALS scores of the 24 low-skilled contrast students seem to replicate those of Bentin and Leshem, O'Connor et al., and Warrick et al. The complete information on scores from measures of phonological awareness by treatment and contrast conditions provided in Tables 5 and 6 on pages 85 and 86 depicts findings similar to results demonstrated in the studies conducted by Bentin and Leshem, O'Connor et al., and Warrick et al.

These findings seem to support the conclusion that preschoolers with little awareness of the phonological structure of language can be brought to levels of phonological awareness similar to their average- to high-skilled peers through exposure to appropriate instruction. Additional speculations regarding the positive impact that phonological awareness instruction can have on low-skilled preschoolers may be drawn from the following facts. Before instruction, 40 students scored a 0 on the TALS. After 6

weeks of phonological awareness instruction, only 1 student obtained this low score. The number of preschoolers identifying less than 4 initial sounds per minute decreased from 25 to 2 during the 6-week intervention period.

Before discussing one possible reason for the shortcomings of the experimental treatment, I refer back to findings from previous phonological awareness research studies. Brady et al. (1994) and O'Connor et al. (1996) noted that some children did not grasp phonological concepts as quickly as others and hypothesized that these students might require more intensive instruction than that delivered to large classroom groups. Based on the predictions of O'Connor et al. and Brady et al. regarding some students' need for additional instructional support, this study attempted to prove experimentally that a combination of whole-class and small-group instruction would be more effective for children with low levels of phonological sensitivity than whole-class instruction alone.

The results from the tests of the effectiveness of this experimental treatment, the supplemental small-group instruction, should not be interpreted as a testimonial to the fact that some children do not require more support than can be easily offered during whole-class phonological awareness instruction. O'Connor et al. (1996) found that differences in the amount of phonological growth made by students were most obvious on measures of blending and segmenting phonemes. The additional small-group instruction in the present study included only 1 lesson on segmenting individual phonemes in words and none on blending. Whole classes were only offered a total of 3 instructional sessions on blending and segmenting phonemes due to the limited (6-week) intervention period. Student variance may have been apparent if more instructional time had been devoted to the more difficult tasks of blending and segmenting phonemes. Only

3 of the 61 students in the entire sample were able to successfully segment any words into phonemes at posttesting.

Future Research

There is a need for additional research in two major areas, both of which focus on young children at risk for encountering reading difficulties. First, a need remains to recognize children at risk for experiencing reading difficulties early in their school careers. One goal of future research should be to develop and/or test measures that indicate responsiveness to phonological awareness instruction, such as curriculum-based measurement. I was unable to test the effectiveness of the *DIBELS*-ISF as an indicator of students' responses to instruction because of time limitations. The 20 alternate forms of the ISF make it suitable for curriculum-based measurement of phonological sensitivity. Curriculum-based measures, such as the ISF, may identify young children at risk for developing future reading difficulties by indicating their responsiveness to phonological awareness instruction.

Once educators are able to recognize young children who may need additional external support in order to fully develop phonological awareness, other research questions remain to be answered regarding the type and amount of instructional support required to effectively meet their learning needs. The supplemental, small-group phonological awareness instruction investigated in this study was not proven to be effective. This finding supports Byrne, Fielding-Barnsley, and Ashley's (2000) conclusion that small-group phonological awareness instruction delivered to preschoolers has limitations. In other words, reducing group size alone may not be sufficient for meeting the needs of students with low levels of phonological awareness. Future research needs to examine methods for intensifying instruction.

Wanzek et al. (2000) described four types of scaffolding for teaching students at risk for reading failure that can be incorporated into phonological awareness instruction. These are content, task, materials, and teacher scaffolds. Although the supplemental small-group instruction in this study incorporated materials and teacher scaffolding, it did not incorporate content or task scaffolding. The small-group instruction simply previewed and reviewed the content and tasks covered during the week's whole-class sessions. The major reason for aligning the content of whole-class and small-group sessions, instead of scaffolding, was to ensure equivalent exposure to all posttest phonological tasks. Future research should pay more attention to the effects of increased content and task scaffolding. Such sequencing of instructional tasks and the size of the linguistic unit being manipulated could be coordinated with more frequent measurement of response to instruction.

In summary, this study did not support the conclusions that supplemental, intensive, small-group phonological awareness instruction delivered to low-skilled preschoolers could promote their phonological sensitivity to levels significantly higher than those of low-skilled preschoolers who participate only in phonological awareness instruction delivered to the whole class, or to levels similar to their average- to high-skilled classmates. However, the effects of supplemental, intensive, small-group phonological awareness on low-skilled preschoolers may have been observable if more instructional time had been devoted to the more difficult tasks of blending and segmenting phonemes. Also, the supplemental small-group sessions may have been more effective if content and task scaffolding had been incorporated into the instruction. Future research needs to investigate methods to intensify phonological awareness instruction for low-skilled students. There is also a need to recognize young students who may require

more intense phonological awareness instruction than that delivered to large classroom groups.

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APPENDIX A

PHONOLOGICAL AWARENESS INTERVENTION STUDIES WITH PREREADERS NOT INCLUDED IN ANALYSIS

- Blachman, B., Ball, E., Black, R., & Tangel, D. (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.
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Child Psychology, 13, 103 – 113.

APPENDIX B

TALS ASSESSMENT FIDELITY CHECKLIST

Child: _____

Date: _____

Yes No N/A

Part A: Sentences-to-Words

Examiner models the task using the sentence –
“(Child’s Name) runs.”

___ ___ ___

Examiner engages the child using 2- and 3-word
personalized sentences.

___ ___ ___

If the child does not name the first block, the examiner
prompts “What does this block stand for?” before allowing
the child to continue.

___ ___ ___

If the child appears to have forgotten the sentence,
examiner repeats entire sentence (not just forgotten
word).

___ ___ ___

If the child has difficulty, examiner offers two or
three more personalized sentences.

___ ___ ___

If problems persist, testing may be discontinued.

___ ___ ___

Examiner proceeds with less personalized
sentences, using pronouns (he, she, they)

___ ___ ___

If child continues to experience problems with
these tasks, testing is discontinued.

___ ___ ___

If child responds correctly, examiner begins testing
Part A.

___ ___ ___

Yes No N/A

Test Administration

If the child makes an error on sentences 1a or 1b, examiner uses the sentence to demonstrate the task again. [Splitting a word into syllables is not considered an error on Part A.]

(Re-teaching is continued only through sentences 1a and 1b.)

Re-taught 1a	_____	_____	_____
(If no error was made, mark N/A.)			
Re-taught 1b	_____	_____	_____

If child gets 1a correct, examiner proceeds with sentence 2a.	_____	_____	_____
---------------------------------------------------------------	-------	-------	-------

Examiner administers b sentence, only if child fails sentence a in any group. Please note any b sentence administered incorrectly. A check under “Yes” denotes correct usage of this provision. If a “No” is checked, please note which sentence was incorrectly administered. (____)	_____	_____	
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------	-------	--

Shadow Scoring

- | | | |
|-----------------------------------------|---|---|
| 1. a. Mother called. | + | - |
| b. I fell. | + | - |
| 2. a. Go home, John. | + | - |
| b. Father works hard. | + | - |
| 3. a. Tomorrow is my birthday. | + | - |
| b. Will you help me? | + | - |
| 4. a. Let’s play a game together | + | - |
| b. When does the bus leave? | + | - |
| 5. a. What time does the program start? | + | - |
| b. I can ride a bicycle fast. | + | - |

Total Part A _____

Testing is discontinued at Part A if no sentence was segmented correctly.	_____	_____	_____
---------------------------------------------------------------------------	-------	-------	-------

Part B. Words-to-Syllables

Examiner models the task using the word “toothbrush”	_____	_____
------------------------------------------------------	-------	-------

	<u>Yes</u>	<u>No</u>	<u>N/A</u>
Examine engages the child, asking him to identify the word “tooth”, then “brush”, then asking him to identify the whole word.	___	___	
If child does not respond appropriately, examiner provides two or more examples (“snowman”, “cowboy”, “hotdog”, “mailman”)[Note how many more examples were provided - ____.]	___	___	___
If child still cannot perform the task, testing may be discontinued.	___	___	___
Examiner models the task using the word “happy”.	___	___	___
Examiner asks the child to identify “hap”, then “pe”, then asks him to identify the whole word.	___	___	
If child has difficulty, examiner provides more examples (“table”, “summer”, “cherry”, or “properly”)	___	___	___
If problems persist, testing is discontinued.	___	___	___
<u>Test Administration</u>			
The examiner does not reteach the task.	___	___	

Over-segmenting is not considered an error.

Shadow Scoring

- | | | |
|-------------------------------|---|---|
| 1. popcorn (pop – corn) | + | - |
| 2. banana (ba – na – na) | + | - |
| 3. rabbit (rab – bit) | + | - |
| 4. classroom (class – room) | + | - |
| 5. tiny (ti – ny) | + | - |
| 6. tomorrow (to – mor – row) | | |
| 7. window (win – dow) | + | - |
| 8. telephone (tel – e- phone) | + | - |
| 9. football (foot – ball) | + | - |
| 10. baby (ba – by) | + | - |

	<u>Yes</u>	<u>No</u>	<u>N/A</u>
Testing is discontinued if the child responds incorrectly to more than 5 items.	___	___	___
Total Part B _____			

Part C: Words-to-Sounds

Examiner models the task using the word “meat”.	___	___	
Examiner points to the first block and asks the child to say the sound that block stands for.	___	___	
If the child does not respond or gives an incorrect response, examiner models. “I hear m-m, e-e, t-t-“ pointing to each block.	___	___	___
Examiner engages the child using 2- and 3-phoneme words.	___	___	___
If child has difficulty with task, examiner models.	___	___	___
If the child is unable to learn the task, as evidenced by the child’s consistent selection of only one block for each target word or inability to isolate sounds, testing may be discontinued.	___	___	___

Test Administration

Examiner pronounces the words in a natural way (i.e., as if it were within a sentence), <u>without</u> exaggerating the sounds.	___	___	
If the child responds incorrectly on either of the first two items, examiner models the task again, beginning with the phrase, “I hear...” and pointing to the separate blocks saying each sound.			
1. leaf	___	___	___
2. dough	___	___	___

[If the child “over-segments” – uses blocks to note additional sounds – that is not considered an error.]

Shadow Scoring

Note on this sheet the child’s response (i.e., l/e-f or l-e/f) or (+) if correct.

- | | | |
|--------------------|---|---|
| 1. leaf (l-e-f) | + | - |
| 2. dough (d-o) | + | - |
| 3. pen (p-e-n) | + | - |
| 4. wave (w-a-v) | + | - |
| 5. skate (s-k-a-t) | + | - |
| 6. sight (s-I-t) | + | - |

Testing is discontinued after incorrect responses on the first 2 items.

Total Part C _____

Test Total _____

APPENDIX C

LESSON FIDELITY CHECKLIST

Date: _____
Time Lesson Started: _____
Time Lesson Ended: _____

Yes No N/A

Introduction is included and relates to the key phonological concept.

(Phonological unit: words, syllables, onsets/rimes, phonemes –
 Circle the applicable linguistic unit(s))

Activity No: _____

Teacher **models** lesson activity. **Directions** are provided and include a **sample stimulus** and **model of correct response**. (Teacher’s stimuli should be pronounced clearly and easily understood.)

Teacher provides **student response opportunities** during activity.

Practice opportunities: _____ (supply #)

If children respond before teacher provides the response signal, they are reminded to wait for teacher’s signal before responding, allowing all children to think of a response on their own.

Teacher provides both group and individual response opportunities.

Group Responses: _____ (Supply #)

Individual Responses: _____ (Supply #)

The majority of response opportunities were **group responses.**

Yes No N/A

Teacher **repeats/models the correct response** after every item.

Teacher **monitors student progress.**

Teacher actively observes students (obviously looking, listening, attending to errors).

Group Errors: _____ (#)
Individual Errors: _____ (#)

If any student makes an error on the first 3 items, teacher employs the **model-lead-test (me-we-you)** format to remediate.

Student Behaviors

At least **80%** of students are attentive throughout lesson. (If more than 20% of the students are off-task, mark **“No”**. In a class of 20, no more than 4 students should be off-task during the lesson. See **definition of off-task behavior below.**)

On-Task Behaviors –

- Child is seated as required by teacher.
- While teacher is instructing, child is physically oriented, “facing” the teacher.
- Child responds in unison or individually, as indicated by teacher, within 10 seconds of a teacher request or direction.
- Child may be responding or watching another child respond to a teacher question.

Off-Task Behaviors –

- Child is not in assigned area or is not oriented to the teacher. (This must persist for at least **10 seconds.**)
- Child does not respond within 10 seconds of a teacher request or direction.

VITA

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Ms. Guidry's primary area of research interest is the prevention of reading difficulties. She is interested in developing and testing methods to identify children who may develop reading difficulties early in their school careers. Additional areas of research interest are the use of data from screening, diagnostic, and curriculum-based assessment to inform instructional decisions and effective early literacy instruction for general and special education students. She will receive the degree of Doctor of Philosophy at the August 2003 commencement.