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Effects of Rhyming Instruction on Learning the Alphabetic Principle, Phonemic Awareness, and Rhyming Complexity Skills with At-Risk Prekindergarten Students

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EFFECTS OF RHYMING INSTRUCTION ON LEARNING THE ALPHABETIC PRINCIPLE, PHONEMIC AWARENESS, AND RHYMING COMPLEXITY SKILLS WITH AT-RISK PREKINDERGARTEN STUDENTS

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This work is dedicated to my godchildren, great niece, and great nephew: Daryl Dunifer, Jr., Jasmine Trapp, Jada Trapp, Olivia Fulk, and Jaden Felix and to all the children experiencing the very intricate process of learning to read.

In loving memory of my uncle, Howard Craig, Sr., who had planned to join me at the conclusion of this momentous accomplishment but was called upon by God to serve a greater purpose.

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ABSTRACT

At-risk prekindergarten students (i.e., low SES, speech-language impaired) typically lag behind their peers in phonological awareness and other emergent literacy skills such as letter knowledge and vocabulary (Duursma et al., 2008; Lundberg, 2009). However, there is a limited amount of research that has studied the efficacy of phonological interventions for at-risk children (Ziolkowski & Goldstein, 2008). Because of the long-lived debate concerning the role of rhyme versus the role of phoneme awareness, it is uncertain whether learning rhyming skills will provide the most facilitative context to learn other emergent literacy skills (e.g., letter knowledge, phonemic awareness).

The current study investigated the effects of an 8-week intervention on learning the alphabetic principle (i.e., letter knowledge, phonemic awareness), phonemic awareness skills, and rhyming complexity skills. The existence of a continuum of rhyming complexity skills (e.g., expressive rhyming, rhyming couplets) was also explored. Twenty-nine at-risk prekindergarten students received an intervention focused on rhyme awareness (i.e., rhyme) or an intervention focused on phoneme awareness.

The results of the study revealed both groups made statistically comparable progress on letter knowledge, phonemic awareness, word reading, and rhyming complexity skills. A visual inspection of gains scores and cut-off scores for weekly probes revealed differential progress by the type of intervention received. Participants with a suspected or diagnosed speech-language impairment were not significantly different from their peers at the conclusion of the study. The result of the study also indicated that rhyming skills exist on continuum of complexity with reciting nursery rhymes being the least complex and coordinating sound and rhyme being the most complex.

INTRODUCTION AND LITERATURE REVIEW

When one hears the term rhyme awareness, an immediate association that may come to mind is nursery rhymes such as "Jack and Jill" or "Mary had a Little Lamb." Another image that may be conjured includes one in which children in a classroom are singing and chanting songs and poems that contain stanzas of rhyming words. Although the above activities may give some insight into the concept of rhyme awareness, these activities do not provide a complete picture of the various complexities of rhyme awareness. Knowledge of nursery rhymes at 3-4 years of age has been shown to relate to alliteration and rhyming skills at ages 4-7. Furthermore, sensitivity to rhyme and alliteration at ages 4-5 contributes to reading progression at ages 6-7 (MacLean, Bradley, & Bryant, 1987).

Some researchers view rhyme as a fundamental phonological awareness skill. According to this perspective, sensitivity to rhyme helps children become aware of phonemes since the change of a single phoneme (i.e., onset) results in a different word with the same rime (Bryant, Maclean, Bradley, & Crossland, 1990). This bridge to phonemic awareness establishes an important link needed to discover the alphabetic principle (Treiman, 1985). Consequently, teaching rhyming skills at an early age may be an important strategy for facilitating the early decoding skills of pre-kindergartners, especially those with a low socioeconomic status (SES) background (Fernandez-Fein & Baker, 1997; Lundberg, 2009). Studies have demonstrated a strong correlation between SES and performance on phonological awareness measures, presumably from less stimulating home environments and have found that rapid gains occur when children receive frequent regular training in phonemic awareness (Fernandez-Fein & Baker, 1997; Lundberg, 2009). Furthermore, twenty percent of children in preschool and kindergarten fail to acquire phonological awareness skills (Torgeson, 2000).

Research further shows that teaching rhyming skills in conjunction with other emergent literacy skills may result in heightened literacy and phonological awareness skills (Bradley & Bryant, 1983; Bradley, 1988; Defior & Tudela, 1994; Hatcher, Hulme, & Ellis, 1994). This is because rhyming skills have been found to enhance other phonological awareness skills as well as emergent literacy skills such as letter identification, phonics, phonemic awareness, and word decoding (Goswami, 1999; Hindson, Byrne, Fielding-Barnsley, Newman, Hine, & Shankweiler, 2005; Treiman, 2006; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998). Research concerning the effect of a combination of rhyming and emergent literacy interventions is needed to determine how to best address early literacy learning for children with low SES. Intervention studies also can lend insights regarding the role of rhyme in early alphabetic learning.

The purpose of this study was to determine if providing at-risk children with rhyming instruction will facilitate letter-sound learning, phonemic awareness skills including phoneme isolation and blending, and word reading abilities. The study also addressed whether levels of rhyming are learned in a hierarchical manner and whether levels of rhyming are differentially affected by rhyming instruction.

Learning to Decode

The ultimate goal of reading is fluent word recognition with good comprehension, so that written language is processed as effortlessly as oral language. This occurs as a reader links the words read in a text to already constructed bodies of linguistic and background knowledge to result in an interpretation (Applegate, Applegate, & Modla, 2009). This level of fluency is achieved when nearly every word is recognized automatically, without pauses between words or parts (Ehri & Wilce, 1983). Current theories suggest that most words achieve automatic recognition through the construction of a cognitive network of connections between letters in

spellings and sounds in pronunciations, or orthographic knowledge. To achieve fluent reading, children must master the alphabetic principle, constructing abstract representations of graphemes (i.e., g, G, and g are all allowable forms of "g") and linking these to related phonemes (i.e., /g/ and / ʤ/). In addition, the allowable combinations (i.e., gr, gh) and orthographic position of letters within words (i.e., *gh*ost, hi*gh*) must be constructed (Ehri, 2005; Hoover, & Gough, 1990; Seidenberg & McClelland, 1989).

Since it is assumed that the linguistic knowledge, including a basic vocabulary, syntax, morphology and other higher level language skills are constructed during the preschool years and prior to reading instruction, then learning to decode graphemes is the big challenge presented to young beginning readers (Hoover, & Gough, 1990). Children need to learn to interpret the alphabetic code because once the printed word is recognized its pronunciation is linked to its related vocabulary word (Byrne & Fielding-Barnsley, 1989). The vocabulary word in turn is linked to the oral language information as well as the background knowledge already constructed. Unfamiliar words acquire a probable meaning within the context of the written passage, so that the network continuously expands and refines through the process of reading (Seidenberg & McClelland, 1989). Thus, the task for beginning readers is to discover how the alphabetic principle works and begin to construct the cognitive network for orthographic knowledge. Like other aspects of language acquisition, this development occurs across time in flexible, overlapping phases of closer approximations to an adult network.

Alphabetic principle. To read, children must discover the connection between letters and sounds, or more accurately, between phonemes and graphemes. A phoneme is an abstract mental category for a sound, such as /g/. The actual pronunciation of the phoneme may vary by age, gender, regional dialect, culture, or articulation skill of the speaker, but the underlying

phoneme is the same (Liberman, Shankweiler, & Liberman, 1989). A grapheme is a mental category of a letter, even though the shape of the letter may differ by case, font, script, or handwriting skill (i.e., g, g, G, *g*) (Worden & Boettcher, 1990). Alphabet learning in part involves mapping a phoneme category to a grapheme category, but English presents many challenges to this process. A Latin-based writing system (adapted from the Greek alphabet) was used, but the 26 letters fall short of the 44 phonemes of English. Thus, children must learn the orthographic patterns used to represent many phonemes of English, including the approximately 20 vowels (depending on one's dialect) (Rogers & Dalby, 2005). In home environments where literacy is valued, children are exposed to storybook reading, songs, games, and other experiences that immerse them in letters and letter-sounds from an early age. Thus, it is not surprising that the level of letter-sound knowledge tested prior to school entry has be shown to be highly predictive of learning to read (Hulme, Goetz, Adams, & Snowling, 2007; Stuart & Coltheart, 1988).

Letter names have been shown to provide a bridge to learning letter sounds, and some studies have found letter-name knowledge to be the strongest predictor of later reading abilities in young children (Adams, 1990; Foulin, 2005; Snow, Burns, & Griffin, 1998). Children who know letter names are able to learn and recall more words than those who do not (Samuels, 1975). Further, children who learned letter-names for novel letter-like shapes were able to learn words spelled using these symbols than controls (Chisholm & Knafle, 1975). Letter names are syllables, like other words (unlike phonemes that represent a single sound). The name refers to a visible object (i.e., a letter shape) and so giving it a name fits a child's expectations that objects are named. In contrast, the letter shape does not "make a sound" like a dog or cat or squeaky table makes a sound. The child must discover how the object represents an arbitrary sound, and

the letter name provides important clues. If provided the experience, most children learn to sing the letter names using the alphabet song beginning at age 2 and in its entirety between ages 4-5 (Bergeson & Trehub, 2007). Many of these letter names are acrophonic, meaning the onset of the letter name when pronounced includes the target phoneme (e.g., d, b, k versus f, l, h or w). These consonant + vowel (CV) letter names have been shown to be easier to learn and children know more of these letter names when beginning to learn the alphabetic principle. When children attempt to spell words, they may use the letter-name to represent the CV sequence if the letter name can be heard in the word (i.e., "dp" for "deep" but random letters for "dip;" "kk" for "cake" but random letters for "kick"). Letter names beginning with a vowel and ending with the letter sound (VC) (i.e., f, m, n, l) provide a similar bridge to final sounds (i.e., "sl" for "sell" but random final letters for "sail") (McBride-Chang, 1999; Treiman et al., 1998). These words provide a context for experimenting with the alphabetic principle before the child is fully aware of units smaller than syllables, that is, phonemes (Treiman et al., 1998).

Phases of word recognition. Ehri (1995, 2005) proposed a now widely accepted model of word learning, adapted from the initial work of Frith (1985). In both models, children's earliest attempts to interpret words are prealphabetic, using visual cues and semantic representation to identify words. In his observations of kindergartener's reading attempts, Mason (1980) showed emergent readers were able to identify a range of advertisement logos (e.g., McDonald's) and other environmental print. However, if the letters within the advertisement logo were switched, the reader would not be affected and would identify the logo as readily because the actual letters and their association to sound are irrelevant cues to the child (Masonheimer, Drum, & Ehri, 1984). The word recognition occurs through context cues and the child may assume that any word with the same colors or beginning with letter "M" says

"McDonald's" (Mason, 1980). However, this phase represents an emerging awareness of print as representing meaningful words.

The partial alphabetic phase emerges as children begin to discover the alphabetic principle as letters and letter-sounds are learned. Children use letters they recognize, particularly in initial and final word positions, and the context to predict words (Ehri, 1995; 2005). A child in this phase may read *horse* as *house* or vice versa. Children become more aware of sounds and sounds in words (i.e., phoneme awareness) as they form connections between letters, sounds, and words during this phase. It is not surprising that many studies have found strong correlations between phonemic awareness and partial alphabetic reading attempts (Baddeley, 1986; de Jong & Olson, 2004; Fowler, 1991; Goswami, 2002; Share, 1994). Stuart, Masterson, and Dixon (2000) further showed that when sight words were taught to five-year olds, those who had partial alphabet knowledge recalled more words a month later. Other researchers have shown that more errors occur for the recall of visual similar words (soon, spoon) than visually distinct words (soon, goof) because of reliance on first and last letters and the resulting confusion (Ehri, 1995; Savage et al., 2001).

During the full-alphabetic phase, the reader is able to form complete connections between each grapheme and its related phoneme within a word. This more complex network enables the reader to more accurately decode new words by blending the phonemes in sequence (Ehri, 1995; 2005). It also enables recognition of many words by sight, resulting in increased reading speed and fluency. Ehri (1992) demonstrated this by asking students in 2nd through 4th grades to read familiar words versus nonsense words with the same syllable shapes. The skilled readers read the words as fast as they read single digit numbers, indicating the words were read as wholes rather than sounded out, while poor readers took longer to read both real and nonsense words.

Finally, the consolidated alphabetic phase encompasses the ability to consolidate recurring letter patterns and recognize these patterns within new words (Ehri, 1995; 2005). For example, a word such as 'stamp' may be read in the full alphabetic phase as 5 units, *s, t, a, m, p,* but in the consolidated alphabetic stage it would be read as 2 units, *st, amp*. Consolidation occurs for units such as morphemes, syllables, onset and rime, or word families (i.e., syllables containing *–ant*, as in "constant"). The consolidation of recurring letter patterns reduces memory load and encourages reading by analogizing (Ehri, 1998; Goswami, 1986, 1993; Goswami & East, 2000). Wright and Ehri (2007) showed that nonsense words comprised of allowable orthographic patterns were read faster than those that violated these patterns.

Ehri's phases provide insight into what is required to construct a complex and flexible network for written word recognition. For most children, the first step is the alphabetic principle.

Phonological Awareness Skills

Children spend the first five years of their lives detecting phonemes and gradually learning how they form the patterns of a language and refer to meaning (Stoel-Gammon, 1998). During this preliterate time, the phonological structure of language is constructed. As children learn to read, they must then go in the opposite direction, learning to decontextualize a word from its meaning in order to become aware of the sound structure of the word for decoding and spelling (Bradley& Bryant, 1983, 1985; Gough, Larson, & Yopp, 2000; Juel, 1988). During this peri-literate time, learning letter-names may serve as a bridge to phonological awareness, but to achieve the level of phonological awareness needed for decoding unknown words and spelling, children must progress from implicit to explicit control of manipulating, substituting, and recombining the phonemic segments of language (Lundberg, 2009). This may be a difficult feat given phonemic segments are submerged in a wave of speech sounds bound by coarticulatory

characteristics. This achievement for most children emerges at about age five, occurring both as a result of the increasing ability to decenter from objects to representations of objects (Piaget, 1962) and from exposure that comes from literacy experiences (Duursma, Augustyn, & Zuckerman, 2008).

According to Goswami and Bryant (1990), phonological awareness is the ability to perceive and manipulate the sounds of spoken words. Chard and Dickson (1999) give a more detailed explanation of phonological awareness, stating that phonological awareness is the ability to understand that spoken language is componential and can be thought of as a series of successively smaller units; that is, sentences contain words, words contain syllables, syllables contain phonemes, and phonemes entail sounds. Researchers have developed a wide range of measures to ascertain if and what level of phonemic awareness has been achieved. These phonological awareness tasks include phoneme deletion (e.g., "what word is left when "t" is removed from "bust?"), phoneme isolation (e.g., "what sound is at the beginning – middle – end of this word?"), phoneme counting, phoneme reversal (e.g., "what would the word "nab" change to if the "b" and the "n" switched positions?"), syllable and phoneme segmentation (e.g., "tell me the syllables/sounds you hear in this word"), rhyme oddity (e.g., "what word sounds different-hat, dog, pat?"), phoneme blending (e.g., "what word do you hear: /d/ /o/ /g/), and rhyme judgment (e.g., "do cat and bat rhyme?") (Castles & Coltheart, 2004). In general, the results of these studies have shown children who are better at detecting and manipulating syllables, rhymes or phonemes learn to read earlier and better (Anthony & Lonigan, 2004; Wagner, Muse, & Tannenbaum, 2006). Anthony, Lonigan, Driscoll, Phillips, and Burgess (2003) investigated the order of phonological sensitivity for four levels (words, syllables, onset-rime, phonemes) using four tasks with children from two to five years of age. Their results support a developmental

continuum of phonological sensitivity consistent with his levels and suggested that as the level of one phonological awareness skill increases, it boosts the level of a different phonological awareness skill. Accomplishments in rhyming were soon followed by advances in syllable awareness, alliteration, and phonemic awareness. He recommended that interventions should adhere to this sequence.

Debates exist over the causal relationship between phonological awareness and reading, as well as what components of phonological awareness are critical for the acquisition of early reading as well as those more predictive of later reading abilities (Bradley, 1988; Goswami, 1999; Macmillan, 2002; Goswami & East, 2000). As the research accumulates, evidence supports a reciprocal rather than causal relationship between phonological awareness and reading. Several studies have shown the development of phonological awareness skills and letter-sound and letter-naming are reciprocal (Foy & Mann, 2006; Frost, 2001; Hogan, Catts & Little, 2005; Webb, Schwanenflugel, & Kim, 2004) and that this reciprocal development facilitates decoding abilities (Hindson et al., 2005). That is, experience with reading heightens awareness of phonological knowledge, enabling the learner to begin to learn the alphabetic principle, and use of that principle to decode and spell words in turn heightens phonological awareness in a nearly continuous cycle (Blaiklock, 2004; Bowey & Francis, 1991; Foy & Mann, 2006; Hogan, Catts & Little, 2005; Liberman et al., 1974; Norris & Hoffman, 2002). A meta-analysis of the extant literature (Anthony & Lonigan, 2004) found that overall phonological sensitivity and not the individual components of phonological awareness best predicted later reading abilities. They suggested that the components of phonological awareness are only measures of an overall construct of phonological sensitivity. It remains unclear how many or what types of phonological awareness tasks should be addressed in at-risk learners.

Previous studies with adult populations have provided evidence that phonological awareness skills are essential components for satisfactory reading skills. Morais, Cary, Alegria, and Bertelson (1979) compared the phonological awareness skills of adult speakers of Portuguese who were illiterate to those who had learned to read as adults. Portuguese speakers with no exposure to literacy learning could not perform phonological awareness tasks, while those who had learned to read performed them easily. Perfetti, Beck, Bell, and Hughes (1987) compared first-graders with a superficial level of phonological awareness to those with higher-level skills and found that those with superficial levels could only achieve limited progress in reading. Chinese adults who are proficient readers of the Chinese character writing system show little phonological awareness, supporting the logical assumption that phonological awareness is only important for an alphabetic code. Further, typically developing preschool children acquire early levels of phonological awareness, including rhyme and segmentation of sentences into words and words into syllables without direct instruction, but few demonstrate awareness of phonemes (Hindson et al., 2005; Liberman, Shankweiler, Fischer & Carter, 1974).

At-risk learners. The reciprocal relationship between phonological awareness and reading as well as the predictive power of phonological awareness for reading success implies that early identification of at-risk students is critical for planning interventions. In studies of phonological awareness abilities in kindergarteners, Ehri (1984) and Lyon (1996) found that 20% and 17%, respectively, performed poorly on these tasks. Because phonological awareness is highly dependent upon literacy experience and language abilities, children at-risk include those from low SES backgrounds and those with language impairments.

Lundberg and Strid (2009) tested 1100 Swedish six year olds prior to formal instruction in reading. Those performing in the at-risk range included 19% of the boys but only 7% of the

girls. At the higher end of the test, only 14% of the boys scored in this range compared to 29% of the girls. Children with high SES outperformed those with low SES (as measured by parent education and family income). Following eight months of training, few children remained at the low performance level, but girls retained the advantage on the high end with 73% performing in this range compared to 47% of the boys. Duursma et al., (2008) similary found that children with a low SES knew fewer letters than children with a high SES. Similar findings, including poor performance on tasks measuring phonological and print awareness, have been reported by others comparing high and low SES populations (Bowey, 1995; Ehri, Nunes, Stahl, & Willows, 2001; Fernandez-Fein & Baker, 1997; McDowell, Lonigan, & Goldstein, 2007; Raz & Bryant, 1990). Children who speak English as a second language are another at-risk group (Snow et al., 1998).

Schiff and Lotem (2011) assessed reading speed and accuracy and phonological awareness among high and low SES second, fourth and sixth graders. Results showed slower development in reading and phonological awareness for the low SES students and that the discrepancy increased across time. They suggest that children from low SES families enter school with low phonological awareness and that this profile has cascading consequences on the development of reading.

Bird, Bishop and Freeman (1995) found that children with phonological impairments scored significantly below matched peers (age and nonverbal ability) for phonological awareness and reading, independent of whether they had additional language impairments. Even when they knew letter-sounds, they were poor at reading and spelling real and nonwords. Others have similarly identified phonological awareness deficits in children with speech impairments (Gillon, 2005; Hesketh, Dima, & Nelson, 2007). Children with specific language impairment have been

found to perform significantly below age and SES matched peers on phonological awareness and reading tasks (Boudreau & Hedberg, 1999; Catts, Fey, & Tomblin, 2002; Gillon, 2000; Nathan, Stackhouse, Goulandris, & Snowling, 2004). Thatcher (2010) compared the development of phonological awareness in children with specific language impairment at preschool, kindergarten, and first grade. Typically developing children outperformed the children with specific language impairment on all measures and showed a developmental trend across time that was lacking in the participants with specific language impairment. Children diagnosed with speech sound disorders may also be at a greater risk for delayed phonological awareness skills. A study by Rvachew and Grawburg (2006) found a direct effect of speech perceptions on phonological awareness skills. However, causal effects of speech sound disorders on speech perceptions were not explored.

The research for children at-risk for phonological awareness and reading indicates that developmental lags are apparent early during the preschool years and that rather than catching up, the gap widens with time. These findings suggest that interventions in kindergarten or before are needed to target these populations to prevent or lessen reading failure.

Phonological and print awareness interventions. Phonological awareness skills do not occur naturally, but develop most effectively if children are engaged in organized, developmentally appropriate activities (Hindson et al., 2005; Snowling & Hulme, 1994). A growing body of research has been conducted to determine the necessary and best components to include in phonological awareness training. Several studies have shown that phonological awareness skills can be successfully taught in preschool training programs that do not involve letters (Fox & Routh, 1976, 1984; Koutsoftas, Harmon, & Gray, 2009; Lundberg, Frost, & Petersen, 1988). Koutsoftas et al. (2009) provided intervention twice weekly in small groups for

six weeks. Students receiving treatment made greater gains in phonological awareness, including students enrolled in special education and those learning English as a second language. McIntosh, Crosbie, Holm, Dodd, and Thomas (2007) compared performances of low SES children on phonological awareness tasks following 10 weeks of intervention implemented by the preschool teacher versus a classroom with no intervention. Children receiving the intervention made significantly higher gains and the advantage was maintained three months later. Nancollis, Lawrie, and Dodd (2005) also intervened with low SES preschoolers and following nine weeks, their scores were similar to higher SES peers. These gains were maintained two years later.

While several studies have shown improvements in phonological awareness following intervention, others have shown that phonological awareness training without the involvement of letters does not produce significant benefits for reading (Bradley, 1988; Bradley & Bryant, 1983; Defior & Tudela, 1994; Hatcher et al., 1994). This perspective was reinforced by a 2009 study conducted by Castles, Coltheart, Wilson, Valpied, and Wedgwood. Preschoolers were trained in either letter awareness, phonemic awareness or a control task for six weeks. This six-week intervention was followed by an additional six-week intervention for either letter-sound learning or a control task. Results indicated no advantage for teaching either letterforms or sounds in isolation prior to providing instruction on letter-sound association. Furthermore, data did not support training phonemic awareness in prekindergarten prior to learning letter-sound correspondences Blaiklock (2004) showed that predictive relationships between phonological awareness and later reading skills were significant until controlled for letter knowledge, which reduced most correlations to nonsignificant levels. Lundberg et al. (1988) also showed that training phonological awareness to a level that purportedly meets the high demands of the

alphabetic system resulted in a relatively small effect, despite the comparatively long training period. These studies support the proposition that is only important when learning the alphabetic principle. Additionally, teaching phonological awareness outside of a literacy context may result in the development of an isolated skill that does not generalize to reading.

Several studies have explored shared book reading as a context for training phonological awareness and print awareness. Results revealed improvements in phonological awareness, language, and vocabulary abilities (Duursma et al., 2008; Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999; Stadler, McEvoy, 2003). Additionally, shared book reading improved alphabet knowledge and reading conventions such as holding a book and turning pages (Bus, van Ijzendoorn, & Pellegrini, 1995; Duursma et al., 2008). Justice and her team of researchers conducted a series of studies examining the use of storybooks to increase print awareness. When adults were used to refer to print while reading picture and rhyming books to preschoolers, the children increased attention and comments about print (Ezell & Justice, 2000; Justice and Ezell, 2000). Justice, Weber, Ezell, and Bateman (2002) showed that typically developing middle-class children as young as four years of age have the requisite skills needed to participate in talk about print and concepts of wordness in the context of a storybook and that they respond to high-level tasks when parents prompted them with questions and requests. Justice and Ezell (2002) also explored the effects of print referencing during storybook reading with children from low-income households attending Head Start. Following 24 sessions, children receiving the intervention were significantly better at print and alphabet skills than the control group.

Justice, Chow, Capellini, Flanigan, and Colton (2003) provided intervention to 4-5 year old children with language delays from low-income homes. Following 12 weeks, experimental participants showed significant gains in both print knowledge and phonological awareness, with

the greatest gains in alphabet knowledge, phonological segmentation, and rhyme. Justice, Ritter, Gray, and Pillow (2005) engaged thirty 4-5 year old preschoolers (22 typically developing, 8 language impaired) in storybook reading with an explicit focus on phonemic awareness. Following 12 sessions, the language impaired children showed gains primarily in segmentation, while typically developing children made gains in all phonological awareness skills. They concluded that both groups benefitted from teaching phonological awareness skills in a storybook reading context, although more time and exposures are needed for language impaired children.

Brazier-Carter (2008) taught Head Start teachers to engage in print referencing during daily book reading for six weeks. One group read books that were designed to elicit talk about letters and letter sounds (i.e., Phonic Faces Alphabet Storybooks) while the others read typical emergent reading books. Each Phonic Faces book focused on a character whose mouth is shown producing the letter-sound (i.e., the letter P in the mouth of Peter suggests popping the /p/ sound with the top lip). Children produced the sound repeatedly as a natural part of telling the story (see Figure 1). Results showed the groups reading Phonic Faces books made significantly greater gains than the groups reading the emergent readers. Video recordings of the readings showed that adult print referencing behaviors rapidly decreased for the emergent reader books but were maintained or increased for the Phonic Faces books due to the inherent cues to attend to letter-sounds.

Banajee (2007) adapted Phonic Faces books to create electronic books that could be manipulated using a single rocking lever switch by three children with severe speech and physical disabilities. Results revealed greater improvements for letter/sound identification, sound to letter identification, identification of letter names, and identification of location of

letters and sounds in all word positions words for all three participants during the Phonic Faces Storybook phases compared to a control condition. Improvement was also seen in gain scores following six weeks of intervention for rhyming, phoneme deletion, substitution, isolation, segmentation, blending, letter sounds, and word recognition. Terrell (2007) read simple books comprised of a Phonic Face accompanied by a few pictures of familiar objects that begin with the sound to 20-24 month old children. Following 18 short book-reading sessions, children made significant gains in letter identification, letter discrimination, and letter-sound production that were maintained 6 weeks after training was completed.

Figure 1. Example of a Page from a Phonic Faces Alphabet Storybook

While these studies show that intervention conducted in the context of storybook reading is an effective format for learning phonological and print awareness skills, little research has been conducted on which skills should be addressed. Several researchers have suggested that there is both a shallow level of phonological awareness, which includes larger units such as rhyme words or syllables, and a deep level where smaller units such as phonemes are perceived and manipulated (Justice & Schuele, 2004; Stanovich, 1992; Treiman & Zukowski, 1996). These levels have been shown to differ in their ease of learning (Simmons & Kame'enui, 1998; Stahl & Murray, 1994) but are believed to have their origins in the same underlying knowledge base (Anthony & Lonigan, 2004; Schatschneider, Francis, Foorman, Fletcher, & Mehta, 1999).

This has led researchers to suggest that phonological awareness intervention should follow developmental principles by teaching children to segment and manipulate the larger units first (i.e., syllables, words that rhyme, and beginning sound awareness) before addressing progressively smaller units (i.e., onsets and rimes and finally phonemes) (e.g., Hindson et al., 2005; Schuele & Boudreau, 2008; Ziolkowski & Goldstein, 2008).

Rhyme

Research regarding rhyme suggests that it is a developmentally important form of phonological awareness. The shallow level of rhyme where children can indicate whether two words rhyme typically develops by four years without direct instruction. Children become aware of rhymes at a young age from exposures, starting in infancy, to nursery rhymes, lullabies, games such as "Peek-a-boo, I see you" or "Pat-a-Cake." By three years of age children might recite nursery rhymes in part or whole, and enjoy musical games and finger plays containing rhymes. Videos, computer programs, and televsion programs bombard children with songs, poems, and other sources of rhyme (Bryant et al., 1990; MacLean et al., 1987). One of the reasons that children are intrigued by the alphabet song is that many of the the rhyme, ending in the phoneme /i/ (that is, long e). The rhyming letters are distributed across the song, including b,c,d,e,g,p,t,v, and z. Rhyme helps children remember the letter names, as evidenced by their ability to chime in with these letter names as the entire song is sung by others (Bergeson & Trehub, 2007).

Researchers suggest that rhyming skills should be taught in a hierarchical manner, with rhymes and syllable awareness taught before onset-rime (Chard & Dickson, 1999; Schuele & Boudreau, 2008; Schuele & Dayton, 2000). Higher level rhyming tasks, such as rhyme oddity (picking out the rhyming words from a choice of three or more words) and generation of

rhyming words may be dependent on onset-rime awareness (Kirtley, Bryant, MacLean, & Bradley, 1989).

Rhyme and phonemic awareness. Phonemic awareness skills have been shown to be positively affected by gains from rhyme training (Hindson, et al., 2005). Dickinson and Neuman's (2006) longitudinal study found a relationship among rhyme awareness and other measures of phonological awareness, arguing that rhyming increased sensitivity to phonemes. An extant view of literature found rhyming serves as a bridge to phonemic awareness (Macmillan, 2002). However, an opposing view states that rhyme training does not have any effect on other phonemic awareness skills (Martin & Byrne, 2002; Yeh & Connell, 2008). O'Connor et al. (1992) showed that children with disabilities made significant progress within the taught categories of blending, segmenting, and rhyming, but were unable to generalize the skills learned between or within phonemic awareness categories. Yeh and Connell (2008) taught phoneme segmentation, rhyming, and blending and found rhyming did not improve segmentation or blending. Intervention studies can lend insights into whether or not rhyme training holds any advantage over training phoneme awareness skills directly (Martin & Byrne, 2002; Yeh & Connell, 2008). Since segmentation better predicts reading, Hulme, et al. (2002) recommended training segmentation.

Role of onset-rime in early reading and spelling skills. Although onset-rime and rhyme are not the same, they share a special relationship and contribute to the learning of emergent literacy skills. An onset consists of the initial consonant or cluster of a word whereas the rime consists of the vowel and any letters that follow. There is evidence that monosyllabic words are naturally divided into onset and rime syllables from an early age (Kirtley et al., 1989; Treiman, 1985). Treiman (1985) found that children learn to divide words into onset-rime easier

than any other divisions of words into syllables. These findings have led researchers to suggest that rhyming forms a natural bridge between words and phonemes. The rime is a syllable unit which requires only a shallow level of phonological awareness to perceive. As children engage in rhyming, they are changing a single phoneme (i.e., the onset) while maintaining the rime. Learning to change the first sound begins to shift the focus to a deep level of phonological awareness (Bryant et al., 1990; Hindson et al., 2005).

The importance of rhyme for reading compared to other phonological awareness skills such as phoneme isolation or manipulation has been debated (Macmillan, 2002). The finding by Goswami (1999) that rhyme tasks were easier for preschoolers to detect than phonemes and serves as "a route into phonemes" (Goswami, 1999, p. 233) has led some to propose that reading instruction should call attention to rime units within words. As children see the repeating rime patterns they begin to recognize the structure of words and associate new words with known patterns (i.e., reading by analogy) (Goswami & Bryant, 1992). This conclusion was based on Goswami's review of extant research showing that rhyme awareness is related to reading ability and it affects reading achievement (Macmillan, 2002). Goswami argued that the balance of the research evidence supported a causal role of rhyming in learning to read (Goswami, 1999; MacLean et al., 1987). For example, studies examining language development (Slobin, 1978), nursery rhyme knowledge (MacLean et al., 1987), rhyme judgment (Lenel & Cantor, 1981; Lundberg, Frost, & Petersen, 1988; MacLean et al., 1987; Muter, 1994; Stuart and Coltheart, 1988), and oddity detection (Bowey, 1994) reveal that young children are sensitive to onset and rime units, the foundation of reading by analogy. Blaiklock (2004) found numerous significant correlations between rhyme and other phoneme awareness tasks and reading, supporting an important role in learning to detect phonemes (Blaiklock, 2004; Perfetti et al., 1987). Baker

(1998) showed that nursery rhyme knowledge in kindergarten was the strongest predictor of word attack and word identification skills measured in the second grade. Several studies showed that children who received training in rhyming have an advantage in performing reading tasks when compared to those who do not receive training (Blachman, Ball, Black, & Tangel, 1994; Byrne & Fielding-Barnsley, 1991). Goswami (1999) states that rhyming may contribute to reading in two different ways as children begin to detect patterns learned from rhyming and apply it to reading and spelling tasks. First, rhyme awareness increases phonemic awareness skills, and secondly, the consistent spelling sequences of rhyming words make it easier to read new words that contain familiar rimes (i.e., Ehri's (1995, 2005) consolidated phase).

Rhyming skills also have important implications for spelling (Goswami, 1999). Many words and syllables share the same rime, including regular (i.e., man, pan, Japan, mansion) and irregular (i.e., sight, might, tight) words (Johnston, 1999). When a child begins forming phonological categories for shared onsets and rimes, they develop spelling sequences for those onsets and rimes. A child who is able to spell *cat* finds spelling words that rhyme with *cat* much easier than spelling words outside of the same rime family (Johnston, 1999). Realizing rimes as a unit as opposed to the phoneme as a unit when spelling certain words renders spelling of these words more predictable. One such example is the vowel '*ow'* that can be pronounced as a long or short vowel sound combination. Therefore, teaching words such as *how* and *cow* or *know* and *show* as common rime units facilitates correct spelling practices, a common strategy used in classrooms to facilitate spelling skills. Wylie and Durell (1970) created a list of 37 rimes that can be used to make 500 words. They argue that studying high frequency rimes eases the load of decoding single and multiple syllable words.

Bryant et al. (1990) composed three models that summarized the ongoing debates between phonological awareness and reading. The first model depicts disconnect between rhyme and alliteration and the ability to detect phonemes, which is shown to have a greater impact on reading success than rhyme and alliteration. The second model attributes rhyme and alliteration to the success of phoneme detection eventually leading to reading success. Finally, the third model depicts rhyme and alliteration as having a direct effect in reading success separate from the direct effect of phoneme detection (see Bryant et al., 1990 for a visual representation of the summary of debates).

Part of the problem is that studies measure and train different rhyming skills and so different outcomes may be because of variations in the way rhyme is measured. This led Lonigan (2007) to conclude that rhyming is not the most evidenced based pedagogical practice. Studies that exist have taught rhyming in the context of storyreading (Reynolds, Callihan, & Browning, 2003; Ziolkowski & Goldstein, 2008), using manipulatives that rhyme during circle time actitivies (O'Connor et al., 1992), using rhyme detection activities during circle time (Majsterek, Shorr, & Erion, 2000), using preschool curriculum materials (Yeh & Connell, 2008), and utilizing rhyme oddity tasks (Bradley & Bryant, 1985). Additionally, rhyming instruction can include a range of tasks such as identifying rhymes, matching rhymes, generating rhymes, and finding the odd word that does not rhyme when given a trio of words (i.e., rhyme oddity) (Schuele & Dayton, 2000). Moreover, rhyming instruction may involve several phonological awareness skills such as blending onsets and rimes, segmenting syllables, and alliteration depending on how it is presented.

Rhyme training. Many may believe existing rhyming activities (e.g., singing nursery rhymes) are sufficient and that rhyming is the easiest phonological awareness skills to learn.

Yet, to complete a rhyme oddity task, a child must know what it means to rhyme, attend to the structure of all three words presented and mentally segment the rime from the onset, and compare the three rimes and conclude that *pig* has a different rime than *cat* and b*at* (Phillips, Clancy-Menchetti, & Lonigan, 2008). There may be confusion if two of the words share an onset (Phillips et al., 2008) or if phonetic features differ by more than two (Snowling & Hulme, 1994). Teaching rhyming activities may differ in the degree of both implicit and explicit teaching entailed. Explicit and implicit teaching methods are used to teach many skills in the classroom setting. Implicit teaching is described as a passive, unsystematic, and naturalistic teaching process, whereas explicit teaching is an active, highly structured, and purposeful teaching process. Singing nursery rhymes and listening to poems are examples of implicit teaching of rhyming, whereas giving a definition of rhyme and explaining why two words rhyme are examples of explicit teaching of rhyming.

The type of training received has an effect on learning and generalizing (Macmillan, 2002). Research that taught rhyming skills in conjunction with other emergent literacy skills resulted in gains in literacy knowledge and a range of phonological awareness skills (Bradley & Bryant, 1983; Bradley, 1988; Defior & Tudela, 1994; Hatcher et al., 1994). Rhyming taught in the classroom as part of a more global lesson was found to be effective with low SES preschoolers (McIntosh et al., 2007). Meaningful but structured contexts such as reading stories containing rhyme have been shown to be effective for increasing phonological sensitivity (Duursma et al., 2008). Recall also that while interventions targeting phonological awareness in isolation improve these skills, there is question of whether teaching them without the involvement of letters has any actual benefits for reading (Bradley, 1988; Bradley & Bryant, 1983; Castles et al., 2009; Defior & Tudela, 1994; Hatcher et al., 1994). Thus, implicit teaching

through classroom songs, rhymes and poems may not result in direct benefits to reading. This suggests that research addressing the explicit teaching of rhyming within a reading context using print may present an ideal context for rhyme instruction and examining its effects on other phonological awareness skills and early reading.

Levels of Rhyme

Another important factor in deciding where to begin when teaching rhyming skills is determining what level of rhyme is appropriate. Many researchers propose that rhyme is an early skill in development that may provide the child clues that form a bridge for discovering phonemes. These researchers suggest that phonological awareness is a sequence of events that begins its foundation with rhyme (Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003; Stuart, 2005) and progresses toward more advanced skills requiring manipulation of phonemes (Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003; Stuart, 2005). Stanovich (1992) suggested that there are different levels within rhyme itself, with word rhyming representing a shallow level of phonological awareness while detecting onset and rime requires a deeper level of processing. Others describe the range of tasks used to measure rhyme, suggesting that some are more difficult than others such as identifying rhymes, matching rhymes, generating rhymes, and finding the odd word that does not rhyme when given a trio of words (i.e., rhyme oddity) (Schuele & Dayton, 2000). Hoffman and Norris (2002) suggest that rhyme has its own developmental continuum beginning with prelanguage experiences such as listening to lullabies and progressing toward rhyme awareness and more complex and abstract accomplishments. Thus by 3 years children recite nursery rhymes, songs, and chants in whole or part; by late 3's tell whether two words rhyme; by 4 years children can choose the rhyming words from a choice of words; by 4;6 they can substitute initial sounds to make rhyming words, by 5 years they can

coordinate meaning-syntax-rhyme to complete the last word of a poem, by 5;6 they can coordinate sound and rhyme (What starts with X and rhymes with Y?); and by 6;6 complete the last sentence of a poem. In the Norris and Hoffman model, each strand of phonological and print awareness (i.e., alphabet knowledge, segmentation, sound isolation, developmental spelling) can be similarly profiled. While each skill has its own milestones, developmentally they interact reciprocally so that advances in one area facilitate advances in another.

Summary

The literature is inconclusive regarding the role of rhyme in reading development. Some researchers believe the role is direct and even causal, while others believe the role is minimal compared to other phonemic awareness skills such as phoneme segmentation. Some studies support the perspective that rhyme creates a bridge to other phonological awareness skills since segmenting a word into onsets and rimes is easier than segmenting words into phonemes. Changing the onset phoneme to create a rhyming word places rhyme at the center of learning the alphabetic principle. Intervention studies can provide insights into the importance of rhyme, but few have been conducted (Bradley & Bryant, 1983; Brazier-Carter, 2008; O'Connor et al., 1992; Majsterek et al., 2000; Yeh & Connell, 2008). Further, intervention studies that have examined interventions taught rhyme without print and in isolation from a literacy context, both factors which have been shown to be critical for letter-sound learning and reading. This study will address the role of rhyme in learning the alphabetic principle by explicitly teaching rhyme in the context of interactive storybook reading and rhyme practice with at-risk prekindergarten children.

In addition, rhyming may develop along a continuum of complexity. Understanding this continuum can provide a means to examine extant literature for conflicting results, as well as to

plan developmentally appropriate interventions. Given the findings in the literature review, it was hypothesized that teaching rhyme awareness would provide a more facilitative context to learn the alphabetic principle, phonemic awareness skills, and increasingly complex rhyming skills when compared to teaching phoneme awareness. It was also hyposthesized that increasingly complex rhyming skills develop in a hierarchical manner. The questions of this study are:

1. Does teaching larger units (i.e., rhyme) of phonological awareness offer an advantage in acquiring the alphabetic principle (i.e., letter names, letter sounds, letter and sound fluency) when compared to teaching smaller units (i.e., phonemes)?
2. Does teaching larger units of phonological awareness offer an advantage when learning phonemic awareness skills (i.e., isolate initial consonants, isolate final consonants, blend onset and rime, blend separately spoken phonemes) when compared to teaching smaller units?
3. Does teaching larger units of phonological awareness offer an advantage in learning increasingly complex rhyming skills when compared to teaching smaller units?
4. Do participants in the experimental and control groups with a diagnosed or suspected speech-language impairment make similar progress as participants without a diagnosed or suspected speech-language impairment in letter knowledge, phonemic awareness, and rhyming complexity skills?
5. Are increasingly complex rhyming skills learned in a hierarchical manner?

METHODS

This study investigated whether teaching larger units (i.e., rhyme) of phonological awareness would facilitate learning of the alphabetic principle (i.e., phonemic awareness, letter-sound association, and decoding CVC words) more than instruction focused on phoneme sequences for preK children. Students received either a rhyme-focused intervention (experimental) or phoneme-focused intervention for 8weeks. Groups were compared for relative changes in gain scores as well as weekly probes.

Setting

The study took place in a Title I elementary school in southeastern Louisiana that serves children primarily from low-income families. The school has a population of 362 students (Common Core Data, 2009-2010). Of the 362 students, 331 receive free lunch and 16 receive reduced lunch prices. The racial profile of the school includes 331 African Americans, 18 European Americans, 11 Hispanic/Latino Americans, and 1 Asian American.

Classrooms

The participants were recruited from the two prekindergarten classrooms at the school. The classrooms were divided into different areas representing learning centers. The centers in the classroom typically included the listening, computer, art, library, blocks, science, and dramatic play centers. A teacher and paraprofessional managed each of the classrooms. The teachers stated they used a research-based curriculum to guide lessons throughout the day. The daily routine varied and consisted of morning and afternoon whole and small group activities.

The experimenter completed 45-minute observations in classrooms A and B to measure the literacy environment using the Get Ready to Read Classroom Literacy Environment Checklist (http://www.getreadytoread.org) (See Appendix C). The checklist is divided into

several sections with related statements in each section including availability of learning materials; children's use of learning materials; what the teacher or assistant teacher does; the teacher's background; and about the classroom and school, preschool, or center. The observer rates each statement under each section as true or false and calculates the number of true statements to determine the literacy-friendliness of the classroom. A score consisting of 31-41 indicates the classroom literacy environment has most of the many supportive elements; 21-30 indicates the classroom literacy environment has many supportive elements; 11-20 indicates the classroom literacy environment has some supportive elements, and 0-10 indicates the classroom literacy environment needs improvement. The experimenter rated Classroom A with a score of 39 and classroom B with a score of 36.

Participants

Participants were pre-kindergarten (preK) students selected from those who returned letters of consent approved by the LSU Institutional Review Board (including video recording of the intervention sessions). Students were excluded if they were able to name upper and lowercase letters and letter sounds with 100% accuracy, received an average or above score on standardized assessments, and received a score of 90% or above on informal assessments. Thirty-two students returned consent forms. Three students were excluded from the study based on exclusion criteria, uncooperative behavior, or transference to a different school one week after the study began.

The resulting participants included 29 preK students, 17 males and 12 females. Nineteen of the students were in Classroom A, and 10 in Classroom B. The participants ranged in age from 4;4 to 5;5 years (M = 4;8; SD = 0.41) and included 22 African American, 1 Caucasian and 6 Hispanic/Latino American students. Socioeconomic status was determined by the participants'

lunch status. All of the students received free lunch with the exception of one student in the control group. Three of the participants had Individualized Education Plans (IEP), two in Classroom A with articulation or articulation and language impairments, and one in Classroom B diagnosed with a developmental delay and exhibiting characteristics of autism. Additionally, two of the students (participants 14 and 15) one from each class with IEPs were repeating preK due to lack of progress during their first year in preK.

The experimenter initially placed participants in the experimental or control treatment conditions using a random assignment of matched pairs following pretesting (see description of test battery). Participants were matched on as many characteristics as possible, with priority given to rhyming ability, followed by letter naming, sound blending, and general language abilities. If more than two participants had similar characteristics, the match was made based on similarity in age. Recall that one of the participants transferred to a different school one week after the intervention began. A t-test was conducted to determine if the groups were significantly different in age after the loss of the participant. There was not a significant difference in age between the groups, t (27) = .97, p = 0.34.

During the data analysis phase of the study, differences in the patterns of performance began to emerge from the data for participants identified or suspected of SLI and phonological disorders. Because of new referrals for participants suspected to have an SLI the study progressed, it was observed that slightly more than one third of the participants in the study had a diagnosed or suspected SLI. A diagnosed SLI participant can be defined as a student who has an individualized education plan for a diagnosed SLI. A suspected SLI participant can be defined as a student who had been referred because of difficulties with speech and/or language difficulties or who was receiving speech-language interventions because of a suspected SLI.

Examples of SLIs include articulation, phonological, fluency, and language disorders. The groups therefore were subdivided for additional analyses to determine if the performance of the subjects with SLI differed from those with no presenting communication delays.

The experimenter initially placed participants in the experimental or control treatment conditions using a random assignment of matched pairs following pretesting (see description of test battery). Participants were matched on as many characteristics as possible, with priority given to rhyming ability, followed by letter naming, sound blending, and general language abilities. If more than two participants had similar characteristics, the match was made based on similarity in age. Recall that one of the participants transferred to a different school one week after the intervention began. A t-test was conducted to determine if the groups were significantly different in age after the loss of the participant. There was not a significant difference in age between the groups, t (27) = .97, p = 0.34. Table 2 profiles the phonological awareness, print awareness, and name writing abilities of participants in the experimental and control groups.

Table 3 profiles the receptive vocabulary and the letter knowledge abilities as measured by the Peabody Picture Vocabulary Test-4th edition (Dunn & Dunn, 2007) and the Alphabet Test. The experimenter combined scores from the Vowel Phonics Test with the consonant sounds subtest of the Alphabet Test. The resulting scores are presented in Table 2 under the Letter Sounds (LS) column. Results of the Rimes Test are not presented in the table below due to the small number of students able to complete the task. Four participants, two from each group, were able to read rimes from the Rimes Test at pretest. Participant 9 read three out of eight of the rimes and participants 2, 17, and 27 read one out of eight of the rimes presented. Pre- and posttest rhyming complexity scores are presented in the results section (See Table 13) for ease of comparability.

Table 1. Demographic Characteristics of Experimental and Control Participants

Participants[a]	Age (yrs; mos.)	Gender	Race	Classroom	Risk[b] Factor
Experimental					
1	4;4	F	H/L	B	Low SES
2	4;5	M	AA	A	Low SES
3	4;7	F	H/L	A	Low SES
4	4;8	M	AA	A	Low SES
5	5;1	F	C	A	Low SES
6	5;1	F	AA	A	Low SES
7	5;2	M	AA	A	Low SES
8	5;3	M	AA	A	Low SES
9	5;3	M	AA	B	Low SES
Experimental SLI					
10	4;5	F	AA	B	A/L-IEP
11	4;9	F	AA	A	L-referral
12	4;10	F	AA	B	L-referral
13	5;0	M	AA	A	A-IEP
14	5;5	M	H/L	B	L/DD-IEP
15	5;5	F	AA	A	A/L-IEP
M (SD)	4.91 (0.37)	8F/7M		10A/5B	
Control					
16	4;7	M	AA	B	Low SES
17	4;7	M	AA	A	Middle SES
18	4;7	F	H/L	A	Low SES
19	4;7	M	AA	A	Low SES
20	4;8	F	AA	B	Low SES
21	4;10	M	AA	A	Low SES
22	4;11	M	AA	A	Low SES
23	5;2	M	H/L	B	Low SES
24	5;3	M	AA	A	Low SES
25	5;3	M	H/L	A	Low SES
Control SLI					
26	4;4	M	AA	B	A-referral
27	4;7	F	AA	A	A-referral
28	4;9	M	AA	B	A-referral
29	4;10	F	AA	A	F-referral
M (SD)	4.79 (0.28)	4F/10M		9A/5B	

Note. AA = African American; C = Caucasian; H/L = Hispanic/Latino; L = Language; DD = Developmental Delay; A = Articulation; F = Fluency. The groups are subdivided for ease of comparability.

[a]Participants with SLI also had Low SES as a risk factor. [b]Disability status is denoted by diagnosed or suspected disability followed by "IEP" for participants with a diagnosed disability and "referral" for suspected disability.

Table 2. Profile of Phonological Awareness Skills on Individually Administered Instruments at Pretest for Experimental and Control Participants

Participant	PALS					PA				
	NW	BS	PWA	RA	NRA	ER	IIC	IFC	BOR	BSSP
Experimental										
1	4	6	7	6	8	2	0	0	4	2
3	5	3	8	5	7	1	3	0	1	0
4	4	7	7	3	7	5	4	2	2	0
5	6	0	4	1	4	1	0	0	0	0
9	7	10	9	10	9	5	5	4	5	3
10	5	9	7	6	4	1	0	0	4	0
11	7	10	8	4	6	5	1	2	2	0
12	5	6	5	5	7	0	1	0	2	1
13	7	10	9	4	9	5	5	4	1	1
Experimental SLI										
2	2	2	4	5	5	2	1	0	0	0
6	4	3	3	2	3	1	0	0	0	0
7	3	5	3	4	6	0	2	0	1	0
8	7	2	7	5	2	0	0	0	0	0
14	0	3	1	0	0	3	0	0	0	0
15	7	0	3	8	0	0	0	0	0	0
M (SD)	5.40 (1.72)	4.80 (3.75)	5.87 (2.29)	4.60 (2.41)	5.00 (2.88)	2.07 (2.02)	1.47 (1.88)	0.80 (1.47)	1.47 (1.68)	0.47 (0.91)
Control										
17	6	10	9	9	8	2	0	0	1	0
18	7	9	9	9	4	2	3	2	2	1
19	1	3	4	3	3	0	0	0	0	0
21	7	9	6	10	8	5	0	2	2	0
22	7	10	9	6	10	5	0	0	0	0
25	7	10	4	10	7	5	2	1	2	0
26	2	6	2	2	1	1	0	0	1	0
27	7	0	8	2	5	1	0	0	0	0
28	4	5	8	8	4	4	2	1	1	0
29	5	6	7	5	8	4	0	0	1	0
Control SLI										
16	1	7	8	8	1	5	0	0	2	0
20	5	3	7	1	5	3	0	0	1	1
23	2	9	0	4	1	0	0	0	0	1
24	4	10	7	1	5	0	0	0	0	0
M (SD)	4.47 (2.42)	6.27 (3.63)	5.80 (3.10)	5.20 (3.59)	5.13 (3.02)	2.47 (2.07)	0.47 (0.99)	0.40 (0.73)	0.87 (0.83)	0.20 (0.41)

Note. PALS = Phonological Awareness Literacy Screening (Invernizzi, Sullivan, & Meier, 2001); NW = name writing; BS = beginning sounds; PW = print and word awareness; RA = rhyme awareness; NR = nursery rhyme awareness; PA = Phonemic Awareness Assessment (National Center on Education and the Economy and the University of Pittsburgh, 1998); ER =

(Table 2 continued)
expressive rhyming; IIC = isolate initial consonant; IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes. The groups are subdivided for ease of comparability.

A multivariate analysis of variance (MANOVA) was conducted on pre-assessment variables to determine if the experimental and control groups were similar before the intervention began. Results of the MANOVA indicated no significant difference between groups on pre-assessment variables, Pillai's Trace (V) = 0.77, F (8, 20) = 1.34, $p > .05$.

Interventionists. Ninety-six interventionists enrolled in a service-learning course at a local university's communication disorders department were recruited to implement the intervention. The interventionists were trained in class prior to administering the assessment instruments. The interventionists were assigned to either the experimental or control treatment conditions and trained in the implementation procedures in separate 2-hour training workshops. Procedures were reviewed and the importance of maintaining fidelity was stressed throughout the study during class meetings for the service-learning course.

Interventionists participating in the current study completed a demographic survey (See Appendix B) requesting information such as age, ethnicity, and experience with working with children. Demographic information was similar for interventionists in the experimental and control groups. There were 37 undergraduates and 4 graduates providing intervention for the experimental group and 42 undergraduates and 4 graduates providing intervention for the control group. Interventionists in the experimental group consisted of 39 Caucasian and 6 Hispanic individuals who all stated they had previous experience in working with children. Interventionists in the control group consisted of 41 Caucasian, 2 African American, 2 Asian, and 2 biracial individuals all of whom stated they had previous experience in working with children with the exception of one individual. More specifically, 89% of the experimental group

interventionists and 94% of the control group interventionists stated they had worked with children ages 0-5 years old. There was not a significant difference in the ages of interventionists in the experimental group (M = 21.53; SD = 2.47) and in the control group (M = 21.08; SD = 1.54), t (91) = 1.06, p = .29. Additionally, the number of years of experience in working with children did not differ significantly between the experimental (M = 6.42; SD = 3.55) and control (M = 7.05; SD = 3.64) groups, t (80) = .78, p = .44.

Teachers. Following the experimenter's observations, the classroom teachers completed a demographic survey (See Appendix D) including such items as highest degree completed, years of preschool teaching experience, total hours of training in early literacy skills, and areas of certification. The teacher from classroom A reported to have had 28 years of experience teaching preschool and had received more than 7 hours of early literacy training in phonics, phonemic awareness and Language Essentials for Teachers of Reading and Spelling (LETRS) (Moats, 2005). She also reported her highest level of education completed as a master's degree with certification in art education and early childhood education.

The teacher from classroom B reported to have had 12 years of teaching experience, 3 of which occurred in the preschool setting. She reported receiving more than 7 hours of training in early literacy including communication and literacy in early intervention and building early literacy and language skills. The teacher from classroom B also reported her highest level of education as a master's degree with certification in special education and guidance and counseling.

Monitors. Monitors were present during all intervention sessions including the experimenter, course instructor, and senior level students. The monitors observed sessions with a fidelity checklist and provided oral and written feedback, modeling, and correction as needed.

Table 3. Profile of Receptive Language and Letter Knowledge Skills on Individually Administered Instruments at Pretest for Experimental and Control Students

Participant	PPVT	Alphabet		
		UC	LC	LS
Experimental				
1	94	10	9	7
3	82	7	6	2
4	103	4	1	2
5	83	2	2	4
9	113	24	20	16
10	85	9	7	2
11	115	19	11	3
12	96	23	18	12
13	85	26	19	24
Experimental SLI				
2	74	9	7	3
6	74	2	0	1
7	73	3	2	2
8	92	14	11	3
14	72	25	23	21
15	71	17	12	7
M (SD)	87.47 (14.47)	12.93 (8.81)	9.87 (7.39)	7.27 (7.47)
Control				
17	86	25	18	10
18	106	26	23	17
19	88	2	3	1
21	94	12	7	4
22	74	19	11	10
25	92	24	18	8
26	83	0	0	1
27	93	211	16	15
28	113	12	7	6
29	102	4	5	2
Control SLI				
16	89	23	20	8
20	100	12	5	4
23	71	2	2	0
24	106	7	1	2
M (SD)	86.47 (26.61)	12.6 (9.75)	9.07 (7.94)	6.29 (5.31)

Note. PPVT = Peabody Picture Vocabulary Test (Dunn & Dunn, 2007); UC = uppercase letters; LC = lowercase letters; LS = letter sounds. The groups are subdivided for ease of comparability.

Assessments

The administration of the test battery occurred before the intervention began and was repeated at the conclusion of the intervention. Both oral and written language measures assessed the vocabulary, phonological awareness, letter identification, and phonics skills of the participants (See Table 3 for a summary of oral and written language measures). Table 4 provides a compilation of test battery administered and the corresponding construct measured by each test.

Peabody Picture Vocabulary Test- (PPVT- 4). The PPVT: 4 (Dunn & Dunn, 2007) is a norm-referenced measure of receptive vocabulary that can also be used to screen for verbal ability. The vocabulary presented represents 20 content categories including verbs, nouns, and adjectives. The examiner orally presents a stimulus word while presenting the examinee with a set of 4 black and white drawings. The examinee then selects a response by pointing or indicating the number of the chosen item.

Phonological Awareness Literacy Screening-Preschool (PALS-Pre-K). The PALS-Pre-K (Invernizzi, Sullivan, Meier, & Swank, 2004) is an emergent literacy screening test. The Six subtests of the PALS-Pre-K were administered, including name writing, beginning sounds, print and word awareness, rhyme awareness nursery rhyme awareness (the alphabet knowledge task was not administered). Each subtest results in a raw score.

The **Name Writing** task requires the child to draw a self-portrait and write his/her name. The name writing is scored on a developmental continuum.

The **Beginning Sound** task requires the child to produce the beginning sounds (i.e., /s/, /m/, /b/) of pictures that are presented.

The **Print and Word Awareness** task consists of a nursery rhyme printed in a text book format and requires the child to demonstrate his/her awareness of print concepts including directionality and differences between pictures and letters and words after a nursery rhyme is read.

The **Rhyme Awareness** task requires the child to point to the picture that rhymes with the first one presented after the examiner names all pictures that are shown.

The **Nursery Rhyme Awareness** task requires the child to give the final rhyming word after listening to a familiar nursery rhyme.

Individual Growth and Development Indicators (IGDI). The IGDI (University of Minnesota, 2003) contains three subtests including picture naming, alliteration, and rhyming. Progress is achieved by making progressively higher scores in one minute and is monitored by entering scores in a database, which create graphs of student progress. Local norms are recommended to interpret scores.

The **Picture Naming** subtest includes one hundred 5.5 X 8.5" stimulus cards with one colored picture on each card. The child is given one minute to name as many pictures as possible. A score of 26.90 is average for typically developing preschoolers, 19.01 for low-income preschoolers, and 16.88 for preschoolers with identified disabilities (Missall & McConnell, 2004).

The **Alliteration** subtest includes forty-six 5.5 X 8.5" stimulus cards with four colored pictures on each card. One picture is located at the top of the card, and three pictures are located at the bottom of the card. The child is given two minutes to identify as many pictures that begin with the same sound as the top picture. A score of 5.23 is

average for typically developing preschoolers, 4.28 for low-income preschoolers, and 4.43 for preschoolers with identified disabilities (Missall & McConnell, 2004).

The **Rhyming** subtest includes forty-six 5.5 X 8.5" stimulus cards, two of which are samples. Four colored pictures are on each stimulus card. One picture is located at the top of the card, and three pictures are located at the bottom of the card. The child is given two minutes to respond to as many rhyme stimulus cards as possible. A score of 7.61 is average for typically developing preschoolers, 6.5 for low-income preschoolers, and 5.07 for preschoolers with identified disabilities (Missall & McConnell, 2004).

The Alphabet Test. The Alphabet Test is an online-based letter naming and letter sound test that assesses alphabet and phonics knowledge (http://www.handwritingworksheets.com/k-test/index.htm). The test consists of naming uppercase and lowercase alphabet letters that are typed sans serif font. The examinee is first asked to name all uppercase letters followed by lowercase letters and then consonant sounds. A percentage of correctly named upper- and lowercase letters and letter sounds are generated at the end of the test.

Phonemic Awareness Assessment (National Center on Education and the Economy and the University of Pittsburgh, 1998).The Phonemic Awareness Assessment is an informal assessment and includes five subtests:

The **Rhyming Words** subtest measures expressive rhyming skills and requires the child to give a rhyming word, real or made up, that corresponds to the two rhyming words given by the examiner (e.g. "Tell me a word, real or made up that rhymes with fell and sell").

The **Isolate Initial and Ending Consonants** subtests measure phoneme segmentation skills and requires the child to identify the sound he or she hears at the beginning of a word and at the ending of a word respectively.

The **Blend Onsets and Rimes** subtest requires the child to say the word heard when presented with the onset and the rime of a word.

The **Blend Separately Spoken Phonemes** subtest requires the child to say the word heard when given the separate phonemes of a word.

A score of "1" is given for correct responses and a score of "0" is given for incorrect responses for each subtest.

Rhyming Complexity Test. The investigator-created rhyming complexity test was created to measure multiple levels of rhyming complexity. The measurement is composed of less known mother goose rhymes (i.e., Come Out to Play, Come to the Window) and contains three subsections. Five trials of each type of rhyme were presented in each subsection.

AABB rhyme scheme - measures the ability to complete the last word of each couplet stanza within a poem (i.e., a word that rhymes with the previous sentences).

Coordinate sound and rhyme – respond with a rhyming word when prompted, "What starts with X and rhymes with Y?"

ABAB rhyme scheme - complete the last word of each quatrain stanza within a poem.

Vowel Phonics Test. The investigator created vowel phonics test was used to measure knowledge of vowels sounds, /a, e, i, o, u/. Children were presented with lowercase vowels in a serif font and asked to name the two sounds that each vowel produces.

Rimes Test. The investigator-created rimes test is used to measure the ability to read rimes targeted in the current study. Children are first presented with a sample rime (-at) which is

read by the examiner and participants are then asked to read the sample rime. Lastly, the children are presented with the eight targeted rimes taught during the intervention and were asked to read each one.

Letter Naming and Letter Sounds Fluency. The DIBELS probe (Good & Kaminski, 2002) for letter naming fluency (LNF) was modified to include upper- and lowercase letters taught during the intervention including vowels and two control letters (B, C, D) and was used to assess letter names and letter sounds weekly. Eight versions of the form were created, one for each week of intervention. One form was presented for one minute and participants were required to name the letters. The same form was presented for another minute and participants were required to provide the letter sound. The DIBELS 6th edition benchmark levels recommend the following scores for kindergarteners at the beginning of the school year: 0-1 (at-risk), 2-7 (some risk), and 8 and above (low risk). AIMSweb norms recommend a cut-off score of 7 for kindergarteners at the beginning of the school year.

DIBELS (2002) Nonsense Word Fluency. The progress monitoring versions of the nonsense word fluency (NWF) DIBELS probes (Good & Kaminski, 2002) were modified and used to assess sound blending weekly. The probes were modified so that the first five words were substituted with nonsense words that fit the rhyme patterns studied that week. The DIBELS 6th edition benchmark levels for NWF recommend the following scores for kindergarteners during the middle of the school year: 0-4 (at-risk), 5-12 (some risk), 13 and above (low risk). Because the DIBELS 6th edition does not give cut-off scores for reading whole words, the DIBELS Next edition cut-point scores were used. The cut-point score for risk for 1st grade students at the beginning of the school year is 1.

Materials

Materials included intervention materials and weekly probes. The intervention materials used provided visual strategies to help facilitate the learning of early literacy skills and increase engagement during early literacy activities.

Table 4. Quick Reference of Test Battery and Probes and Constructs Measured by Each Test

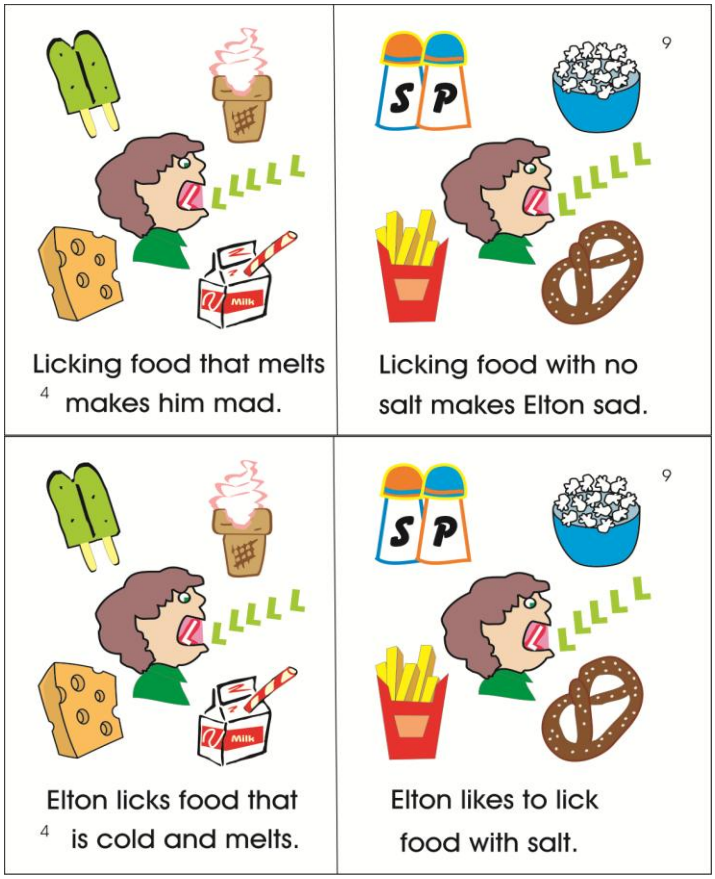
Test	Construct (s) Measured
Peabody Picture Vocabulary Test: 4:	receptive vocabulary
Phonological Awareness Literacy Screening-Pre-K:	NW, BS, PWA, RA, NRA
Individual Growth and Development Indicators:	receptive rhyming, alliteration, picture naming
Alphabet Test:	letter naming, letter sounds
Phonemic Awareness Assessment:	ER, IIC, IFC, BOR, BSSP
Rhyming Complexity Test:	ability to complete complex rhyming tasks
Vowel Phonics Test:	knowledge of vowel sounds
Rimes Test:	ability to read rimes
Letter Naming and Letter Sounds Fluency:	letter naming and letter sounds
Nonsense Word Fluency:	read nonsense words

Note. NW = name writing; BS = beginning sounds; PWA = print and word awareness; RA = rhyme awareness; NRA = nursery rhyme awareness; ER = expressive rhyming; IIC = isolate initial consonant; IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes.

Phonic Faces. Phonic Faces (Norris, 2001) are multicolored picture cards that provide visual cues to the speech production cues associated with the corresponding sounds of the alphabetic letters. The character is depicted with a letter drawn in the character's face to represent lip, tongue, or jaw positions used to produce the target sound (i.e., the vertical line of letter "L" is represented as the tongue stretching upward to the alveolar ridge) (See Figure 2). Phonic Faces utilize short anecdotal stories that function as a mnemonic device to cue the letter-sound association. For example, Elton uses his L-shaped tongue to lick food as he tastes sweet or salty flavors, saying /llll/ as he licks.

Phonic Faces Alphabet Story Books. Each Phonic Face character has a corresponding Phonic Faces Alphabet Story Book. The stories are written to elicit the sound associated with the letter as a natural part of reading the book (i.e., children make the licking /l/ sound each time they see the Elton licking the food). Two versions of the storybooks were utilized in the current study. In the experimental version, the sentences ended with rhyming words whereas the control version did not. A sample page from both versions of the storybooks is shown in Figure 3.

Figure 2. Phonic Faces Picture Car



(a) Rhyming Alphabet Story Book

(b) Non-Rhyming Alphabet Story Book

Figure 3. Sample Pages from the Experimental (a) and Control (b) Conditions' Phonic Faces Alphabet Story Books

Phonic Faces Word Train. The word train is a colorful three-car train (i.e., engine, boxcar, caboose) designed to help visualize sounds in different word positions and sound sequencing from left to right (See Figure 4). Changing the letter on the engine can result in rhyming words, whereas changing other letters helps visualize letter-sound manipulation. Additionally, the separate train cars help visualize sound segmentation, while the connection between the cars shows sound blending to form a single word.

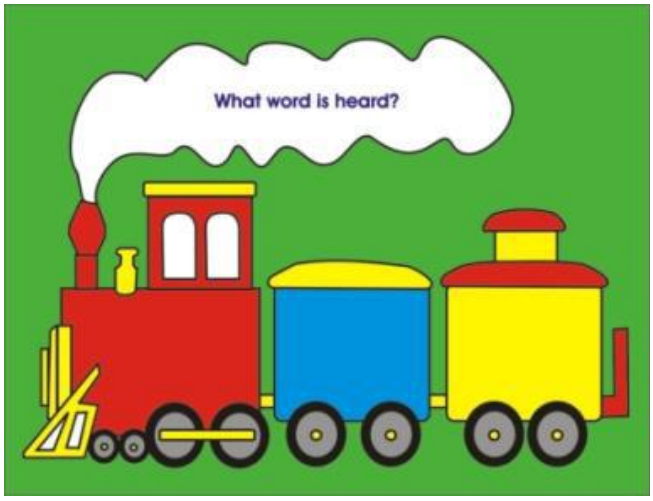


Figure 4. Phonic Faces Word Train

Procedures

Participants were administered the battery of assessments at pretest one week prior to intervention and again at posttest at the completion of the intervention. Additionally, probes administered at pre-test provided a measurement of the participants' baseline performance and probes administered at posttest provided a measure of skills maintained at the conclusion of the intervention.

After being assigned to the experimental or control condition, the participants in each condition were seen in groups of 3 for 30 minutes, 3 times weekly for eight weeks with 3 interventionists in each group. Given the nature of the study, information provided in the literature review concerning characteristics of at-risk children, and limited resources, having a

control group which received no treatment would have proved to be unethical. Therefore, both groups received interventions, but the procedures utilized in the experimental and control conditions were similar with one exception. The experimental group received rhyming instruction in addition to the phonics and blending sounds instruction (See Appendices E and F for sample lesson plans). The intervention took place in vacant classrooms throughout the school building.

Interventionists were assigned specific responsibilities during the intervention. One interventionist was responsible for introducing the target letter, another led the blending rhymes or sounds activity, and the remaining interventionist was responsible for reading the corresponding storybook (See Table 5 for a weekly schedule of letter-sounds, rimes, and storybooks). The procedures for interventionists providing the third day of intervention were slightly different; each of the interventionists completed one of the above responsibilities within a 15-minute time frame followed by administration of weekly probes. Interventionists completed the prescribed lesson plan and made comments on daily logs as needed (i.e., child x had a bad cold and minimally participated, or fire drill interrupted session). They also recorded participant attendance on daily forms.

The participants did not receive the 10 hours of supplemental originally intended for them. During week 5, the participants missed two intervention sessions due to a change in the school district's scheduling. Additionally, the participants missed 2 days of intervention during week 6 due to inclement weather conditions and a planned field trip for both preK classes. Ultimately, each participant had the opportunity to receive a maximum of 9.25 hours of intervention. Participants absent on the day of their intervention received a make-up intervention session.

Rhyming (experimental) condition. Each session began with an introduction of a targeted letter and a rime. One letter was targeted weekly and was chosen based on the letters and letter sounds in error on the pre-assessment. Additionally, the short vowel sounds were targeted at the beginning of each session. After the introduction of targeted sounds and rime, the interventionist asked the participants to produce the sounds associated with each letter and given corrective feedback using the cues on the Phonic Faces as needed. The interventionist then read the version of the storybooks containing the targeted sound and rhyming words. After reading each page of the storybook, the interventionist instructed the participants to imitate the sound of the letter and read the rime, find the targeted rime, and point to the two words that rhymed on the page. Further, the interventionist instructed the participants to locate words that contained the targeted sound. On the last page of the books, participants named words that rhyme with a given word.

Following the storybook reading, the participants practiced blending sounds in consonant (i.e., rime) + VC (rime) words using the PF train and the targeted weekly rime and letters. The sounds for the rime were placed on the middle train car and caboose, and children were prompted to say the rime (i.e., "an"). Then each participant took a turn adding a letter to the train engine (onset sound) and blending the onset and rime to make a word. If the child could not hear the blended word, stick-figure pictures were drawn on a white board to provide the child with a binary choice (i.e., m - an. Does this say "mean" or "man"?). Lastly, participants were asked to name the first letter and sound of each word spelled on the word train.

No-Rhyme (control) condition. The control condition targeted the same letter each week as in the experimental condition and introduced the short vowel sounds at the beginning of each session. The participants produced the sounds associated with each letter when asked and

received corrective feedback using the cues on the Phonic Faces as needed. The version of the storybooks containing the targeted sound and but no rhyming words were then read. After reading each page of the storybook, the interventionist instructed the participants to produce the sound associated with the letter, find words that began with the targeted letter, and identify words that presented the sound in a different word position. On the last page of the books, participants produced the letter name and letter sound of the target letter and named words that began with the sound in addition to blending sounds of words that contained the target phoneme.

The participants then practiced blending sounds in CVC words using the PF train and the targeted weekly letters. The sounds for the CVC sequence were placed on the engine, car and caboose. Then each participant took a turn producing the sound sequence to make a word. If the child could not hear the blended word, stick-figure pictures were drawn on a white board to provide the child with a binary choice (i.e., m - a - n. Does this say "mean" or "man"?). Lastly, participants were asked to name the first letter and sound of each word spelled on the word train.

Weekly probes. Weekly probes were administered to each participant at the end of the week and consisted of receptive rhyming, alliteration, picture naming, naming letter and letter sounds, and blending sounds in nonsense CVC words.

Fidelity

A checklist of the procedures for each condition was used to assure that the interventions were implemented with fidelity (See Appendix G). Monitors assigned to each group observed 100% of each session. Modeling and corrective feedback were provided as needed and variations or problems were noted in writing on the fidelity checklist. Video-recording of intervention sessions occurred at weeks two and eight. Two individuals blind to the purpose of the study watched twenty percent of the recorded sessions and completed the fidelity checklists.

A comparison of adherence to prescribed procedures at the beginning and conclusion of the study revealed 79 percent and 85 percent adherence, respectively.

Table 5. Schedule of Letter-Sounds, Rimes, Storybooks, and CVC Words Introduced Weekly

Week	Letter	Rime	Storybook Title	Words[a]	Words Rhyme[b]
1	L	-ad	Elton Likes to LLLick	lad, lop, lap, lit, lot	had, tad, mad, bad, fad
2	G	-ub	Gigi's Big Gulp	gum, gar, get, gap, gut	rub, sub, tub, cub, nub
3	M	-it	Emmet's Magic Meal	mug, mad, met, mop, mid	bit, sit, lit, fit, pit
4	V	-ot	Venus' Adventurous Vacation	vat, vet, van, vap, vim	hot, cot, pot, lot, dot
5	N	-et	Ennos and His Engine	net, not, nut, nil, nap	net, pet, get, let, met
6	R	-ed	Arlene's Roar	red, rig, rob, rid, rub	red, led, fed, ted, wed
7	W	-ig	Double-UU'sWonderful Waves	wet, war, win, wax, wig	big, rig, jig, pig, wig
8	F	-ap	Effy's Fan	fur, fix, fan, fat, fit	cap, tap, zap, gap, nap

[a] Word list used in the control condition
[b] Word list used in the experimental condition

Reliability

Scoring test and probe data. The interventionists initially calculated test scores given at pre- and posttest but the experimenter checked all scoring for accuracy. The experimenter recalculated 20% of pre- and posttest scores when blinded to the identity of the participants. Recalculation of pre- and posttest scores and daily probes revealed 100% agreement.

Data input. A second and third individual examined data obtained from pre- and posttest and probes that were entered into data sheets to ensure accuracy. There was 100% agreement on data entered into data sheets.

Study Design and Data Analysis

The current study utilized a two group experimental design in which groups were randomly assigned to the experimental or control condition. This type of design provides strong internal validity. However, external validity may be compromised. Experimental designs allow for the implication of causation for a treatment or program (Trochim, 2006). Dependent variables in the current study included nonsense word fluency, upper and lowercase letter knowledge (pre-/posttest measures), letter sound knowledge, LNF, LSF, phonemic awareness skills, and rhyming complexity skills. Data were analyzed using multiple statistical analyses and visual inspection.

Multiple 2 x 2 and 2 x 10 MANOVAs were used to measure the progress made by the experimental and control groups and if the groups differed significantly on the dependent variables. Posthoc analyses for significant MANOVAs included multiple univariate ANOVAs adjusting for Type I inflation errors using the Bonferroni Correction (Fields, 2009). Visual inspection (i.e., tables, bar graphs) was used to compare each group's performance on the dependent variables and to measure the participants' continuity in rhyming complexity tasks.

Finally, effect size (i.e., Partial Eta Squared) was calculated for each statistical test to determine the difference between the experimental and control group at the conclusion of the study. Whereas statistical analysis reveals whether groups are statistically different, effect sizes reveal whether the implemented intervention produced a clinical significance. Cohen (1988) recommends the following for interpretation of effect sizes: .2-small effect, .5-medium effect, and .8-large effect.

RESULTS

The current study investigated if providing low SES children with rhyming instruction will facilitate letter-sound learning, phonemic awareness skills including phoneme isolation and blending, and word reading abilities. The study also will address whether levels of rhyming are learned in a hierarchical manner and whether levels of rhyming are differentially affected by rhyming instruction. Several statistical tests were executed and assumptions of all statistical analyses including normality, homogeneity of variance-covariance, linearity, and dependence were checked prior to completing the analyses.

Alphabetic Principle

The first question asked if teaching larger units (i.e., rhyme) of phonological awareness facilitated acquirement of the alphabetic principle including naming lower- and uppercase letters, letter sounds, letter naming fluency, letter sound fluency, and nonsense word fluency when compared to teaching smaller units (i.e., phonemes). Data used to answer the first question were taken from the pre- and posttest results of the Alphabet Test, the combined results of the consonant sounds and vowels test, and the weekly probes. It was hypothesized that teaching larger units of phonological awareness would give the experimental group an advantage in acquiring the alphabetic principle.

Upper- and lowercase letters and letter sounds. Inspection of the means revealed greater gains for the experimental group for both upper and lower case letters, but greater gains in letter-sound learning for the control group. To determine if group differences were significant, a group (experimental vs. control) by time (pretest vs. posttest) MANOVA revealed there was not a significant main effect for groups $V = .06$, $F\ (3, 25) = .50$, $p > .05$, $\eta_p^2 = .06$ nor a group by time interaction, $V = .07$, $F\ (3, 25) = .67$, $p > .05$, $\eta_p^2 = .07$. However, there was a main

effect for time, $V = .83$, F (3, 25) = 41.20, $p = .001$, $\eta_p^2 = .83$. The main effect of time was followed-up using multiple univariate ANOVAs in which the significance level was adjusted using the Bonferroni correction ($p = .02$) to avoid inflated Type I errors. The results for letter knowledge revealed significant progress from pre- to posttest with uppercase letters, F (1, 27) = 44.88, $p = .001$, $\eta_p^2 = .62$; lowercase letters, F (1, 27) = 79.84, $p = .001$, $\eta_p^2 = .75$; and letter sounds, F (1, 27) = 111.84, $p = .001$, $\eta_p^2 = .81$. Table 6 provides the means and standard deviations for letter knowledge for the experimental and control groups at pre- and posttest.

Table 6. Pre- and Posttest Means and Standard Deviations for Uppercase Letters, Lowercase Letters, and Letter Sounds

Group	Uppercase Letters			Lowercase Letters			Letter Sounds		
	Pretest M (SD)	Posttest M (SD)	Avg. Gains	Pretest M (SD)	Posttest M (SD)	Avg. Gains	Pretest M (SD)	Posttest M (SD)	Avg. Gains
Exp. $n = 15$	12.93 (8.81)	19.93 (6.39)	7.00	9.87 (7.39)	18.20 (6.09)	8.33	7.27 (7.48)	17.47 (7.32)	10.20
Control $n = 14$	13.50 (9.45)	18.86 (8.53)	5.36	9.71 (7.82)	16.57 (8.22)	6.86	6.29 (5.31)	17.71 (8.30)	11.43

Note. Exp =experimental

Fluency skills. To examine if there were significant group difference, a group (experimental vs. control) by time (10 weeks including a baseline and maintenance week) MANOVA revealed there was not a significant main effect for group, $V = .22$; F (6, 22) = 1.01, $p > .05$, $\eta_p^2 = .22$ nor a group by time interaction, $V = .23$; F (54, 1458) = 1.08, $p > .05$, $\eta_p^2 = .04$. However, there was a significant main effect for time on fluency skills, $V = .47$; F (54, 1458) = 2.27, $p = .001$, $\eta_p^2 = .08$ but Mauchley's test indicated the assumption of sphericity had been violated for letter naming fluency, $\chi^2(44) = 100.35$, $\varepsilon = .57$; letter sound fluency, $\chi^2(44) = 97.70$, $\varepsilon = .50$; nonsense word fluency-sounds, $\chi^2(44) = 214.45$, $\varepsilon = .26$; nonsense word fluency-whole words, $\chi^2(44) = 214.45$, $\varepsilon = .26$; rhyming, $\chi^2(44) = 121.72$, $\varepsilon = .44$; and alliteration, $\chi^2(44) = 49.00$, $\varepsilon = .70$. The main effect of time was followed-up using multiple univariate ANOVAs in

which the degrees of freedom were adjusted using the Greenhouse-Geisser correction for variables that violated Mauchley's test, and significance levels were adjusted using the Bonferroni correction (p = .01) to avoid inflated Type I errors. The results of the univariate ANOVAs are shown in Table 7.

Table 7. Results of Univariate ANOVAs for the Main Effect of Time for Weekly Progress Monitoring Probes

Variable	F	df	Error df	η_p^2
LNF	5.84*	5.15	139.07	.18
LSF	9.08*	4.52	121.95	.25
NWF-S	5.66*	2.33	62.80	.17
NWF-W	2.61	2.64	71.39	.09
Rhyming	1.32	3.92	105.95	.05
Alliteration	3.02*	9.00	243.00	.10

Note. LNF = letter naming fluency; LSF = letter sound fluency; NWF-S = nonsense word fluency-sounds; NWF-W = nonsense word fluency-whole words.
* indicates significance at p = .01

Letter naming and letter sound fluency. Figure 5 provides a visual representation of the experimental and control groups' weekly progress for letter naming. Earlier changes were accrued to the control condition but both groups made equivalent changes by the end, suggesting teaching rhyme does not offer an advantage for letter naming fluency beyond teaching emergent literacy skills alone. Also on week 6, the control group named slightly fewer letters than the experimental group.

The weekly progress of the experimental and control groups for letter sound fluency is depicted in Figure 6. Both groups made continuous progress in letter sound fluency with higher gains accrued to the control condition. On week 7, the control group made a marked increased in letter sound fluency when compared to the experimental group. However, the gap between the groups was not significant, suggesting teaching rhyming does not offer an advantage for letter sound skills beyond teaching emergent literacy skills alone.

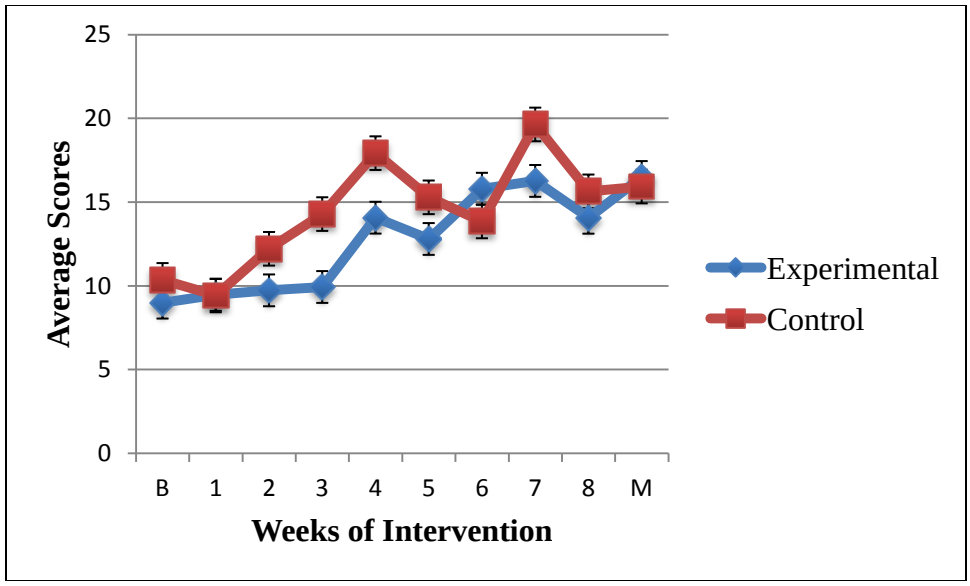


Figure 5. Average Weekly Scores for the Letter Naming Fluency Probe for the Experimental and Control Groups.

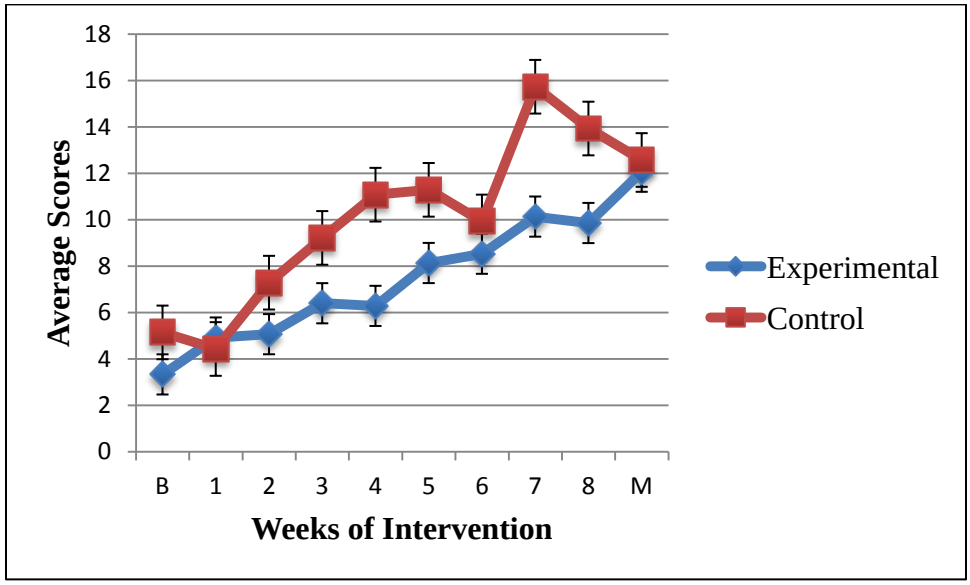


Figure 6. Average Weekly Scores for the Letter Sound Fluency Probe for the Experimental and Control Groups.

Further investigation of each participant's progress on letter naming and letter sound fluency skills was completed. Each participant's baseline, weekly intervention, and maintenance scores were averaged and then compared to the kindergarten benchmark levels and cut-off scores utilized by DIBELS (Good & Kaminski, 2002) and AIMSweb (Pearson, 2008). The results of the comparisons revealed advantages for the experimental group in letter naming fluency and

letter sound fluency. Table 8 profiles participants meeting and not meeting the kindergarten cut off scores for the letter sound fluency and gives the benchmark levels of participants for the letter naming task.

Table 8. Profile of Participants' Benchmark Levels on Weekly Letter Naming and Letter Sound Probes According to DIBELS and AIMSweb's Norms by Group

Probe	Experimental	Control
LNF		
at risk	1	2
some risk	1	2
low risk	13	10
LSF		
not met	3	5
met	12	9

Note. LNF = letter naming fluency; LSF = letter sound fluency

Nonsense word fluency. The weekly progress of the experimental and control groups for nonsense word fluency-sounds is depicted in Figure 7. Both groups make progress in letter sound fluency as time progresses. However, there is not a significant gap between the groups suggesting that teaching rhyming does not offer an advantage for nonsense word fluency-sounds beyond teaching emergent literacy skills alone.

The weekly progress of the experimental and control groups' progress on nonsense word fluency-whole words is depicted in Figure 8. Both groups make minimal progress in nonsense word fluency-whole words as time progresses. However, there is not a significant gap between the groups suggesting that teaching rhyming does not offer an advantage for nonsense word fluency-whole words beyond teaching emergent literacy skills alone.

Further investigation of each participant's progress on nonsense word fluency skills (correct letter sounds and whole words) was completed. Each participant's baseline, weekly intervention, and maintenance scores were averaged and then compared to the kindergarten benchmark levels and cut-off scores utilized by DIBELS (Good & Kaminski, 2002). The results

of the comparisons revealed advantages for the experimental group in nonsense word fluency-whole words. Table 9 profiles participants meeting and not meeting the 1st grade cut-off scores for nonsense word fluency-whole word tasks and gives the benchmark levels of participants for the letter naming and nonsense word fluency-sounds tasks.

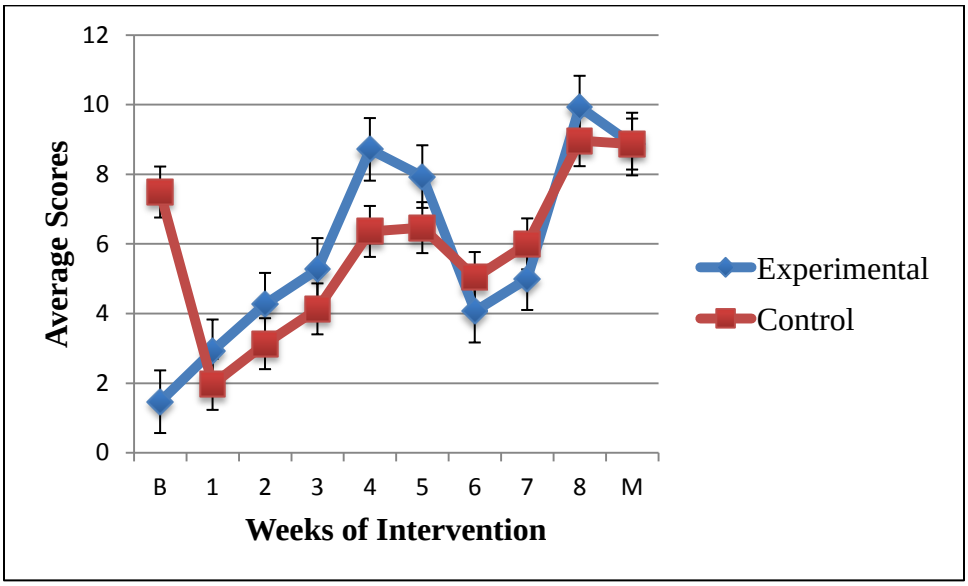


Figure 7. Average Weekly Scores for Nonsense Word Fluency Probe (Correct Letter Sounds) for the Experimental and Control Groups.

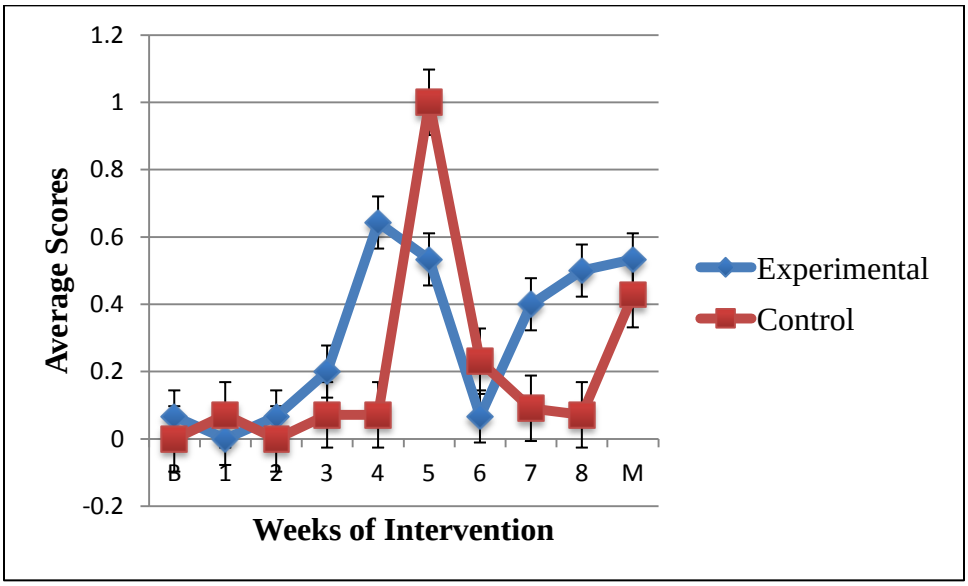


Figure 8. Average Weekly Scores for the Nonsense Word Fluency Probe (Whole Words) for the Experimental and Control Groups.

Table 9. Profile of Participants' Benchmark Levels on Weekly Nonsense Word Fluency Probes According to DIBELS Norms by Group

Probe	Experimental	Control
NWF-CLS		
at risk	6	5
some risk	5	3
low risk	4	6
NWF-W		
not met	11	12
met	4	2

Note. NWF-CLS = nonsense word fluency-correct letter sounds; NWF-W = nonsense word fluency-whole words.

Reading rimes. An analysis of the groups' ability to read rimes was completed. A one-way ANOVA of the groups gain scores revealed there was not a significant difference in gains made on reading rimes, F (1, 28) = .72, $p > .05$. Even though the results were not statistically significant, visual inspection of posttest rime scores revealed more participants in the experimental group were able to read rimes than participants in the control group. Table 10 profiles the descriptive statistics for reading rimes and the number of participants in each group who were able to read rimes at the conclusion of the study.

Table 10. Profile of Descriptive Statistics and the Number of Participants able to Read Rimes at Pre- and Posttest

	Experimental n = 15			Control n = 14		
	Pretest	Posttest	Gains	Pretest	Posttest	Gains
M (SD)	0.53 (1.25)	3.27 (2.31)	2.73	0.29 (0.61)	3.93 (3.40)	3.64
No. of participants read rimes	3	14		3	9	

Weekly rhyming and alliteration probes. The groups' weekly progress on the rhyming probe is shown in Figure 9. Visual examination of the figure reveals greater early gains for the control group but comparable gains by the end. -This gap suggests greater gains for the control

group and further suggests that teaching rhyme does not offer an advantage for rhyming beyond teaching literacy skills alone.

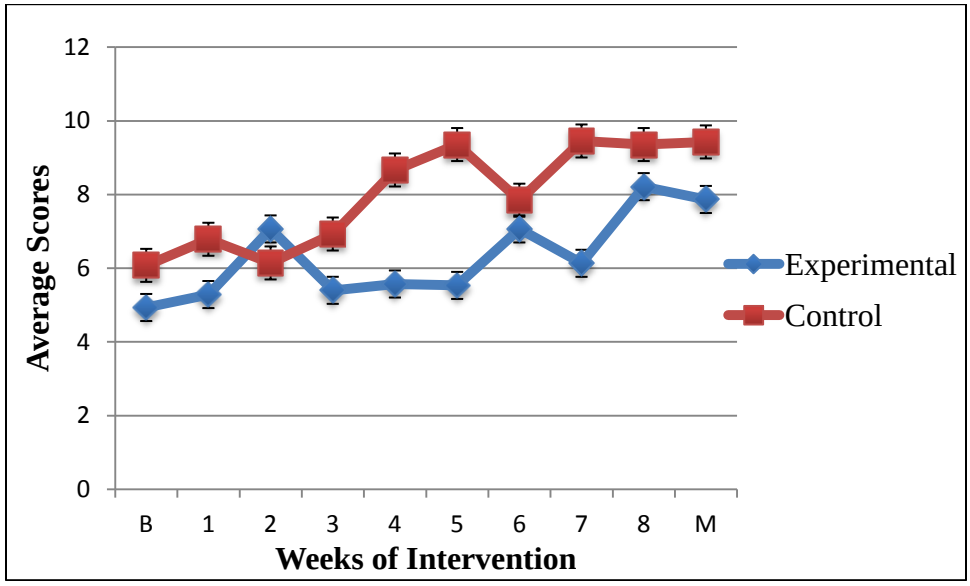


Figure 9. Average Weekly Scores for the Rhyming Probe for the Experimental and Control Groups.

The groups' weekly progress in alliteration is shown in Figure 10. Visual examination of the figure reveals comparable progress for both groups in the area of alliteration suggesting teaching rhyme does not offer an advantage in alliteration beyond teaching literacy skills alone.

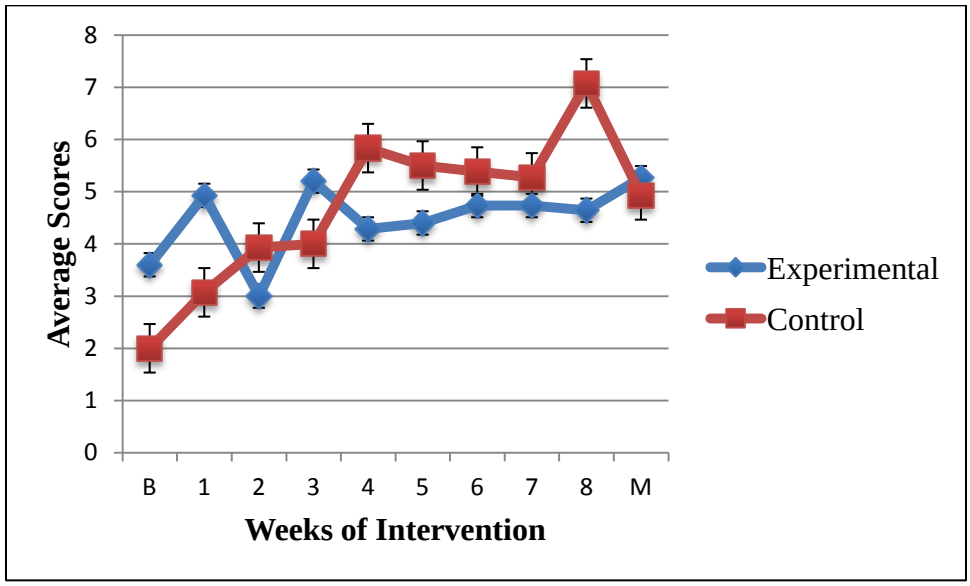


Figure 10. Average Weekly Scores for the Alliteration Probe for the Experimental and Control Groups.

Further analysis of individual progress in rhyming and alliteration was completed. Each participant's baseline, weekly intervention, and maintenance scored were averaged and then compared to cut-off scores for low-income children established by results of a technical report on the psychometric properties of the IGDI, which sampled 90 preschool aged children from several SES backgrounds (Missall & McConnell, 2004). The results of the comparison revealed more participants in the experimental group met the cut-off score (4.28) for alliteration; whereas, the number of participants meeting the cut-off score for rhyming (6.5) was equal (See Table 11).

Table 11. Profile of the Number of Participants Meeting and Not Meeting Alliteration and Rhyming Probe Cut-Off Scores Using Averaged Weekly Scores

Probe	Experimental	Control
Alliteration		
not met	7	9
met	8	5
Rhyming		
not met	7	6
met	8	8

Note. Cut-off scores for low SES populations were used.

Phonemic Awareness Skills

The third question asked whether teaching larger units (i.e., rhyme) of phonological awareness facilitated the learning of phonemic awareness skills such as isolating the initial consonant of a word, isolating the final consonant of a word, blend onset and rime, and blend separately spoken phonemes. It was hypothesized that teaching larger units of phonological awareness would give the experimental group an advantage in acquiring phonemic awareness skills. The results of a group (experimental vs. control) by time (pre- and posttest) MANOVA revealed there was not a significant main effect for group, $V = .08$, $F\ (4, 24) = .51$, $p > .05$, $\eta_p^2 = .08$ nor a significant group by time interaction, $V = .10$, $F\ (4, 24) = .67$, $p > .05$, $\eta_p^2 = .65$. However, there was a significant main effect for time, $V = .65$, $F\ (4, 24) = 11.01$, $p = .001$. The

main effect of time was followed-up using multiple univariate ANOVAs in which the significance level was adjusted using the Bonferroni correction (p = .01) to avoid inflated Type I errors. The results of the univariate ANOVAs revealed significant time effects for all phonemic awareness subtests, including isolate initial consonant, F (1, 27) = 34.12, p = .001, η_p^2 = .56; isolate final consonant, F (1, 27) = 23.80, p = .001, η_p^2 = .47; blend onset and rime, F (1, 27) = 25.85, p = .001, η_p^2 = .49; and blend separately spoken phonemes, F (1, 27) = 11.59, p < .01, η_p^2 = .30. Table 12 provides the means and standard deviations of pre- and posttest scores for the subtests of the Phonemic Awareness Assessment.

Table 12. Pre- and Posttest Means and Standard Deviations for the Phonemic Awareness Assessment

Phonemic Awareness Subtest		**Experimental Group** M (SD)	**Avg. Gains**	**Control Group** M (SD)	**Avg. Gains**
IIC	Pretest	1.47 (1.89)	1.53	0.50 (1.02)	2.50
	Posttest	3.00 (2.00)		3.00 (2.00)	
IFC	Pretest	0.80 (1.47)	1.27	0.43 (0.76)	1.93
	Posttest	2.07 (1.83)		2.36 (1.87)	
BOR	Pretest	1.47 (1.69)	1.07	0.93 (0.83)	1.86
	Posttest	2.53 (1.92)		2.79 (1.72)	
BSSP	Pretest	0.47 (0.92)	0.40	0.21 (0.43)	1.07
	Posttest	0.87 (1.25)		1.29 (1.27)	

Note. IIC = isolate initial consonant; IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes. Each of the phonemic awareness tasks contained 5 items.

Rhyming Complexity Skills

The fourth question asked if teaching rhyming skills in combination with emergent literacy skills increased the ability to complete increasingly complex rhyming tasks. It was hypothesized that the explicit teaching of rhyming in combination with teaching emergent literacy skills would give the experimental group in advantage in learning increasingly complex rhyming skills. Inspection of the means revealed greater gains for the experimental group in

nursery rhymes, receptive rhyming, and expressive rhyming. The control group made greater gains in rhyming couplets, rhyming quatrains, and coordination of sound and rhyme. Table 13 provides the means, standard deviations, and gains for each rhyming complexity task at pre- and posttest by group.

Table 13. Pre- and Posttest Means and Standard Deviations for Rhyming Complexity Tasks

Rhyming Complexity Task	Experimental Group M (SD) n = 15			Control Group M (SD) n = 14		
	Pretest	Posttest	Gains	Pretest	Posttest	Gains
NR	5.00 (2.88)	5.20 (2.93)	0.20	5.43 (2.65)	5.57 (2.68)	0.14
RR	4.60 (2.41)	6.73 (2.82)	2.13	5.57 (3.41)	7.36 (2.98)	1.79
ER	2.07 (2.01)	3.40 (1.72)	1.33	2.64 (2.02)	3.71 (1.38)	1.07
RC	1.53 (1.64)	1.87 (1.68)	0.33	2.14 (1.70)	2.64 (1.86)	0.50
RQ	0.87 (0.83)	1.27 (1.49)	0.40	1.00 (1.36)	2.07 (1.69)	1.07
CSR	0.27 (0.70)	0.92 (1.21)	0.53	0.36 (0.63)	0.93 (1.21)	0.57

Note. NR = nursery rhyme; RR = receptive rhyming; ER = expressive rhyming; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme. The NR and RR tasks contained 10 items. The remaining tasks contained 5 items.

To determine if there were group differences, a group by time (pretest vs. posttest) MANOVA used to measure the effect of the experimental and control conditions on rhyming tasks along the continuum of complexity. The analysis revealed there was not a significant main effect of group on progress made on the rhyming complexity tasks, F (5, 23) = .49, $p > .05$, η_p^2 = .10 nor a group by time interaction, F (5, 23) = .31, $p > .05$, η_p^2 = .06. However, there was a significant effect of time, F (5, 23) = 3.87, $p < .05$, η_p^2 = .46. The main effect of time was followed up using multiple univariate ANOVAs in which the significance level was adjusted using the Bonferroni correction (p = .01) to avoid inflated Type I errors. The follow-up analyses revealed significant time effects for receptive rhyming, F (1, 27) = 13.17, p = .001, η_p^2 = .33; expressive rhyming, F (1, 27) = 12.00, $p < .013$, η_p^2 = .31; and rhyming quatrains, F (1, 27) =

5.68, $p < .05$, $\eta_p^2 = .17$. There were not significant time effects for nursery rhymes, F (1, 27) = .23, $p > .05$, $\eta_p^2 = .01$ or rhyming couplets, F (1, 27) = 1.77, $p > .05$, $\eta_p^2 = .06$.

Progress Made by Participants with a Suspected or Diagnosed Speech-Language Impairment (SLI)

The progress made by participants diagnosed with a speech-language impairment or referred for speech-language difficulties was investigated. Comparisons were made on pre- and posttest variables including letter knowledge, phonemic awareness, and rhyming complexity. To complete the comparison, the study sample was divided into four groups: experimental participants with speech-language impairments experimental participants without SLI, control participants with SLI, and control participants without SLI. Table X gives the mean and standard deviations for pre- and posttests for letter knowledge for each of the groups.

Letter knowledge. The control SLI made greater gains in naming uppercase letters. The experimental group made greater gains in naming lowercase letters and the control group made greater gains in letter sounds. A group by time (pre-and posttest) MANOVA was used to determine if the groups differed on letter knowledge tasks (See Table 14 for pre- and posttest descriptive statistics). The results of the analysis revealed a significant main effect for time $V = .81$, F (3, 23) = 33.31, $p = .001$, $\eta_p^2 = .81$. However, there was not a main effect for the group by time interaction, $V = .16$, F (9, 75) = .46, $p > .05$, $\eta_p^2 = .05$, nor was there a main effect for group, $V = .23$, F (9, 75) = .69, $p > .05$, $\eta_p^2 = .08$. The main effect of time was followed-up using multiple univariate ANOVAs in which the significance level was adjusted using the Bonferroni correction ($p = .02$) to avoid inflated Type I errors. The results for letter knowledge revealed significant progress from pre- to posttest with uppercase letters, F (1, 25) = 44.88, $p = .001$, $\eta_p^2 = .62$; lowercase letters, F (1, 25) = 79.84, $p = .001$, $\eta_p^2 = .75$; and letter sounds, F (1, 27) = 111.84, $p = .001$, $\eta_p^2 = .81$.

Table 14. Pre- and Posttest Means and Standard Deviations for Letter Knowledge for SLI and Non-SLI Groups

Letter Knowledge Task		Experimental SLI M (SD) $n = 6$	Experimental M (SD) $n = 9$	Control SLI M (SD) $n = 4$	Control M (SD) $n = 10$
UL	Pretest	11.67 (8.80)	13.78 (9.24)	11.00 (8.98)	14.50 (9.91)
	Posttest	18.50 (8.76)	20.89 (4.57)	18.50 (5.20)	19.00 (9.80)
	Gains	6.83	7.11	7.50	4.50
LL	Pretest	9.17 (8.28)	10.33 (7.21)	7.00 (8.83)	10.80 (7.60)
	Posttest	17.00 (7.95)	19.00 (4.85)	15.25 (5.19)	17.10 (9.35)
	Gains	7.83	8.67	8.25	6.30
LS	Pretest	6.17 (7.55)	8.00 (7.79)	3.50 (3.42)	7.40 (5.66)
	Posttest	15.17 (8.54)	19.00 (6.44)	14.00 (6.68)	19.00 (10.37)
	Gains	9.00	11.00	10.50	11.80

Note. UL = uppercase letters; LL = lowercase letters; LS = letter sounds.

Phonemic awareness. The control group made the greatest gains on the phonemic awareness tasks. The experimental SLI and control SLI group made comparable gains on blending separately spoken phonemes. A group by time (pre-and posttest) MANOVA was used to determine if the groups differed on phonemic awareness tasks (See Table 15 for pre- and posttest descriptive statistics). The results of the analysis revealed a significant main effect for time $V = .60$, F (4, 22) = 8.31, $p = .001$, $\eta_p^2 = .60$. However, there was not a main effect for the group by time interaction, $V = .32$, F (12, 72) = .73, $p > .05$, $\eta_p^2 = .11$, nor was there a main effect for group, $V = .66$, F (12, 72) = 1.68, $p > .05$, $\eta_p^2 = .22$. The main effect of time was followed-up using multiple univariate ANOVAs in which the significance level was adjusted using the Bonferroni correction ($p = .01$) to avoid inflated Type I errors. The results for the phonemic awareness tasks revealed significant progress from pre- to posttest with isolate initial consonants, F (1, 25) = 24.89, $p = .001$, $\eta_p^2 = .50$; isolate final consonants, F (1, 25) = 18.35, $p = .001$, $\eta_p^2 = .42$; blend onset and rime, F (1, 25) = 20.90, $p = .001$, $\eta_p^2 = .46$; and blend separately spoken phonemes, F (1, 25) = 7.98, $p = .001$, $\eta_p^2 = .24$.

Table 15. Pre- and Posttest Means and Standard Deviations for the Phonemic Awareness Subtests for SLI and Non-SLI Groups

Phonemic Awareness Subtest		Experimental SLI M (SD) $n = 6$	Experimental M (SD) $n = 9$	Control SLI M (SD) $n = 4$	Control M (SD) $n = 10$
IIC	Pretest	0.50 (0.84)	2.11 (2.15)	0.00 (0.00)	0.70 (1.16)
	Posttest	1.83 (2.23)	3.78 (1.48)	1.25 (2.50)	3.70 (1.34)
	Gains	1.33	1.67	1.25	3.00
IFC	Pretest	0.00 (0.00)	1.33 (1.73)	0.00 (0.00)	0.60 (0.84)
	Posttest	0.83 (0.98)	2.89 (1.83)	1.75 (2.06)	2.60 (1.84)
	Gains	0.83	1.56	1.75	2.00
BOR	Pretest	0.17 (0.41)	2.33 (1.66)	0.75 (0.96)	1.00 (0.82)
	Posttest	1.33 (1.97)	3.33 (1.50)	2.50 (1.73)	2.90 (1.79)
	Gains	1.17	1.00	1.75	1.90
BSSP	Pretest	0.00 (0.00)	0.78 (1.09)	0.50 (0.58)	0.10 (0.31)
	Posttest	0.50 (1.22)	1.11 (1.27)	1.00 (1.41)	1.40 (1.26)
	Gains	0.50	0.33	0.50	1.30

Note. IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes. Each of the phonemic awareness tasks contained 5 items.

Rhyming complexity. A group by time (pre-and posttest) MANOVA was used to determine if the groups differed on phonemic awareness tasks (See Table 16 for pre- and posttest descriptive statistics). The results of the analysis revealed a significant main effect for time V = .50, F (6, 20) = 3.30, p = .001, η_p^2 = .50 and for group, V = 1.01, F (18, 66) = 1.86, $p < .05$, η_p^2 = .34. . However, there was not a main effect for the group by time interaction, V = .50, F (18, 66) = .73, $p > .05$, η_p^2 = .17. The main effect of time was followed-up using multiple univariate ANOVAs in which the significance level was adjusted using the Bonferroni correction (p = .01) to avoid inflated Type I errors. The results for the rhyming complexity tasks revealed significant progress from pre- to posttest with receptive rhyming, F (1, 25) = 9.65, $p < .01$, η_p^2 = .28 and expressive rhyming, F (1, 25) = 8.15, $p < .01$, η_p^2 = .25. However, the time effect was not significant for nursery rhymes, F (1, 25) = .16, $p > .01$, η_p^2 = .01; rhyming couplets, F (1, 25) =

1.12, $p > .01$, $\eta_p^2 = .04$; rhyming quatrains, F (1, 25) = 4.58, $p > .01$, $\eta_p^2 = .16$; or coordinate sound and rhyme, F (1, 25) = 3.29, $p > .01$, $\eta_p^2 = .12$.

The between-subjects effects for group revealed a significance difference for group on the nursery rhyme, F (3, 25) = 3.55, $p < .05$, $\eta_p^2 = .30$; receptive rhyming, F (3, 25) = 4.13, $p < .05$, $\eta_p^2 = .33$; and expressive rhyming tasks, F (3, 25) = 5.35, $p < .05$, $\eta_p^2 = .39$. Pairwise comparisons of nursery rhymes, receptive rhyming, and expressive rhyming revealed the experimental SLI group was significantly different than the experimental and control groups but not the control SLI group.

Table 16. Pre- and Posttest Means and Standard Deviations for Rhyming Complexity Tasks for SLI and Non-SLI Groups

Rhyming Complexity		Experimental SLI M (SD) n = 6	Experimental M (SD) n = 9	Control SLI M (SD) n = 4	Control M (SD) n = 10
NR	Pretest	2.67 (2.50)	6.56 (1.94)	4.75 (2.87)	5.70 (2.67)
	Posttest	3.00 (2.10)	6.67 (2.50)	4.75 (3.30)	5.90 (2.51)
	Gains	0.33	0.11	0.00	0.20
RR	Pretest	4.17 (2.48)	4.89 (2.47)	3.50 (3.32)	6.40 (3.24)
	Posttest	4.33 (1.75)	8.33 (2.18)	4.50 (1.29)	8.50 (2.68)
	Gains	0.17	3.44	1.00	2.10
ER	Pretest	1.00 (1.27)	2.78 (2.17)	2.00 (2.45)	2.90 (1.91)
	Posttest	1.97 (0.82)	4.56 (1.01)	2.50 (1.00)	4.20 (1.23)
	Gains	0.67	1.78	0.50	1.30
RC	Pretest	0.67 (0.82)	2.11 (1.83)	2.75 (1.71)	1.90 (1.73)
	Posttest	0.83 (1.17)	2.56 (1.67)	3.00 (2.16)	2.50 (1.84)
	Gains	0.17	0.44	0.25	0.60
RQ	Pretest	0.50 (0.55)	1.11 (0.93)	0.75 (0.50)	1.10 (1.60)
	Posttest	0.33 (0.82)	1.89 (1.54)	2.00 (1.83)	2.10 (1.73)
	Gains	-0.17	0.78	1.25	1.00
CSR	Pretest	0.00 (0.00)	0.44 (0.88)	0.50 (1.00)	0.30 (0.48)
	Posttest	0.00 (0.00)	1.33 (0.87)	0.50 (0.58)	1.10 (1.37)
	Gains	0.00	0.89	0.00	0.80

Note. NR = nursery rhyme; RR = receptive rhyming; ER = expressive rhyming; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme. The NR and RR tasks contained 10 items. The remaining tasks contained 5 items.

Continuum of Rhyming Skills

The fifth question asked if increasingly complex rhyming skills developed in a hierarchical manner. It was hypothesized that the participants would learn less complex rhyming skills before learning more complex rhyming skills. To answer this question, the average percentage of correct responses for each rhyming task was calculated and then graphed (See Figure 11). The results of the analysis revealed a decreasing percentage of correct responses as the complexity of the rhyming task increased.

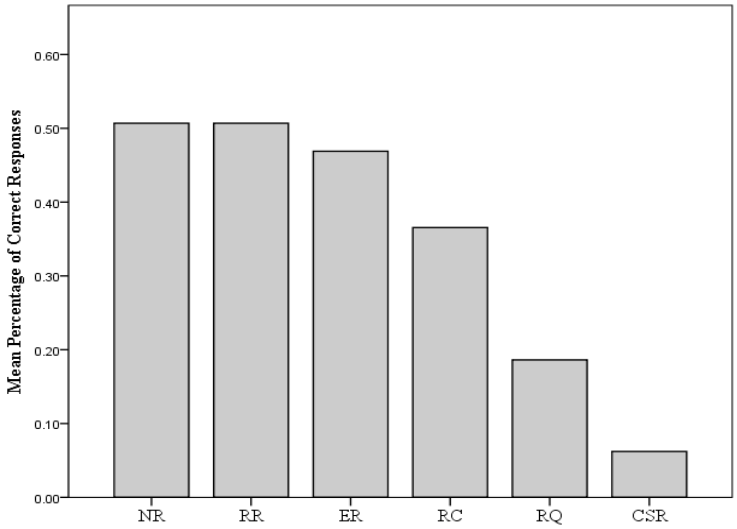


Figure 11. Mean Percentage of Correct Responses for Rhyming Complexity Tasks for Study Sample. NR = nursery rhyme; RR = receptive rhyming; ER = expressive rhyming; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme. The NR and RR tasks contained 10 items. The remaining tasks contained 5 items.

To investigate the average age at which the participants were able to complete each of the rhyming complexity tasks, the ages of participants able to complete at least one item correctly on each rhyming complexity task was averaged. Further, the average number of items that were completed in each task was calculated. The ages of the participants ranged from 4;1 to 5;5. Within this age range, the results revealed that the average age range for participants in this age range were the same for all rhyming complexity tasks with the exception of receptive rhyming

and coordination of sound and rhyme. The average number of correct responses on each task decreases as the complexity of the rhyming task increases. The results are displayed in Table 17.

Table 17. Average Age of Participants Completing Rhyming Complexity Tasks and Average Number of Correct Responses on Each Task

Average	NR	RR	ER	RC	RQ	CSR
Age (yrs; mos)	4;9	4;10	4;9	4;9	4;9	4;11
Correct Responses*	5	5	3	2	1	1

Note. NR = nursery rhyme; RR = receptive rhyming; ER = expressive rhyming; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme.
*****Correct responses refer to the average number of correct responses. The NR and RR tasks contained 10 items. The remaining tasks contained 5 items.

Summary of Findings

The results of the rhyme and phoneme awareness interventions indicated differential effects for progress in learning the alphabetic principle, phonemic awareness skills, and rhyming complexity skills. Table 18 profiles the group making greater gains in alphabetic knowledge, rhyming complexity skills, and phonemic awareness skills. The results revealed that the groups made differential progress on pre- and posttest data and weekly probes.

Table 18. Summary of the Comparison of the Experimental Versus the Control Groups' Gains on Pre- and Posttest Variables

Group	Letter Knowledge			Phonemic Awareness				Rhyming Complexity					
	UL	LL	LS	IIC	IFC	BOR	BSSP	NR	RR	ER	RC	RQ	CSR
EXP	**7.00**	**8.33**	10.20	1.53	1.27	1.07	0.40	**0.20**	**2.13**	**1.33**	0.33	0.40	0.53
CON	5.36	6.86	**11.43**	**2.50**	**1.93**	**1.86**	**1.07**	0.14	1.79	1.07	**0.50**	**1.07**	**0.57**

Note. EXP = experimental; CON = control; UL = uppercase letters; LC = lowercase letter; LS = letter sounds; IIC = isolate initial consonant; IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes; NR = nursery rhymes; RR = receptive rhyming; ER = expressive rhyming; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme. The group making greater gain scores is bolded for each measure.

The participants in the experimental and control groups made differential progress on weekly probes based on DIBELS (Good & Kaminski, 2002) and AIMSweb (Pearson, 2008) norms and benchmarks. More participants in the experimental group met cut-off scores in more categories than participants in the control group (See Table 19).

Table 19. Summary of the Number of Participants in the Experimental and Control Groups Meeting Cut-Off Scores for Weekly Probes

Group	LNF	LSF	NWF-S	NWF-W	Alliteration	Rhyming
Experimental	**13**	**12**	4	**4**	**8**	8
Control	10	9	**6**	2	5	8

Note. LNF = letter naming fluency; LSF = letter sound fluency; NWF-S = nonsense word fluency-correct letter sounds; NWF-W = nonsense word fluency-whole words. Group with the most participants meeting cut-off score is bolded for each probe.

Table 20 profiles the comparison of gain scores for the experimental, experimental SLI, control, and control SLI groups. The group with greater scores on the letter knowledge and rhyming complexity tasks varied by group. The control SLI group had greater gains on all of the phonemic awareness tasks.

Table 20. Summary of the Comparison of Gain Scores for SLI and Non-SLI Experimental and Control Groups on Letter Knowledge, Phonemic Awareness, and Rhyming Complexity

Group	Letter Knowledge			Phonemic Awareness				Rhyming Complexity					
	UL	LL	LS	IIC	IFC	BOR	BSSP	NR	RR	ER	RC	RQ	CSR
EXP	6.83	7.83	9.00	1.33	0.83	1.17	0.50	**0.33**	0.17	0.67	0.17	-0.17	0.00
E-SLI	7.11	**8.67**	11.00	1.67	1.56	1.00	0.33	0.11	**3.44**	**1.78**	0.44	0.78	**0.89**
CON	**7.50**	8.25	10.50	1.25	1.75	1.75	0.50	0.00	1.00	0.50	0.25	**1.25**	0.00
C-SLI	4.50	6.30	**11.80**	**3.00**	**2.00**	**1.90**	**1.30**	0.20	2.10	1.30	**0.60**	1.00	0.80

Note. EXP = experimental; E-SLI = experimental-speech and/or language impaired; CON = control; C-SLI = control- speech and/or language impaired; UL = uppercase letters; LC = lowercase letter; LS = letter sounds; IIC = isolate initial consonant; IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes; NR = nursery rhymes; RR = receptive rhyming; ER = expressive rhyming; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme. The group making greater gain scores is bolded for each measure.

Teachers' Perceptions of Student Progress

A questionnaire given to the teachers of the participants queried the teachers' perceptions of student progress (See Appendix I). The results of the questionnaire revealed the teachers felt the early literacy intervention implemented with their students was successful and skills learned during the intervention such as recognizing letters and letter sounds were evident in the classroom. Additionally, teachers felt the students made gains in their rhyming skills. Overall, the teachers felt the students were the least successful in learning to blend sounds. Lastly, the teachers felt this type of intervention would be successful if performed yearly with at-risk students and if taught the procedures, the teachers stated they would implement a similar early intervention program into their classroom routine.

When retrieving the questionnaires from the teachers at the conclusion of the study, they shared insightful information about their classroom practices and instructional content. For instance, one teacher shared that she focused her time more on counting and other math objective because she knew her students would be receiving help in early literacy skills. The other teacher stated that she continued to teach letter knowledge and early literacy skills using implicit teaching methods such as songs, games, and book reading.

Additional Findings

Additionally, correlational analyses were completed to investigate the relationship between rhyming skills and emergent literacy skills. Several important relationships were revealed, many of which have been documented in the literature relating to emergent literacy skills in preschoolers (See Table 17). For example, vocabulary (i.e., PPVT) shares a significant relationship with beginning sounds, expressive rhyming, isolating final consonants, blending onset and rime, rhyming couplets, rhyming quatrains, and coordination of sound and rhyme.

More importantly, the results of the correlational analyses revealed unique relationships between the different complexity of rhyming skills and alphabet knowledge, phonemic awareness, and vocabulary skills. Expressive rhyming, for instance, shares a relationship with receptive rhyming, nursery rhymes, isolating initial consonants, vocabulary, blending onset and rime and rhyming couplets; whereas, receptive rhyming shares a relationship with lower- and uppercase letter knowledge, beginning sounds, nursery rhymes, blending onset and rime, rhyming couplets, and coordination of sound and rhyme. These unique relationships may indicate the different levels of rhyming complexity as distinct and contributing to different emergent literacy skills and other rhyming skills in a unique manner.

Table 21. Correlation Matrix for Pretest Dependent Variables

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. LC	1.00														
2. UL	.96**	1.00													
3. LS	.86**	.83**	1.00												
4. PPVT	.14	.21	.07	1.00											
5. BS	.10	.21	.07	.38*	1.00										
6. RR	.49**	.49**	.20	.21	.41*	1.00									
7. NR	.21	.28	.19	.36	.51**	.40*	1.00								
8. ER	.35	.42*	.33	.40*	.43*	.39*	.64**	1.00							
9. IIC	.28	.28	.42*	.33	.34	.27	.41*	.41*	1.00						
10. IFC	.36	.40*	.49*	.48**	.52**	.36	.44*	.62**	.81**	1.00					
11. BOR	.28	.25	.15	.49**	.47**	.51	.47**	.39*	.40*	.48**	1.00				
12. BSSP	.31	.27	.39*	.32	.30	.24	.27	.14	.44*	.50**	.62**	1.00			
13. RC	.07	.18	-.03	.51**	.36	.29	.40*	.55**	.31	.47	.24	.14	1.00		
14. RQ	.26	.25	.24	.49**	.42*	.26	.22	.29	.62**	.56**	.20	.26	.34	1.00	
15. CSR	.21	.27	.42*	.45*	.47**	.21	.30	.27	.55**	.71**	.25	.44*	.28	.38*	1.00

Note. LC = lowercase letter; UL = uppercase letters; LS = letter sounds; PPVT = Peabody Picture Vocabulary Test (Dunn & Dunn, 2007); BS = beginning sounds; RR = receptive rhyming; NR = nursery rhymes; ER = expressive rhyming; IIC = isolate initial consonant; IFC = isolate final consonant; BOR = blend onset and rime; BSSP = blend separately spoken phonemes; RC = rhyming couplets; RQ = rhyming quatrains; CSR = coordinate sound and rhyme

* $p < .05$. ** $p < .01$

DISCUSSION

The role of rhyme in learning to read has long been a topic of debate. Some researchers view rhyme as a fundamental phonological awareness skill. According to this perspective, sensitivity to rhyme helps children become aware of phonemes since the change of a single phoneme (i.e., onset) results in a different word with the same rime (Bryant, Maclean, Bradley, & Crossland, 1990). This bridge to phoneme awareness establishes an important link needed to discover the alphabetic principle (Bryant, Maclean, Bradley, & Crossland, 1990; Hindson et al., 2005). Rhyming skills have been found to enhance other phonological awareness skills as well as emergent literacy skills such as letter identification, phonics, phonemic awareness, and word decoding (Goswami, 1999; Hindson, Byrne, Fielding-Barnsley, Newman, Hine, & Shankweiler, 2005; Treiman, 2006; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998). Developmentally, children become aware of larger units of language, such as words and syllables, before smaller units such as phonemes. Rhyme is viewed as a transitional unit since the rime is a syllable and the onset a phoneme (Stanovich, 1992). Rhyme is also found in the letter names of nine letters of the alphabet making them easier to recall (Bergeson & Trehub, 2007). The letter names in turn are used in early attempts to read and spell words, providing children with a strategy for acrophonic syllables (i.e., spelling "bead" as "bd" since the letter name for "b" contains the vowel).

Goswami's review of extant research (1999) showing that rhyme awareness is related to reading ability, it affects reading achievement, and it serves as a bridge to phonemic awareness has resulted in reading practices such as calling attention to rime units within words. The argument is that as children see the repeating rime patterns they begin to recognize the structure of words and associate new words with known patterns (i.e., reading by analogy). However,

other researchers challenge the value of this practice, and studies conducted by Martin and Byrne (2002) and Yeh and Connell (2008) failed to find any advantage for teaching rhyme over smaller linguistic units (i.e., phonemes). However, neither study taught rhyme or other phonemic awareness skills using print, although evidence suggests generalization of phonological awareness skills to reading does not occur unless taught with print (Bradley, 1988; Bradley & Bryant, 1983; Defior & Tudela, 1994; Hatcher et al., 1994). The studies also did not teach skills in a context of actual literacy, but rather as games or tasks. This study proposed that if Goswami's perspective is correct, a focus on rhyme using print in a storybook reading and word study context would result in greater gains in letter name, letter-sound, phonological awareness, and other early literacy skills compared to a phoneme focus.

However, nearly all of the results favored the view that rhyme does not provide a more facilitative context for learning early literacy skills. This finding held across measures, which generally found differences across time but not groups.

Alphabetic Principle

At the beginning of the study children from both groups could name on average 13 of the uppercase letters and 10 lowercase. At posttest the children taught using rhyme knew slightly more letter names (approximately 20 versus 19 uppercase and 18 versus 16 lowercase) but the differences were not significant. Few letter-sounds were known at pretest (7 and 6 for rhyme and phoneme groups, respectively) but at posttest, both recognized approximately 17 resulting in significant changes for time only. The time changes were not only statistically significant but also clinically significant, with medium to large effect sizes for the lowercase (.75), uppercase (.62), and letter-sound recognition (.81) tasks. Weekly probes using the DIBELS Letter Naming Fluency and Letter Sound Fluency tasks revealed that starting the second week of intervention

the phoneme group recognized more letters and letter sounds per minute for the majority of intervention weeks, although differences were not significant and both performed similarly in the final weeks.

Because only one of the letters (i.e., *V*) taught in the intervention was acrophonic, it is reasonable that learning the letter sounds for the remaining letters would more likely be more challenging (Treiman, et al., 1998). The phonological awareness skill taught in each condition would less likely contribute to learning the sounds of letters that are not acrophonic. When examining the effect of each condition on learning the sound of letter "v," it was found that 50 percent more participants in the experimental group were able to identify the sound of letter "v" suggesting instruction in rhyming may be advantageous to learning the sounds of acrophonic letters. Further analysis of the groups' performance on learning the letter sounds of acrophonic letters revealed the experimental group made fewer errors on producing the sounds of acrophonic letters than the control group.

Small advantages for the rhyming condition were accrued to weekly probes for naming the letter sounds and decoding the whole words when presented the Nonsense Word Fluency task from DIBELS (Good & Kaminski, 2002), but the differences were non-significant. Both groups made significant gains for producing the correct sounds for letters within nonsense words, but not for reading the CVC spellings (i.e., cag, maf) as whole words. The participants' inability to make significant progress on the NWF whole words may be attributed to the phase of word recognition in which they were performing (Ehri, 1995; 2005). At the beginning of the study, participants in the experimental group knew an average of four letter sounds and participants in the control group knew an average of three letter sounds placing the groups in the partial alphabetic stage. In order to decode the words in the NWF whole words task, the participants

would have needed to at least be able to perform the tasks included in the full alphabetic phase including mapping graphemes to phonemes and blending phonemes. Thus, the participants were unable to read enough whole words to produce significant changes between groups and from pretest to posttest.

When comparing the group's average of weekly NWF scores to the DIBELS mid-year kindergarten benchmarks, the results indicated the following: 4 at risk, 10 some risk, 1 low risk participants (s) in the experimental group and 6 at risk, 5 some risk, and 3 low risk participants in the control group. Although a majority of the participants scored in the at risk to some risk categories, it is important to remember the DIBELS benchmark levels given are intended for kindergarten students.

Although the DIBELS benchmarks do not give credit for reading whole words until students reach the first grade, the results of the participants' whole word reading abilities were interpreted based on first grade levels. The results revealed four participants in the experimental group and two participants in the control group met the benchmark level at the conclusion of the study. This difference supports studies by Goswami stating reading by analogy is simpler for younger children.

Another measure closely related to word decoding was the Rimes Test. This is because of studies indicating children first learn to read by analogy (Goswami & Bryant, 1992; Goswami & East, 2000). In order to read by analogy, a child must know how to read rimes. The participants in the current study were taught to blend CVC words using an analogy approach or a phoneme-by-phoneme approach. When comparing the gain scores of the experimental and control groups, there was not a significant difference. This finding suggests different strategies may be used to decode words including phoneme by phoneme blending or the blending of onset

and rimes. Upon closer inspection of individual scores on the Rimes Test, it was observed only one participant in the experimental group received a zero on the Rimes Test compared to the five participants in the control group who received a zero. The decreased number of participants in the control group may suggest several possibilities. One is a majority of at-risk prekindergarten students may find it easier to decode by reading by analogy. Secondly, younger children may find decoding words using a phoneme-by-phoneme blending approach to be more difficult conforming to the findings of research by (Goswami & Bryant, 1992). Finally, teaching reading by analogy may be more comprehensible to at-risk prekindergarten students with a range of abilities. Three out of the five children who made zeroes in the control group had a suspected or diagnosed SLI.

These findings all suggest that while rhyme did not provide a more facilitative context for learning the alphabetic principle, neither did it provide a less facilitative context. Whether children were exposed to letters and letter-sounds as the onset of a rhyme or as the first phoneme in a CVC word, both letter names and letter-sounds were acquired. This finding supports earlier research showing a strong relationship between phonological awareness skills (including rhyme) and early reading skills, such as learning the alphabet (Anthony & Lonigan, 2004; Wagner, Muse, & Tannenbaum, 2006). Both rhyme awareness and phoneme awareness instruction had a positive outcome on alphabet learning in this study. Many of the children from both groups scored in the low-risk range at posttest, indicating that at-risk prekindergarten students with low SES have the ability to perform at a level commensurate with their low-risk peers in the area of letter and sound fluency when provided with effective interventions.

Phonemic Awareness

Both groups had opportunities to manipulate phonemes during intervention, the rhyme group changing the initial letter/sound to generate new words and the phoneme group sounding out a series of CVC words. The children in both groups found the phonemic awareness tasks difficult, including identifying first and last sounds in words and blending onset-rimes or CVC sounds to hear a word, averaging one or fewer correct responses at pretest. Both groups made small gains at posttest, following the expected developmental pattern of identifying more first sounds than last sounds, and blending onset-rimes better than individually spoken sounds. Once again, changes across time were significant, but no group advantages were shown. The effect sizes were small to medium (.30 to .56) indicating clinically significant changes except for the alliteration task (.10). While the phoneme group specifically practiced attending to and blending isolated final sounds, they did not show an advantage on the task at posttest. Similarly, only the rhyme group practiced onset-rime blending but both groups were significantly more successful at this skill at posttest.

These findings are consistent with prior research that found boosting the level of one phonological awareness skill boosts the levels of the others (Anthony, et al., 2003; Goswami, 1999; Hindson, Byrne, Fielding-Barnsley, Newman, Hine, & Shankweiler, 2005; Treiman, 2006; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998). As a result, teaching rhyming and phoneme level skills both had a positive effect on the participants' phonemic awareness abilities. Some researchers believe phonemic awareness skills must be taught explicitly (Foy & Mann, 2006; Phillips, et al., 2008). Although not significant, the gain scores for the phoneme level group were slightly larger on all of the Phonemic Awareness Assessment subtests. The intervention tasks required more attention to a range of letters and their corresponding sounds

and involved more practice isolating and sequencing sounds at the phoneme level than the rhyme group. Furthermore, blending onset and rimes is considered a less complex task (Schuele & Boudreau, 2008). In fact, the segmentation of words into onset and rime syllables is thought to be a naturally occurring ability (Treiman & Zukowski, 1996).

Rhyme

Several formal measures of rhyme were used to assess rhyme, including expressive rhyming, blending onsets and rimes, receptive rhyming, and nursery rhyme awareness. Additional examiner-created measures were also administered before and following intervention. At pretest, both groups could complete familiar nursery rhymes with a missing final rhyming word for 5 simple rhymes. Neither group made gains at posttest which was expected since nursery rhymes were not part of either intervention. At pretest, children could pick a rhyming word from a choice (approximately 5 and 6, respectively for the rhyme and phoneme conditions) and produce a rhyming word (approximately 2 for both groups). Both groups made small but significant changes for both receptive and expressive rhyming, with no advantage to the rhyming group despite direct instruction during intervention. The weekly probes revealed that the phoneme group recognized more rhyming pairs in one minute across 6 of 8 weeks although group differences were not significant. This outcome was unexpected since only the rhyme group read and generated rhymes. However, another task, the Rimes Test revealed that following intervention, 14 of 15 students receiving rhyme intervention could read at least one of the rimes, such as –at, while only 9 of the phoneme group participants could. Teaching levels of phonemic awareness accompanied by print enabled children to recognize the orthographic patterns for rime before they would be predicted by Ehri's (1995) model. The finding that several children from the phoneme group were able to read rimes suggests that children may

begin to group letters as soon as they begin to learn to blend letter-sounds, again at an earlier phase than Ehri's model would predict.

The full range of formal and informal rhyming tasks was examined to determine if a developmental progression could be seen for rhyme. Performance on the rhyming skills did reveal a continuum with nursery rhymes being the least complex followed by receptive rhyming, expressive rhyming, rhyming couplets, rhyming quatrains, and finally, coordination of sound and rhyme. These findings conformed to the continuum proposed by Norris and Hoffman (2002). However, none of the tasks showed mastery by 80% or more of the participants, a level used to meet criterion for establishing age norms. Further, the percentages reflect all students who scored at least one item (out of 5 or more trials depending on the task) rather than mastery. To establish norms, only students who achieved mastery would be counted. In addition, participants only represented a very narrow age range, from 4;4 to 5;5 years rather than a representative continuum of participants from 3;6 years to 7 years. Thus, nothing can be said about the age at which these skills are mastered. However, the findings provide preliminary support for the existence of a developmental continuum of rhyming abilities. This finding is important for interpreting the results of studies that use rhyme as an outcome measure. It also is important for choosing intervention goals and activities.

Effects of the Intervention on Participants with a Diagnosed or Suspected SLI

Current literature has found children language impairment, especially those with oral language and/or phonological deficits (i.e., specific language impairment or SLI), are more likely to have more difficulty acquiring alphabetic and phonological awareness skills than children who do not (e.g., Blaiklock, 2004; Justice, et al., 2003; Nancollis, et al., 2005). Slightly more than one-third of the participants in the current study had been diagnosed with or suspected to have

SLI. Results show that at pretest, students with SLI in both the rhyme and phoneme groups performed lower than their typical counterparts as expected. Gains at posttest were not significantly different on the letter knowledge, phonemic awareness, or rhyming complexity tasks. Additionally, there were significant time effects for all components of the letter knowledge and phonemic awareness tasks revealing small to medium effect sizes.

This finding is promising for students from a low SES background diagnosed with a SLI because it reveals the types of intervention implemented in the current study can have significant effects on the development of letter knowledge and phonemic awareness skills. There was also a significant time effect for the rhyming complexity measures but the follow-up analyses revealed a significant time effect only for receptive and expressive rhyming abilities. This finding supports the continuum of rhyming complexity skills, which proposes more complex rhyming skills develop at a later age than the age of the participants in the current study (Hoffman & Norris, 2002). The lack of a time effect for nursery rhyme may be attributed to a lack of instruction in nursery rhymes. Unlike the other rhyming complexity tasks, nursery rhymes can only be learned by exposure to nursery rhymes. Additionally, there was a significant group difference on the rhyming tasks revealing the experimental SLI group was different from the experimental and control groups on the nursery rhyme, receptive rhyming, and expressive rhyming tasks. This difference may be related to the fact that five out of the six participants diagnosed with or suspected to have a SLI in the experimental group had language deficits.

The students diagnosed with or suspected to have a SLI had consistently lower scores than participants in the experimental and control group who did not. For letter knowledge, the experimental SLI group scored higher than the control SLI on naming lower case letters and on letter sounds, suggesting a slight advantage for the experimental SLI group. A different trend

was observed with the phonemic awareness tasks. The control SLI group scored higher than the experimental SLI group on all of the phonemic awareness tasks with the exception of isolating initial consonants. Yet, the experimental group scored higher than the control group on all phonemic awareness tasks with the exception of the blending separately spoken phonemes task. Finally, the experimental SLI group scored consistently lower than the control SLI group on all of the rhyming complexity tasks suggesting students with language impairments may have more difficulty with rhyming tasks than students with articulation or fluency impairments. The experimental group, on the other hand, scored higher than the control group on all rhyming complexity tasks with the exception of nursery rhymes and rhyming quatrains. In summary, the differential effects of the experimental and control conditions on the four groups suggest the experimental conditions had more positive effects for letter knowledge, phonemic awareness, and rhyming complexity skills (Burgess & Lonigan, 1998; Dickinson & Neuman, 2006; Foy & Mann, 2006; Lonigan, et al., 1998). Additionally, having SLI and a low SES may put students at greater risk for phonemic awareness and rhyming complexity skills than having low SES alone. This suggestion supports the findings of a study by Fernandez-Fein & Baker (1997).

Additional Analyses

The additional correlational analyses completed on the relationship between rhyming and other emergent literacy skills provide further insight to the results of the current study. Different complexities of rhyming skills were differentially related to other emergent literacy skills. Positive relationships were found between rhyming complexity skills and emergent literacy skills. There was a significant relationship between receptive and expressive alliteration skills and all of the rhyming complexity skills with the exception of rhyming couplets. This relationship may explain why the control group had significant gains in the

rhyming complexity tasks as well. As the alliteration skills of the control group participants increased, so did their rhyming abilities. For letter knowledge, there was only a significant relationship with expressive and receptive rhyming and coordinating sound and rhyme, which provided a possible explanation for the experimental group's greater gains in upper- and lowercase letters. As the participants in the experimental group's rhyming skills increased so did their ability to name upper- and lowercase letters. However, only coordinate sound and rhyme shared a significant relationship with letter sounds. This finding supports Treiman et al.,'s (1998) proposal that learning the sounds of acrophonic letters is simply segmenting producing the onset of those letters. Likewise, coordination of sound and rhyme requires the segmentation of the onset of a word.

The relationship between vocabulary skills and expressive rhyming, rhyming couplets, rhyming quatrains, and coordinate sound and rhyme provided support for previous studies that found positive correlations between vocabulary skills and phonological sensitivity (Duursma, et al., 2008; Engen & Hoien, 2002; Lonigan, et al., 2000). Finally, the exclusive but significant relationship between blending separately spoken phonemes and coordinating sound and rhyme provide an explanation for the comparable results made by both groups in blending separately spoken phonemes. As the experimental group's participants learned rhyming skills, their ability to blend separately spoken phonemes increased, and as the control group's participants learned to blend separately spoken phonemes, their ability to coordinate sound and rhyme increased. The possibility of causal relationships between rhyming complexity skills and other emergent literacy skills may exist but this proposition is beyond the scope of the current study.

Limitations and Future Research

Although the current study provided useful insights about the addition of phonological awareness activities to instruction for at risk prekindergarten students, it was not without limitations. Some of the limitations of the current study included the instruction methods, fidelity, study design and analysis, setting, and sample size.

Instructional methods. The results of the study suggested the content of instruction for the experimental and control groups may have been matched too closely. As a result, it was difficult to judge whether teaching rhyming skills in addition to emergent literacy skills provided advantages beyond teaching emergent literacy skills alone. The lesson plans for both groups involved phonological awareness activities. Because prior research has shown teaching one phonological awareness skill boosts the levels of other phonological awareness skills, both groups showed similar progress in pre- and posttest measures and weekly probes.

Although both groups received the same amount of treatment time, the experimental group had the extra task of learning rimes to complete within the allotted time. When reviewing the lesson plans and videos, it was noted that the control group had more time to complete the letter knowledge, story reading, and blending activities. Furthermore, the experimental group was required to learn a rime in the same time frame in which the control group learned letter names and sounds. The additional time the control group had during the introduction may have perpetuated comparable results between the experimental and control groups. In future studies, the time allotted for each group should be divided in a way that no group has an advantage over the other.

Another limitation of the instruction methods was the number of individuals implementing the interventions. Ninety-eight undergraduate and graduate students implemented

the intervention in sets of three. As a result, the participants had to adapt to the teaching styles of at least nine individuals. Additionally, accounting for the variability between each interventionist was difficult even with knowing their basic demographic information and experience with working with children. These factors may have confounded the results of the study. Future research should reduce the number of interventionists utilized to reduce variability in teaching styles.

Study design and fidelity. Fidelity was also a limitation of the study. The fidelity of a study is important to assessing the outcome of a study as it relates to efficacy and effectiveness. Upon reviewing the recorded video sessions of the interventions, several instances of student clinicians not adhering to lesson plans were noted by the experimenter and judges. Some of the errors noted by the judges included lack of knowledge of definition for rhyming, producing the incorrect sounds for letters, not adhering to the prescribed lesson plan, and not engaging participants. Not adhering to the prescribed protocol along with the noted errors may have confounded the results of the study.

Sample size is an important component to consider when designing a study. Due to limited resources, the current study only included the prekindergarten students from one site. The participants were initially matched but after pretesting, a student from the control group transferred to a school out of state. An adequate sample size is needed to ensure a statistical difference can be detected if it exists. Future studies should consider recruiting prekindergarten students from multiple sites.

Assessments. The assessments such as LNF, LSF, and NWF used to monitor the progress of the participants are not standardized for preschool aged children. Therefore, the interpretation of the results according to DIBELS and AIMSweb benchmarks may not be reliable

for preschool aged children. There are a limited number of standardized assessments that can be used to progress monitor the early literacy skills such as letter naming fluency or nonsense word fluency of prekindergarten students. For this reason, DIBELS and AIMSweb benchmark levels and cut-off scores were used. Further, the aforementioned assessments are among the most familiar progress monitoring tools used.

Site logistics. The site in which the study took place was limited in space. Initially, the interventions took place in the participants' classrooms. Because of the overwhelming amount of noise and activity, the interventions were moved to different locations within the site. Typically, there were 1-2 groups in each location resulting in 7-14 individuals within the space. Even with the change in locations, there was still noise and distractions. The increased noise level may have interfered with the participants' abilities to discern/hear small units of sound, a necessary component in developing adequate phonological awareness skills. Future studies should choose a location in which there is a decreased noise level and minimal distractions.

Additionally, the participants were not able to receive the intended twenty-four intervention sessions due to inclement weather conditions, a planned field trip, and an unplanned teacher workday. When examining the groups' progress on the weekly probes, a decrease in skills were observed on week six, the week in which 2 of the aforementioned absences occurred. Future studies should include extra days to complete make-ups in the case of any of the scenarios listed above.

It should be noted that each of the limitations affected both groups equally, with the exception of more children with SLI in the experimental condition.

Keeping in mind the limitations above, future studies should replicate the current study and examine if different results are revealed. Including a group that rhyme and phoneme

awareness instruction would provide useful information as well. Furthermore, future studies should compare the performance of children from high, middle, and low SES backgrounds after receiving rhyming instruction and assess whether children from a low SES are able to make gains commensurate with their higher SES peers. Additionally, the performance of the participants in the high and middle SES groups should be examined to see if participants in these groups, though considered to be a non-risk population, are at-risk based on results on rhyming tests.

Future studies should also investigate the effects of rhyming instruction on children with different SLIs (e.g., phonological impairment, language disorder, fluency disorder). This type of study would provide insight about the differential effects of rhyming instruction on children with an SLI.

Finally, future studies that examine the effects of teaching the increasingly complex rhyming tasks would provide valuable information on the causal nature of the significant relationships found between the different rhyming tasks and emergent literacy skills.

Clinical Implications

This study revealed that at-risk prekindergarten students (i.e., low SES, SLI) are able to make substantial gains in early literacy skills (e.g., letter naming, letter sounds) when provided with supplemental instruction that includes explicit teaching of rhyming and alliteration skills. Although participants with a suspected or diagnosed SLI scored lower than participants without a suspected or diagnosed SLI, they were able to make progress on the letter knowledge, phonemic awareness, and rhyming complexity tasks. Further, the study revealed the importance of including phonological awareness activities such as rhyming or alliteration as a component of emergent literacy instruction. In the current study, there were differential effects based on

whether the participants were in the experimental or control condition. For instance, the experimental group had a slight advantage in naming upper- and lowercase letters, LNF, LSF, and NWF-W; whereas, the control group had a slight advantage in letter sounds, NWF-S, IFC, and BSSP. These differential effects suggest including rhyming and alliteration in emergent literacy interventions as they contribute differently to the development of letter knowledge, phonemic awareness, and rhyming complexity skills. Lastly, because rhyming skills develop in a hierarchical manner, using a developmental approach to teach rhyming skills may be more efficient.

For professionals (e.g., teachers, SLPs) implementing an intervention such as the one in the current study may be an effective intervention to use within an RTI model (Nancollis, et al., 2005). Given the short length of time (i.e., 8 weeks) the participants made immense improvements that are vital to later reading abilities. School SLPs should be aware that students with a suspected or diagnosed SLI may need more intensive intervention than the current intervention. Even though the SLI participants made progress, they did not make the same amount of progress as participants without SLI.

Summary

In conclusion, the current study sought to explore the advantage of integrating explicit rhyming intervention with early literacy instruction for at-risk prekindergarten students. Although the results did not reveal a significant difference between groups, the students made significant statistical and clinical changes in the areas of letter knowledge, phonemic awareness, and rhyming complexity. The current study also sought to explore the hierarchy of rhyming skills. It was found that rhyming skills do develop in a hierarchical manner. Additionally, it was discovered that integrating rhyming and alliteration activities in early literacy interventions had a

positive effect on learning rhyming skills across the continuum of complexity. The most promising finding was that completing early intervention activities such as the ones in the current study may help to improve the early literacy skills of at-risk prekindergarten students including those with SLI.

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APPENDIX A
PARENT CONSENT FORM

Project Title: Teaching Early Literacy Skills to PreK Children

Performance Site: Highland Elementary School

Investigators: The following investigator is available for questions, M-F, 8:00 a.m.-3:30 p.m.

Crystal Randolph
Communication Disorders Dept., LSU
(225) 766-1272

Purpose of the Study: The purpose of this study is to help us learn how to best improve the early literacy skills of children in preK

Inclusion Criteria: Children 3-5 years of age who attend the preK program at Highland Elementary

Exclusion Criteria: No child who returns a consent form will be excluded from the study

Description of the Study: Your child will be given tests of early literacy, including letter-sounds, rhyming, and sound blending. During the next 8 weeks, students from LSU will work individually with your child to improve these skills. We are testing different materials and procedures to see which ones are most effective for learning in this age group. All children will receive the extra help three times weekly for 30 minutes in the regular classroom setting. At the end of the 8 weeks, the tests will be given again so that we can measure change.

Benefits: Participants will receive extra help learning the early literacy skills that are important for learning how to read.

Risks: There are no known risks.

Right to Refuse: Participation is voluntary, and a child will become part of the study only if the parent agrees to the child's participation. At any time, the parent may withdraw the child from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: The school records of participants in this study may be reviewed by investigators. Your child's name will not be used and records will be kept by an identification number rather than by name. Results of the study may be published, but no names or identifying information will be included. In addition, participants may be photographed, audio- and/or video-recorded and segments of these recordings

may be shown for educational purposes such as a university class or workshop. Participant identity will remain confidential unless disclosure is required by law.

Financial Information: There is no cost for participation in the study, nor is there any compensation to the subjects for participation.

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

Child's Name _____

Parent's Signature:_____**Date**:_____

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

Signature of Reader:_____ **Date**:_____

Institutional Review Board
Dr. Robert Mathews, Chair
203 B-1 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.6792
irb@lsu.edu | lsu.edu/irb

APPENDIX B
INTERVENTIONISTS' DEMOGRAPHIC SURVEY

Name: _____ **Age**: _____ **Ethnicity**: _____

Major: _____ **Minor**: _____**Other Majors**: _____

LSU Classification: Freshman Sophomore Junior Senior 1-yr Grad 2-yr Grad

Check the COMD Classes you have already taken:

- ☐ COMD 2050 Introduction to Language
- ☐ COMD 2051 Introduction to Manual Communication
- ☐ COMD 2081 Introduction to Communication Disorders
- ☐ COMD 4150 Phonetics
- ☐ COMD 4153 Acoustics of Speech and Hearing
- ☐ COMD 4190 Introduction to Audiology
- ☐ COMD 4250 Anatomy & Physiology of Speech and Hearing
- ☐ COMD 4380 Speech and Language Development
- ☐ COMD 4381 Basic Articulation Disorders
- ☐ COMD 4382 Basic Language Disorders of Children
- ☐ COMD 4590 Auditory Rehabilitation in Children
- ☐ COMD 4383 Basic Fluency Disorders
- ☐ COMD 4384 Basic Voice Disorders
- ☐ COMD 4681 Clinical Preparation and Observation Laboratory
- ☐ COMD 4751 Special Topics in Communication Disorders

List additional COMD-related electives (e.g., Linguistic, English, Psychology, or Human Ecology courses):_____

List COMD courses/electives in which you are currently enrolled:

_____

Have you worked with children before? Yes No

What ages have you worked with (in years)? 0-5 5-12 12-18

Number of years experience working with children? _____

In what capacity? Day School Babysitting Siblings Your own Afterschool Care Summer Camp Tutoring Scouts Big Bro/Lil Sis Programs Other:_____

APPENDIX C
GET READY TO READ CLASSROOM OBSERVATION CHECKLIST

Get Ready to Read!

www.GetReadytoRead.org

Classroom Literacy Environment Checklist

Is your classroom literacy-friendly?

You have an important role in providing the children in your classroom with some of their first experiences with books and reading.

Look around your classroom and think about what you do with the children. If the statement on the checklist is true, place a check in the "true" column. If the statement is false, place a check in the "false" column.

Availability of learning materials...	TRUE	FALSE
Alphabet books (e.g., Dr. Seuss's *ABC* book) are readily available for children's use.	☐	☐
Wood or plastic 3-dimensional alphabet letters are readily available for children's use.	☐	☐
Crayons and pencils are readily available for children's writing and drawing.	☐	☐
Paper is readily available for children's writing and drawing.	☐	☐
Children have tables or other surfaces readily available for writing or drawing.	☐	☐
Rhyming books (e.g., Joseph Slate's *Miss Bindergarten Gets Ready for Kindergarten*) are readily available for children's use.	☐	☐
At least 25 picture books are readily available for children's use.	☐	☐
At least 50 picture books are readily available for children's use.	☐	☐
Children's use of learning materials...		
Games, materials, and activities are used regularly to help children learn the names of alphabet letters.	☐	☐
Children are encouraged to scribble and experiment with pretend writing.	☐	☐
Games, materials, and activities are used regularly to help children learn to rhyme.	☐	☐
Children in the class engage in shared book reading sessions with an adult at least twice a week.	☐	☐
Children in the class engage in shared book reading sessions with an adult at least four times a week.	☐	☐
Games, materials, and activities are used regularly to help children learn to print the letters of the alphabet.	☐	☐
What the teacher or assistant teacher does...		
The teacher sometimes sounds out printed words when reading picture books to children.	☐	☐
The teacher frequently introduces new words to children while reading picture books.	☐	☐
The teacher regularly has detailed and informative conversations with children about things that interest the children (e.g., "How do you think ice cream is made?").	☐	☐
The teacher sends home materials that encourage parents to read with their children at home.	☐	☐
The teacher encourages children to talk about their experiences (e.g., "What happened at the library?").	☐	☐
The teacher asks questions of children and encourages them to talk while reading picture books with them.	☐	☐

What the teacher or assistant teacher does... *(Con't)*	TRUE	FALSE
The teacher sends home materials that encourage parents to help their children learn the letters of the alphabet.	☐	☐
The teacher helps children learn nursery rhymes.	☐	☐
The teacher encourages children to express themselves using complete sentences.	☐	☐
The teacher keeps a record of how individual children are progressing in their reading readiness skills.	☐	☐
The teacher believes that it is important for young children to learn skills that will help them get ready to read.	☐	☐
The teacher regularly engages children in games and activities that help children break spoken words into sound parts (e.g., "Clap your hands for every sound you hear in ba – nan – na.").	☐	☐
The teacher helps children learn to write their own names.	☐	☐
The teacher regularly helps children learn the sounds that alphabet letters make (e.g., "M makes the mmmm sound.").	☐	☐
The teacher is enthusiastic about the literacy and language activities that are included in the classroom curriculum.	☐	☐
The teacher's background...		
The teacher is a good reader.	☐	☐
The teacher has a large vocabulary.	☐	☐
The teacher graduated from college.	☐	☐
The teacher has received training in early literacy or reading readiness.	☐	☐
About the classroom and school, preschool or center...		
The classroom has a detailed year-long sequence of planned activities to introduce letters, language sounds, and print.	☐	☐
Several classroom projects and trips through the year revolve around print (e.g., a visit to the library; making a picture book; visiting the supermarket).	☐	☐
The classroom day includes some planned teaching activities in which all children are expected to engage.	☐	☐
Children are generally occupied rather than standing around waiting for the next activity to start.	☐	☐
The preschool or center screens children for problems with vision and hearing.	☐	☐
The preschool or center screens children for delays in language and literacy development.	☐	☐
Children enjoy the literacy and language activities that are included in the classroom curriculum.	☐	☐

Count up the number of statements marked TRUE and put that number in the box to the right. See the chart below to find out how literacy-friendly your classroom is. ☐

31-41	Classroom literacy environment has most of the many supportive elements
21-30	Classroom literacy environment has many supportive elements
11-20	Classroom literacy environment has some supportive elements
0-10	Classroom literacy environment needs improvement

Get Ready to Read! is a project of the National Center for Learning Disabilities. For more information about this program, please visit our Web site www. GetReadytoRead.org.

APPENDIX D
TEACHER DEMOGRAPHIC SURVEY

1. What is your gender?
Male
Female

2. What is your ethnicity?
Caucasian
African-American
Hispanic
Other (please list) _____

3. What is your age?
18-29 years old
30-49 years old
50-64 years old
65 years and over

4. What is the highest level of education you have completed?
High school graduate
some college
trade/technical/vocational training
college graduate
some postgraduate work
post graduate degree (please list degree) _____

5. How many years have you been teaching?

6. How many years have you taught preschool?

7. What are your areas of Certification (please list all areas)

8. Have you had training in early literacy skills?
YES
NO

9. If you have received early literacy training, approximately how many hours have you received?
0-1
2-3
4-5
6-7

10. Please list topics discussed during your early literacy training.

APPENDIX E
EXPERIMENTAL CONDITION LESSON PLAN

Week 2: Introduce letter "G"; rime "ub"
Days 1 and 2

1. Introduction 5 minutes **Group Leader #1 _____**
Review Letters: "L" **Review Rimes:** "ad"

a. First, review previous week (s) target letter (s) and rime (s) by having students name the letter and letter sound. **"Let's look at the letters and rimes we have learned."**
   i. Show the child the Phonic Face (PF) card with the target letter (s) from previous week (s). Point to upper and lowercase letters on card and say, "**Tell me the name of this letter. Tell me what sound (s) this letter makes**." Allow each child to say and/or imitate the letter name and sound. Reteach using Phonic Faces as needed.
   ii. Then use the white board to write the rimes from the previous week (s). Point to the rime and say, "**Read this rime**." Allow each child to read the rime. If the child is unable to read the rime, read the rime for him/her using Phonic Faces. Then ask the child to repeat the rime after you.

b. Second, introduce the short vowels sounds (a, e, i, o, u) using PF cards. "**Let's meet our 'baby' letters and sounds**."
   i. Show the vowel (baby) sounds one by one. Briefly tell the students the short story that goes along with each vowel PF card (see below or Quick Guide). Then point to "big" (uppercase) and "little" (lowercase) letters on each PF card, and compare them to the letter in the Phonic Faces mouth. Compare the "little" and "big" letters by pointing out distinctive features of each. Emphasize that the letter "a" can be written 3 different ways. Point to each version of the letter "a" on the PF card. Say "**What letter is this"** as you point to each letter.
   ii. **does 'Amy Ann' make**?" Then ask, "**What letter makes that sound**?"

c. Third, introduce this week's new target letter/sound and rime. **"This week we are going to learn the letter 'G' and the 'ub' rime."**
   i. Show the children the PF card with the target letter/sound. Explain the speech production cues for the Phonic Face (PF) and have children make the same sound with their mouth. "**Let's make Gigi's sound together**. **The "G" tells us to use our tongues to make a gulping sound in our throats- /ggg/."**
   ii. Then point to "big" (uppercase) and "little" (lowercase) letters on the PF card, and compare them to the letter in the Phonic Faces mouth. Compare the "little" and "big" letters by pointing out distinctive features of each "**What letter is this? What sound does it make**?" Have students repeat the letter name and sound.
   iii. Write the target rime on the white board. Discuss what letters make up the rime. "**What letters are in this rime**?" Use PF card to help children blend the letters in

the rime. Say the name of the rime. "**Now let's read this rime together**." Have each child repeat while pointing to the rime written on the whiteboard. **"When we see these letters in the story, we will sound out words that rhyme with it."**

***Reinforce correct answers with praise* ("Great, you're right. That is the letter "l"") and provide corrective feedback ("This is the letter "l". It looks different than letter "t") for incorrect responses.

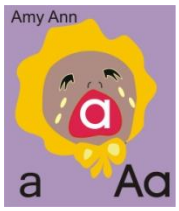
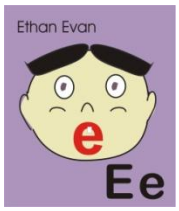
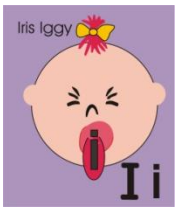
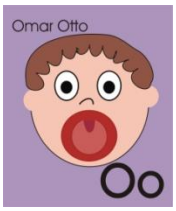
- Look at letter "g" in Gigi's throat
- She uses her tongue to make gulping sounds.
- The circle of the "g" shows her mouth.
- The tail of the "g" shows the sound made in her throat.

Point to each letter and make children aware of upper and lowercase letters.

u b

The letter "b" forms the lips of Bejay. To make his sound, bounce your lips with your voice turned on. Can you hear the b-b-bounce?

- Create rime using PF cards
- Tell children to imitate rime
- Tell children they will find words with this rime in the story

				
Amy Ann is an unhappy baby. She cries, making the /aahh/ (short a) sound, not waaa. Her mouth is in the shape of a wide open "a."	Baby Ethan Evan just got his first tooth and is showing it off. He is making the /eh/ /eh/ short "e" sound.	Baby Iris Iggy was supposed to eat her carrots. But every time she takes a taste, she sticks out her tongue and says the short "i" iiihh/!	Omar Otto must be sick. He is opening his mouth wide so the doctor can see his throat. I can see his uvula. The doctor tells him to say /ahh/, the short /o/ vowel.	EUnice Ulma is very smart. She thinks about hard problems. She opens her mouth and says, /uh/ as she thinks, tapping her forehead.

2. Story Reading 15 minutes **Group Leader #2 _____**

a. Show the students the book and read the title. **Point to the letter in the character's mouth; explain how the "G" has a circle that is shaped like Gigi's mouth and a tail that shows how to make the sound of "G".** Say, **"Each time we see the letter G we will make the /g/ sound like Gigi"** and have children practice. Say, "**Now, we're going to read a story about letter 'G'. You will also see 'ub' in the story (Point to the rime written on the white board). You will help me read the story by saying the sounds of the letters and by helping me find words that rhyme. We will try reading the words that rhyme together. We will even think of other words that rhyme with words in the story."**

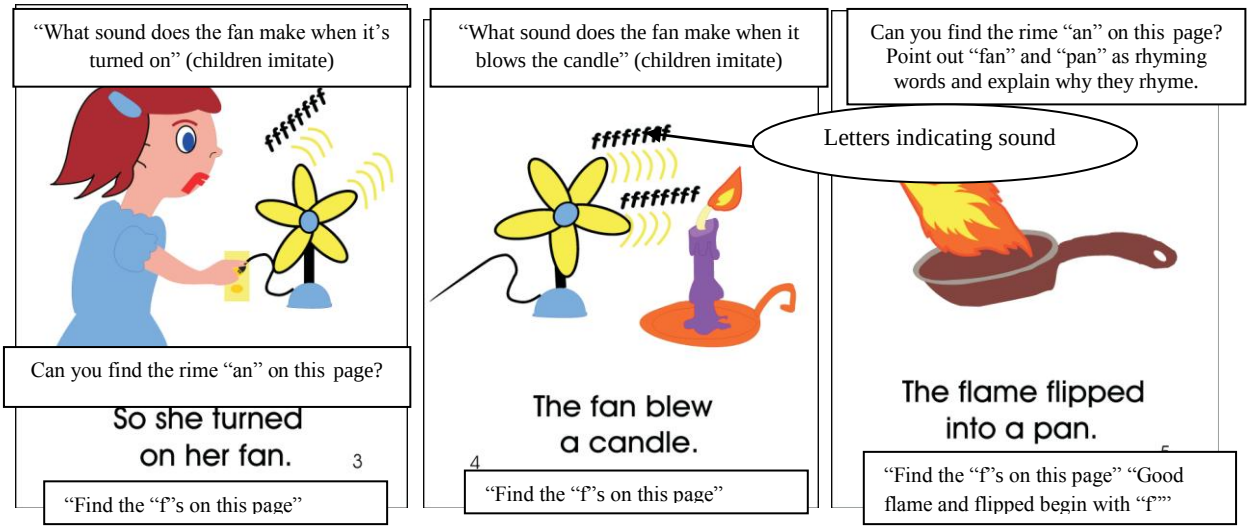
b. Begin reading the story (**Point to words as you read**). **Make sure the letter sound and the rime are emphasized**. Point to the "G" coming from Gigi's throat on each page and help the children make the sound. See the script on the example pages below. After reading a page, repeat the letter sound with the children. "**When Gigi gulps, she says /g/. Say Gigi's sound with me**." Then say, "**Look, I see the letter 'G'. Can you find the letter 'G' on this page**? (Allow children to find the target letter within the text on the page). Repeat the letter sound with the children while pointing to the letters indicating sound. "**What does Gigi say when she Gulps?**"

c. Next look for the target rime on the same page. Say, "**Look, I see the rhyme sound /ad/. Can you find the rhyme letters?**" (Allow children to find the target rime on the page). Give cues as needed by giving letters contained in the rime or by pointing to the word with the target rime in it. "**Help me read the word with the 'ub' rhyme sound in it**." Begin to read the word. "**Read the word with me**." Make sure the children are reading with you. "**Now, try reading the word by yourself**, "**What does it say**?" (Point to the word with the target rime).

d. Quickly reread every 2 consecutive pages with rhyming words. "**Let's listen for words that rhyme**." Briefly pause before you get to the 2nd word with the target rime (Observe if the children supply the rhyming word). If the children don't supply the rhyming word, continue reading. "What **rhyming words did you hear**?"
e. Continue reading the story using procedures a-c under the story reading section. As you progress through the story, point out the rhyming words on each page, you should flip back and forth to show the children the rhyming words. Explain why the words rhyme. "**'rub' and 'sub' rhyme because they end with the same sound, -ub but they have different beginning sounds. Let's say the words together. Can you think of a word that rhymes with cub and sub**?
f. Complete the activity on the last page of the book. Have the children find words that rhyme. "**What rhymes with "_ub"?** Name the words on the page and allow the children to choose words that rhyme. Then say, "**What words begin with the letter "G"**? Name the words on the page and allow the children to choose words that begin with the target letter.

****Reinforce correct answers with praise** ("Great, you're right. Fan does begin with "f"") and provide corrective feedback ("Lick does not begin with "f" but look at this word. It begins with "l") for incorrect responses.

An example of the procedures is shown with pages of the book below:



3. Word Train 9 minutes **Group Leader #3 _____**

a. Present the word train. Begin by reintroducing the targeted rime. Spell the target rime on the word train using corresponding PF cards and practice blending the rime. Have each child read the rime. "**Let's read this rime together**."

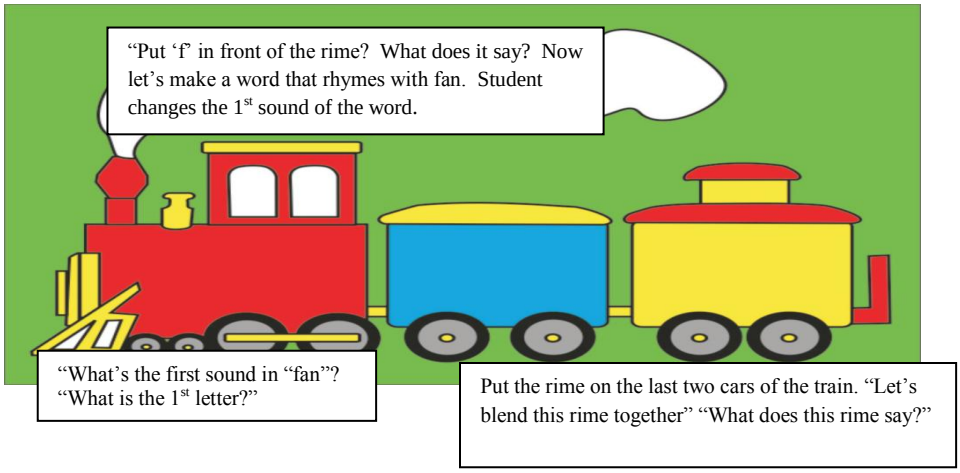
b. Model using 2 of the rhyming words indicated below. Tell the children the name of the letter and its sound before placing it on the train. Begin to blend the sounds on the train by slowly saying each sound. Then say the word quickly. "**Help me read this word**." Have the children "blend" the sounds of each word by joining the onset (1st sound) and the rime (last 2 sounds) together**. Model for the children that the sounds are blended in 1 jaw movement.**

rub	**sub**	**tub**	**cub**	**rub**

c. "**Now let's make more words that rhyme with the words we just read**." Allow each child to take turns adding a letter to the beginning of the rime to form a new word and then allow the children to practice blending the words (Tell the children the name of the letter and its sound if needed). If the child is unable to blend the sounds, use the white board to draw a picture of the correct word and a foil. "**Now try to read the word again**." Ask the child to blend the word again and listen to hear which word they are saying. Provide corrective feedback as needed.

d. Also, allow the children to identify the first letter and sound in the rhymes by pointing to or producing the first letter/sound. "**What sound/letter does this word begin with**?"

e. When all words with target rime have been spelled on the word train, ask each child to name a word that rimes with one of the words spelled on the target train. "**Tell me a word that rhymes with rub**?"



4. Review target letter/sound/rime 1 minute

a. "**Today we talked about the letter 'G'." What sound does it make**?"

b. "**We also read this rime** (Write/point to rime on white board). **Read this rime for me**."

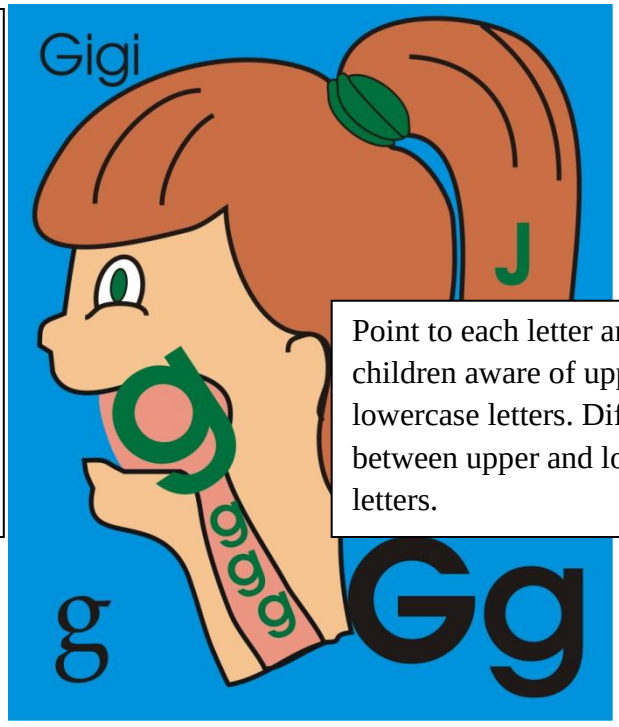
Intervention Day 3

Week 2: Review Letters: "L" **Review Rimes:** "ad"

The intervention should have a medium-fast pace because the children are familiar with the target letter and rime

1. Review the targeted letter/sound/rime for the week and review the story read using an abbreviation of the procedures for Day 1. **5 minutes Group Leader #1_____**
   a. Review target letter from this week and target letters and vowels from previous weeks using Phonic Face (PF) cards. Show children each PF card. Point to the letters on the cards. "What letter is this? What sound does it make? If the student is unable to name letters and/or give letter sounds, provide corrective feedback by giving child a brief description of PF card (Provided in lesson plan folder).
   b. Then write previous weeks' and this week's target rime on the white board. Say, "**Help me read these rimes**." If the child is unable to read a rime, use PF card to provide a visual for each letter in the rime and blend the sounds to read the rime with the child.

- Look at letter "g" in Gigi's throat
- She uses her tongue to make gulping sounds.
- The circle of the "g" shows her mouth.
- The tail of the "g" shows the sound made in her throat.



Point to each letter and make children aware of upper and lowercase letters. Differentiate between upper and lower case letters.

The letter "b" forms the lips of Bejay. To make his sound, bounce your lips with your voice turned on. Can you hear the b-b-bounce?

u b

- Create rime using PF cards
- Tell children to imitate rime
- Tell children they will find words with this rime in the story

2. **Story Reading 5 minutes Group Leader #2_____**

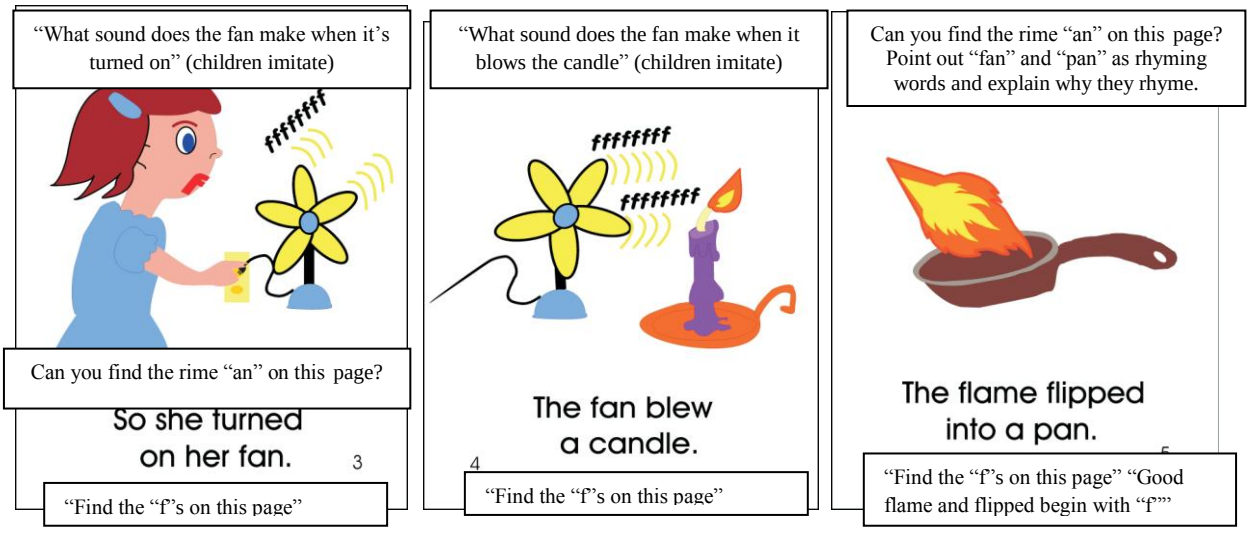
   a. Say "**Now, we're going to read a story that has the letter "G" in it. You will also see the "ub" rime in the story. You will help me read the story by saying the sounds of the letters and by helping me find words that rhyme. We will try reading the words that rhyme together**." Read the story pointing to the words as you read. Briefly pause when you get to a word with the target rime to give the children the opportunity to supply the word. If they don't say the word, continue reading.

   b. Ask the children to find the target letter. "**Can you show me the letter 'G' on this page**?" (Ask this question for each page in the book). "**What sound does it make**?"

   c. Complete the activity on the last page of the book **only if you have enough time**!!!! Have the children find words that rhyme. "**What rhymes with ___?** Name the words on the page and allow the children to choose words that rhyme. Then say, "**What words begin with the letter "G"**? Name the words on the page and allow the children to choose words that begin with the target letter.

*******Reinforce correct answers with praise* ("Great, you're right. lick does begin with "l"") and provide corrective feedback ("Pan does not begin with "l" but look at this word. It begins with "l") for incorrect responses.

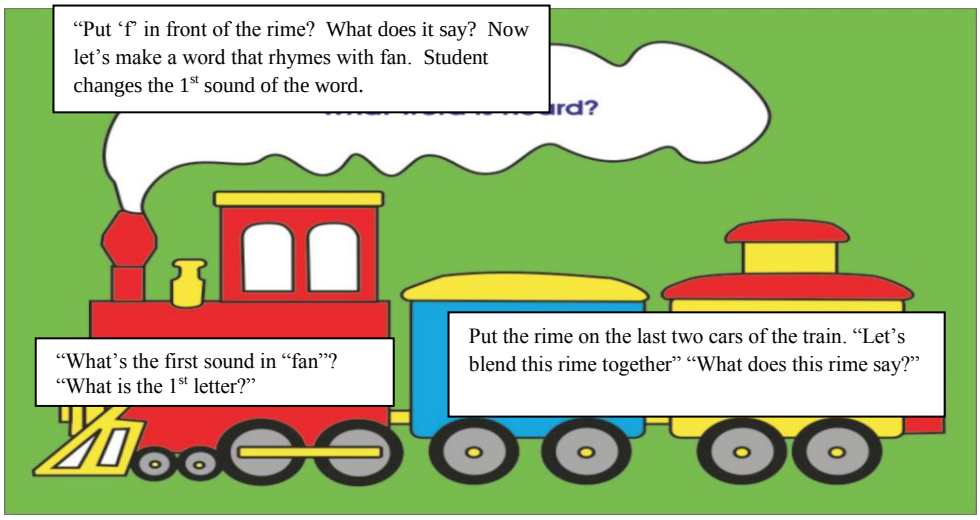
An example of the procedures is shown with a page of the book below:



3. **Review blending sounds on word train. 5 minutes Group Leader #3_____**

a. Begin by using PF cards to spell target rime on word train. Ask the children to read the rime. "**Read this rime**."
b. Take turns giving each of the children a PF card to make a word from the attached word list (Tell the child the letter and letter sound on the PF card you give to them if they don't know it). When the child places his/her letter on the word train, say, "**Now try reading the word**." If the child is unable to read the word by himself/herself, help the child read the word by saying the sounds slowly together and then quickly. Then ask the child to read the word again. "**Try reading the word again**."
c. After the child has read the word, ask him/her what is the first sound in the word. "**What is the first sound you hear in the word**?"

**Reinforce correct answers with praise ("Great, you're right. Fan does begin with "f"") and provide corrective feedback ("Pan does not begin with "f" but look at this word. It begins with "f"") for incorrect responses.



4. Administer probes individually to your child. 15 minutes

APPENDIX F
CONTROL CONDITION LESSON PLAN

Intervention Days 1 and 2

Week 3: Introduce letter "M"

1. **Introduction 5 minutes** **Group Leader #1 _____**
   Review Letter: "L" "G"
   a. First, review previous week (s) target letter (s) by having students name the letter and letter sound. **"Let's look at the letters we have learned."**
      i. Show the child the Phonic Face (PF) card with the target letter (s) from previous week (s). Point to upper and lowercase letters on card and say, "**Tell me the name of this letter. Tell me what sound (s) this letter makes**." Allow each child to say the letter name and sound. Reteach as needed, helping the child understand the speech placement cues provided by the letter in the face.
      ii. As you review target letters from previous weeks, ask the children if they can think of words that begin with those letters/sounds. "**Can you tell me a word that begins with this letter**? **Can you tell me a word that begins with the /m/ sound**?"
   b. Second, introduce the short vowels sounds (a, e, i, o, u) using PF cards. "**Let's meet our 'baby' letters and sounds**."
      iii. Show the vowel (baby) sounds one by one. Briefly tell the students the short story that goes along with each vowel PF card (see below or Quick Guide). Then point to "big" (uppercase) and "little" (lowercase) letters on each PF card, and compare them to the letter in the Phonic Faces mouth. Compare the "little" and "big" letters by pointing out distinctive features of each. Emphasize that the letter "a" can be written 3 different ways. Point to each version of the letter "a" on the PF card. Say "**What letter is this"** as you point to each letter.
      iv. Then ask the children what sound each vowels sound makes. Say, "**What sound does 'Amy Ann' make**?" Then ask, "**What letter makes that sound**?"
      v. Then ask the children what sound each vowels sound makes. Say, "**What sound does 'Amy Ann' make**?" Then ask, "**What letter makes that sound**?"
   c. Third, introduce this week's new target letter/sound. **"This week we are going to learn the letter 'M'."**
      iv. Show the children the PF card with the target letter/sound. Explain the speech production cues for the Phonic Face (PF) and have children make the same sound with their mouth. Make sure all children understand how the letter shows their mouth how to make the sound. "**Let's make Emmet's sound together**. **The "M" tells us to put our lips together and make the delicious sound- /mmmmm/."**

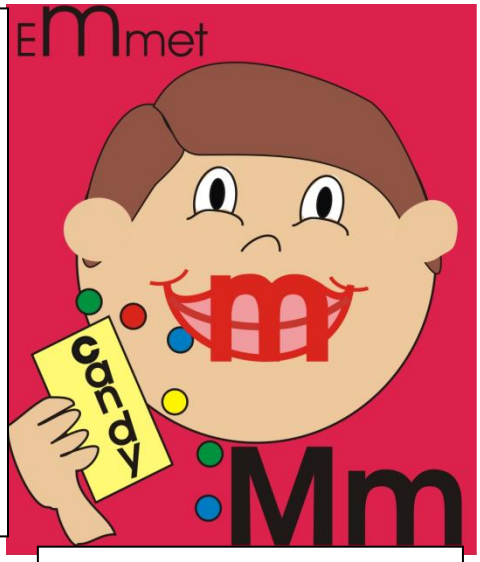
v. Then point to “big” (uppercase) and “little” (lowercase) letters on the PF card, and compare them to the letter in the Phonic Faces mouth. Compare the “little” and “big” letters by pointing out distinctive features of each “**What letter is this? What sound does it make**?” Have students repeat the letter names and sounds.

vi. Have students think of words that begin with the target letter. “Can you tell me a word that begins with the /m/ sound?” If the child can’t think of a word, provide a choice of two and say, “Which word has the /m/ sound at the beginning?” Say each word with an exaggerated production of the first sound.

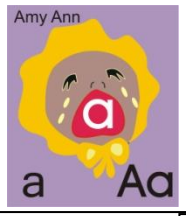
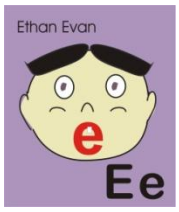
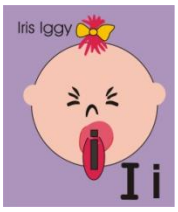
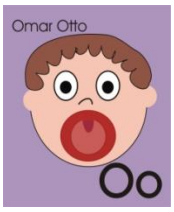
vii. **“When we see the letter ‘M’ <u>in the story</u>, we will point to it and find words that contain that sound.”**

****Reinforce correct answers with praise** (“Great, you’re right. That is the letter “l”””) and provide corrective feedback (“This is the letter “l”. It looks different than letter “t”) for incorrect responses.

- Emmet is a boy who loves candy
- Listen to the sound he makes when he puts his lips together and makes the delicious sound: /mmmmm/
- The letter m in his mouth looks like the cupid’s bow shape of the top lip



Point to each letter and make children aware of upper and lowercase letters.

				
Amy Ann is an unhappy baby. She cries, making the /aahh/ (short a) sound, not waaa. Her mouth is in the shape of a wide open "a."	Baby Ethan Evan just got his first tooth and is showing it off. He is making the /eh/ /eh/ short "e" sound.	Baby Iris Iggy was supposed to eat her carrots. But every time she takes a taste, she sticks out her tongue and says the short "i" iiihh/!	Omar Otto must be sick. He is opening his mouth wide so the doctor can see his throat. I can see his uvula. The doctor tells him to say /ahh/, the short /o/ vowel.	EUnice Ulma is very smart. She thinks about hard problems. She opens her mouth and says, /uh/ as she thinks, tapping

Story Reading 15 minutes **Group Leader #2 _____**

g. Show the students the book and read the title. **Point to the letter in the character's mouth; explain how the "M" looks like a cupid's bow on the top lip o Emmet's mouth.** Say, **" Each time we see the letter M we will make the /mmmmm/ sound like Emmet"** and have children practice. Say, "**Now, we're going to read a story about letter 'M'. You will help me read the story by saying the sounds of the letters and by helping me find words that have the letter "M". We will try reading the words that have the letter "M" together."**

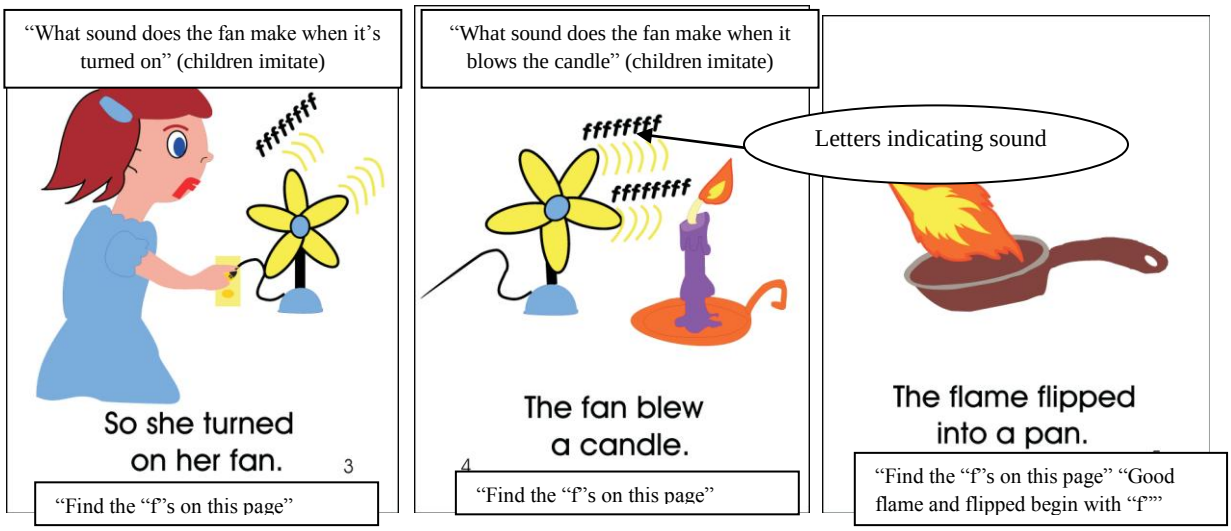
h. Begin reading the story (Point to words as you read). Make sure the letter sound are emphasized. See the script on the example pages below. After reading a page, repeat the letter sound with the children. ""**When Emmet puts his lips together, he says /mmmmm/. Say Emmet's sound with me**" Then say, "**Look, I see the letter 'M'. Can you find the letter 'M' on this page**? (Allow children to find the target letter on the page). Repeat the letter sound with the children while pointing to the letters indicating sound. "**What does Emmet say when he puts his lips together?**"

i. Continue reading the story using procedures a-b under the story reading section.

j. Complete the activity on the last page of the book. Have the children find words that contain the letter 'M'. Name the words on the page. Then say, "**What words begin with the letter "M"**? Ask the children to choose words that begin with the target letter.

***Reinforce correct answers with praise* ("Great, you're right. lick does begin with "l"") and provide corrective feedback ("Pan does not begin with "l" but look at this word. It begins with "l") for incorrect responses.

An example of the procedures is shown with pages of the book below:



2. Word Train 9 minutes **Group Leader #3 _____**

f. Present the word train. Begin by showing the letters for the first word from the word list below using PF cards. Tell the children the name of the letter on each card and the sound each letter makes. Provide the Phonic Faces cues to speech production for any of the letter-sounds the children do not know (p, d, t) (see Guide to Phonic Faces in folder). Spell the word on the word train. "**Now, we're going to read words that begin with the letter 'M'. Put your mouth in the same shape as the faces and listen for the word you are saying."**

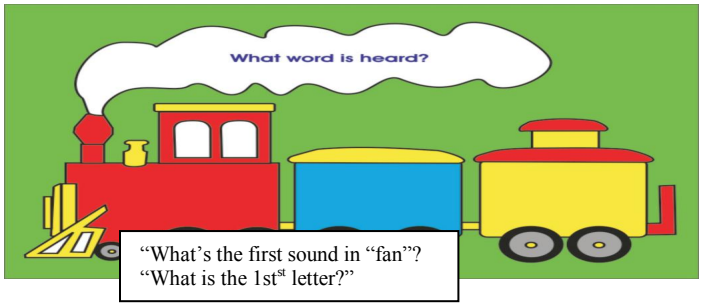
mug	mad	met	mop	mid

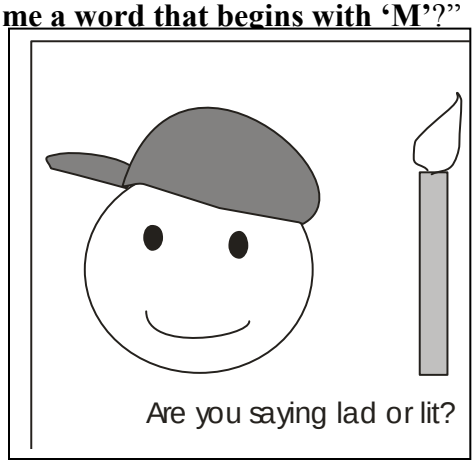
g. Model using 2 of the words that begin with the target letter indicated on the attached schedule. Begin to blend the sounds on the train by slowly saying each sound. Then say the word quickly. "**Help me read this word**." Have the children "blend" the sounds of each word by producing the three sounds shown at the beginning-middle-end of the train as one jaw movement. Model this slowly for several trials, the speed up so the sounds begin to blend. **Models for children that sounds must be blended in 1 jaw movement.**

h. "**Now you will get to make a word on the train that begins with the letter 'M'**." Give one of the children the PF cards needed to make the 3rd word. (Allow each child to take a turn.) Then allow the children to practice blending the words (Tell the children the name of the letter and its sound if needed). "**Try reading the word you just spelled**." If the child is unable to blend the sounds, use the white board to draw a picture of the correct word and a foil. "**Now try to read the word again**." Ask the child to blend the word again and listen to hear which word they are saying. Provide corrective feedback as needed.

i. Also, allow the children to identify the first letter and sound in the word by pointing to or producing the first letter/sound. "**What sound/letter does this word begin with**?"

j. When all words with the target letter have been spelled on the word train, ask each child to name a word that begins with the letter 'M'. "**Tell me a word that begins with 'M'**?"





3. Review target letter/sound 1 minute

i. "**Today we talked about the letter 'M'. What sound does it make**?"

Intervention Day 3

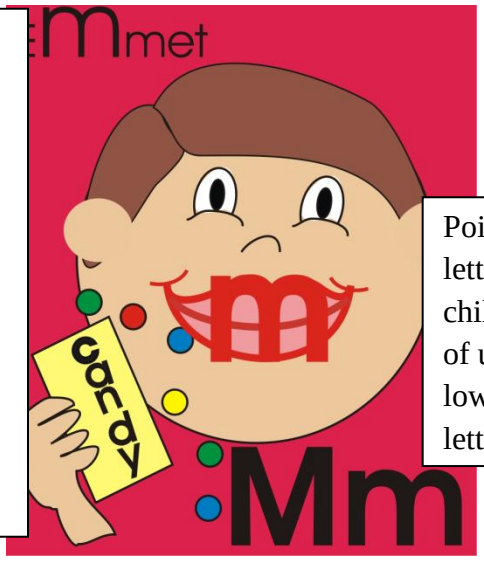
The intervention should have a medium-fast pace because the children are familiar with the target letter

Review Letter: "L" "G"

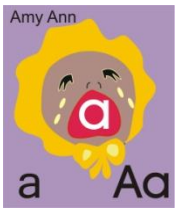
5. Review the targeted letter/sound for the week and review the story read using an abbreviation of the procedures for Day 1. **5 minutes Group Leader #1_____**
   c. Review target letter from this week and target letters and vowels from previous weeks using Phonic Face (PF) cards. Show children each PF card. Point to the letters on the cards. "**What letter is this**? **What sound does it make**?" If the student is unable to name letters and/or give letter sounds, provide corrective feedback by giving child a brief description of PF card (provided in Lesson Plans).

***Reinforce correct answers with praise* ("Great, you're right. That is the letter "l"") and provide corrective feedback ("This is the letter "l". It looks different than letter "t") for incorrect responses.

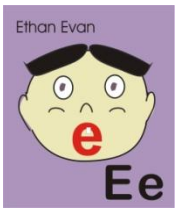
- Emmet is a boy who loves candy
- Listen to the sound he makes when he puts his lips together and makes the delicious sound: /mmmmm/
- The letter m in his mouth looks like the cupid's bow shape of the top lip



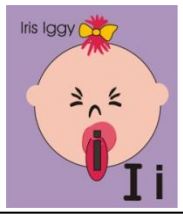
Point to each letter and make children aware of upper and lowercase letters.



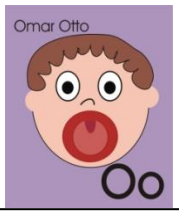
Amy Ann is an unhappy baby. She cries, making the /aahh/ (short a) sound, not waaa. Her mouth is in the shape of a wide open "a."



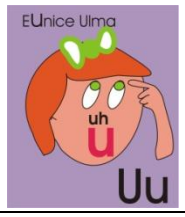
Baby Ethan Evan just got his first tooth and is showing it off. He is making the /eh/ /eh/ short "e" sound.



Baby Iris Iggy was supposed to eat her carrots. But every time she takes a taste, she sticks out her tongue and says the short "i" iiihh/!



Omar Otto must be sick. He is opening his mouth wide so the doctor can see his throat. I can see his uvula. The doctor tells him to say /ahh/, the short /o/ vowel.

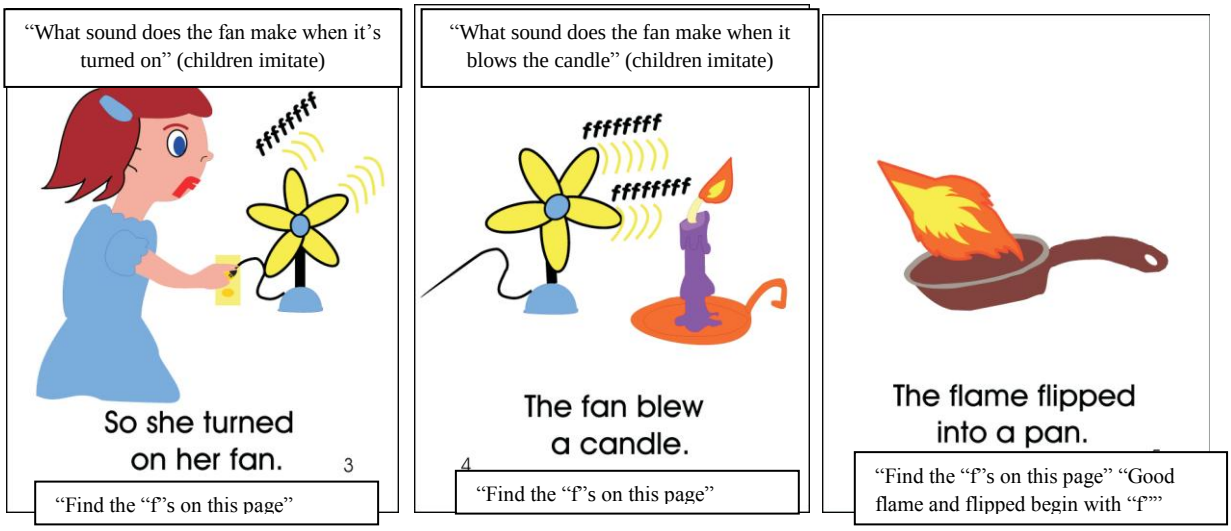


EUnice Ulma is very smart. She thinks about hard problems. She opens her mouth and says, /uh/ as she thinks, tapping

6. **Story Reading 5 minutes Group Leader #2**_____
   d. Say "**Now, we're going to read a story that has "target letter" in it. You will help me read the story by saying the sounds of the letters and by helping me find words with the letter 'M'**." Read the story pointing to the words as you read.
   e. Ask the children to find the target letter. "**Can you show me the letter 'M' on this page**?" (Ask this question for each page in the book). "**What sound does it make**?"
   f. Complete the activity on the last page of the book **only if you have enough time**!!!! Have the children find words that begin with the letter 'M'. Then say, "**What words begin with the letter "M"**? Name the words on the page and allow the children to choose words that begin with the target letter.

***Reinforce correct answers with praise** ("Great, you're right. lick does begin with "l"") and provide corrective feedback ("Pan does not begin with "l" but look at this word. It begins with "l") for incorrect responses.

An example of the procedures is shown with a page of the book below:

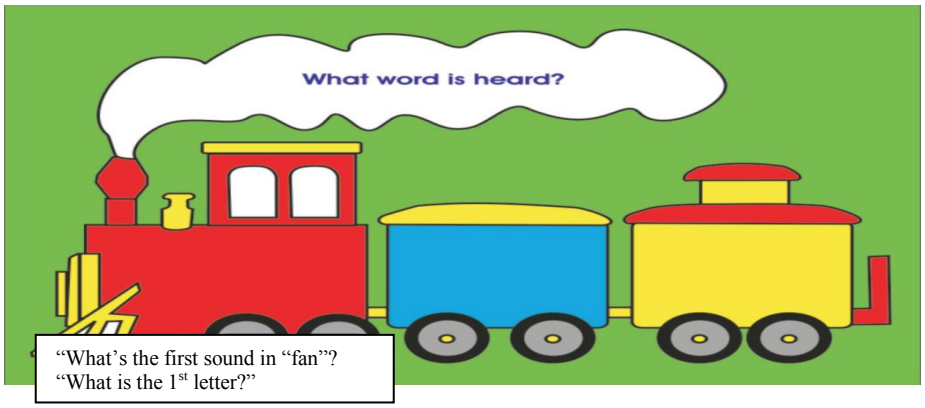


7. **Review blending sounds on word train. 5 minutes Group Leader #3_____**
   d. Begin by using PF cards to spell the words with the target letter (below) on word train. "**We're going to make and read words that begin with the letter 'M'**."

mug	mad	met	mop	mid

   e. Take turns giving each of the children PF cards to make a word from the attached word list (Tell the child the letter and letter sound on the PF cards you give to them if they don't know it). When the child places his/her letter on the word train, say, "**Now try reading the word**." Have the children "blend" the sounds of each word by producing the three sounds shown at the beginning-middle-end of the train as one jaw movement. Model this slowly for several trials, the speed up so the sounds begin to blend.
   f. Then ask the child to read the word again. "**Try reading the word again**."
   g. After the child has read the word, ask him/her what is the first sound in the word. "**What is the first sound you hear in the word**?"

***Reinforce correct answers with praise** ("Great, you're right. lick does begin with "l"") and provide corrective feedback ("Pan does not begin with "l" but look at this word. It begins with "l") for incorrect responses.



8. Administer probes individually to your child. 15 minutes

APPENDIX G
EXPERIMENTAL CONDITION FIDELITY CHECKLIST

RHYME GRADING RUBRIC (Days 1 and 2)

Group # _____ Children Absent_____

Date _____ Group Leader _____

Rhyming Introduction (-.5 for any poorly executed element)	**score**	**Comment**
Reviews prior letters for name/sound; upper/lower case; Help children think of words beginning with sounds		
Review prior rimes on white board; use PF to reteach as needed		
Practices vowels, uses correct short vowel sound; up/lower case		
Introduces target letter for name/sound; upper/lower case		
Introduces target rime; uses PF to explain		
Correctly explains speech production cues on all PF cards		
Each child has turn to imitate letter names, sounds, rime		
Interactions appropriate, good rapport, reinforces as needed		
SCORE	**____/ 4**	

Date_____ Group Leader _____

Rhyming Story Reading -.5 for any poorly executed element	**score**	**Comment**
Reads title; show letter in mouth, gives speech production cues		
Points to words as reading (L to R orient, concept of wordness)		
Focus on PF character and speech-sound cues on each page		
Each child provided opportunities to find target letter; asks for letter name and letter sound		
Each child asked to find target rime; ask for letters and sound		
Uses 2 pages to teach rhyme throughout book; children given turns to say rhyming words		
Helps children complete activity page at the end of the story		
Interactions appropriate, good rapport, reinforces as needed		
SCORE	**____ / 4**	

Date_____ Group Leader _____

Rhyming Word Train (-.5 for any poorly executed element)	**score**	**Comment**
Target rime correctly displayed and explained on train		
Interventionist blends target rime and ask students to repeat		
Interventionist models blending first 2 target words; children each given a turn		
Shows children that sounds must be blended in 1 jaw movement		
Each child given turn to add new letter and blend a word		
Correctly explains speech production cues on all PF cards		
Interventionist draws pictures to help students unable to blend sounds independently		
Interventionist ask students to identify the first letter and sound in target words and asks children to provide a rhyming word		
Interactions appropriate, good rapport, reinforces as needed		
SCORE	____/ **4**	

RHYME GRADING RUBRIC (Day 3)

Group # _____ Children Absent_____

Date _____ Group Leader _____

Rhyming Introduction (-.5 for any poorly executed element)	**score**	**Comment**
Reviews target letter and prior letters for name/sound; upper/lower case; Reteaches as needed		
Review prior rimes on white board; use PF to reteach as needed		
Includes child's name and date on all probe sheets		
Uses appropriate timing for each probe		
Uses bracket to indicate stopping point on LNF/LSF and NWF probes		
Uses appropriate cues (e.g., provide sound/word after 3 sec if child doesn't respond) for LNF/LSF and NWF probes		
Forms correct and incorrect piles for IGDI probe and records response immediately afterwards		
Tallies all probes and includes score		
SCORE	____/ **4**	

Date_____ Group Leader _____

Rhyming Story Reading (-.5 for any poorly executed element)	**score**	**Comment**
Rereads story and Points to words as reading (L to R orient, concept of wordness)		
Uses 2 pages to teach rhyme throughout book; children given turns to say rhyming words		
Includes child's name and date on all probe sheets		
Uses appropriate timing for each probe		
Uses bracket to indicate stopping point on LNF/LSF and NWF probes		
Uses appropriate cues (e.g., provide sound/word after 3 sec if child doesn't respond) for LNF/LSF and NWF probes		
Forms correct and incorrect piles for IGDI probe and records response immediately afterwards		
Tallies all probes and includes score		
SCORE	**____ / 4**	

Date_____ Group Leader _____

Rhyming Word Train (-.5 for any poorly executed element)	**score**	**Comment**
Target rime correctly displayed and explained on train and students asked to repeat		
Interventionist spells target words on train and ask each child to blend; children each given a turn		
Includes child's name and date on all probe sheets		
Uses appropriate timing for each probe		
Uses bracket to indicate stopping point on LNF/LSF and NWF probes		
Uses appropriate cues (e.g., provide sound/word after 3 sec if child doesn't respond) for LNF/LSF and NWF probes		
Forms correct and incorrect piles for IGDI probe and records response immediately afterwards		
Tallies all probes and includes score		
SCORE	**____/4**	

APPENDIX H
CONTROL CONDITION FIDELITY CHECKLIST

SOUND BLENDING GRADING RUBRIC (Days 1 and 2)

Group # _____ Children Absent_____

Date _____ Group Leader _____

Blending Introduction (-.5 for any poorly executed element)	**score**	**Comment**
Reviews prior letters for name/sound; upper/lower case; Help children think of words beginning with sounds		
Practices vowels, uses correct short vowel sound; up/lower case		
Introduces target letter for name/sound; upper/lower case		
Instructs children to think of words that begin with target letter		
Provides 2 word choices if children are unable to think of words that begin with target letter		
Correctly explains speech production cues on all PF cards		
Each child has turn to imitate letter names and sounds		
Interactions appropriate, good rapport, reinforces as needed		
SCORE	____/ **4**	

Date_____ Group Leader _____

Blending Story Reading -.5 for any poorly executed element	**score**	**Comment**
Reads title; show letter in mouth, gives speech production cues		
Points to words as reading (L to R orient, concept of wordness)		
Focus on PF character and speech-sound cues on each page		
Each child provided opportunities to find target letter; asks for letter name and letter sound		
Each child is instructed to read a word that begins with the target letter		
Each child is asked to re-read words he/she is unable to read independently		
Helps children complete activity page at the end of the story		
Interactions appropriate, good rapport, reinforces as needed		
SCORE	____ / **4**	

Date_____ Group Leader _____

Blending Word Train (-.5 for any poorly executed element)	**score**	**Comment**
Spells target word on word train, explains PF production cues for unknown final letters		
Models blending first two target words and asks each child to try to blend the word. Cues them to imitate PF speech cues		
Shows children that sounds must be blended in 1 jaw movement		
Provides opportunity for each student to spell and blend a target word independently; provides prompts as needed		
Interventionist draws pictures to help students unable to hear a blended word		
Asks students to identify the first letter and sound in target words; think of a word beginning with target sound		
Interactions appropriate, good rapport, reinforces as needed		
SCORE	**____/ 4**	

SOUND BLENDING GRADING RUBRIC (Day 3)

Group # _____ Children Absent_____

Date _____ Group Leader _____

Blending Introduction (-.5 for any poorly executed element)	**score**	**Comment**
Reviews prior letters and target letter for name/sound; upper/lower case;		
Correctly explains speech production cues on all PF cards and provides corrective feedback		
Includes child's name and date on all probe sheets		
Uses appropriate timing for each probe		
Uses bracket to indicate stopping point on LNF/LSF and NWF probes		
Uses appropriate cues (e.g., provide sound/word after 3 sec if child doesn't respond) for LNF/LSF and NWF probes		
Forms correct and incorrect piles for IGDI probe and records response immediately afterwards		
Tallies all probes and includes score		
SCORE	**____/ 4**	

Date_____ Group Leader _____

Blending Word Train (-.5 for any poorly executed element)	**score**	**Comment**
Spells target words on word train, explains PF production cues for unknown final letters		
Provides opportunity for each student to spell and blend a target word independently; provides prompts as needed		
Includes child's name and date on all probe sheets		
Uses appropriate timing for each probe		
Uses bracket to indicate stopping point on LNF/LSF and NWF probes		
Uses appropriate cues (e.g., provide sound/word after 3 sec if child doesn't respond) for LNF/LSF and NWF probes		
Forms correct and incorrect piles for IGDI probe and records response immediately afterwards		
Tallies all probes and includes score		
Includes child's name and date on all probe sheets		
SCORE	**____/ 4**	

APPENDIX I
TEACHERS' PERCEPTIONS OF STUDENT PROGRESS QUESTIONNAIRE

"Teaching Pre-K Students Early Literacy Skills"
Spring 2012

1. Do you feel the early literacy intervention implemented with your students was successful?

   YES **NO**

2. What do you feel was most successful about the early literacy intervention?

3. What do you feel was the least successful about early literacy intervention?

4. Was student learning from the early literacy intervention evident in the classroom setting? If so, give examples.

5. How satisfied are you with student progress in the early literacy program (Circle One)?

1	**2**	**3**	**4**	**5**
very dissatisfied	**somewhat dissatisfied**	**neither satisfied/dissatisfied**	**somewhat satisfied**	**very satisfied**

6. How successful was the early literacy program implemented with your students?

1	**2**	**3**	**4**	**5**
very successful	**somewhat successful**	**neither successful/unsuccessful**	**somewhat successful**	**very successful**

7. How much progress do you feel your students made in letter knowledge from the beginning to the conclusion of the early literacy intervention (0 – no progress; 10 – optimal progress)?

   0 1 2 3 4 5 6 7 8 9 10

8. How much progress do you feel your students made in phonics from the beginning to the conclusion of the early literacy intervention (0 – no progress; 10 – optimal progress)?

   0 1 2 3 4 5 6 7 8 9 10

9. How much progress do you feel your students made in blending sounds (i.e., decoding) from the beginning to the conclusion of the early literacy intervention (0 – no progress; 10 – optimal progress)?

   0 1 2 3 4 5 6 7 8 9 10

10. How much progress do you feel your students made in rhyming skills from the beginning to the conclusion of the early literacy intervention (0 – no progress; 10 – optimal progress)?

    0 1 2 3 4 5 6 7 8 9 10

11. Do you feel a similar program should be implemented with low performing students yearly?

    YES **NO**

12. If taught the procedures of the implemented early literacy program, would you incorporate it in your classroom routine?

    YES **NO**

APPENDIX J
IRB APPROVAL

Application for Exemption from Institutional Oversight

Institutional Review Board
Dr. Robert Mathews, Chair
131 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.6792
irb@lsu.edu
lsu.edu/irb

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/ projects using living humans as subjects, or samples, or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.

- Applicant,Please fill out the application in its entirety and include the completed application as well as parts A-E, listed below, when submitting to the IRB. Once the application is completed, please submit two copies of the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at http://www.lsu.edu/screeningmembers.shtml

- A Complete Application Includes All of the Following:
  (A) Two copies of this completed form and two copies of part B thru E.
  (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1&2)
  (C) Copies of all instruments to be used.
  *If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
  (D) The consent form that you will use in the study (see part 3 for more information.)
  (E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: (http://phrp.nihtaining.com/users/login.php.)
  (F) IRB Security of Data Agreement: (http://www.lsu.edu/irb/IRB%20Security%20of%20Data.pdf)

Principal Investigator: Crystal Randolph **Rank:** Doctoral Student

Dept: Communication Disorders **Ph:** 225-454-9872 **E-mail:** crando3@lsu.edu

Co Investigator(s): please include department, rank, phone and e-mail for each

anet Norris, Professor
Communication Disorders
225-578-3936
norris@lsu.edu

IRB# ES813 LSU Proposal #
⊗ Complete Application
⊗ Human Subjects Training

Project Title: Teaching early literacy skills to low-income preschoolers: Effects of rhyming and phonics instruction on complex rhyming skills, phonics, and blending sounds

Study Exempted By:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8692 | www.lsu.edu/irb
Exemption Expires: 1-22-2015

Proposal? (yes or no) no **If Yes, LSU Proposal Number**

Also, if YES, either ◯ **This application completely matches the scope of work in the grant**
OR ◯ **More IRB Applications will be filed later**

Subject pool (e.g. Psychology students) preschool students

*Circle any **"vulnerable populations" to be used:** (children <18; the mentally impaired, pregnant women, the ages, other). Projects with incarcerated persons cannot be exempted.

PI Signature [signature] **Date** 1/9/11 (no per signatures)

I certify my responses are accurate and complete. If the project scope or design is later changes, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I ave LSU before that time the consent forms should be preserved in the Departmental Office.

Screening Committee Action: Exempted √ Not Exempted ____ Category/Paragraph 1

Reviewer Mathews **Signature** [signature] **Date** 1/23/12

VITA

Crystal Randolph completed her Bachelor of Arts degree in Speech Pathology and Audiology in 2004 at South Carolina State University. Upon graduation, she was employed as a speech-language therapist by the Lancaster County School District. While employed, Crystal completed her master's degree in Communication Disorders in 2008 at the University of South Carolina. Following graduation, she completed her clinical fellowship year at Charlotte-Mecklenberg Schools. Crystal received her certificate of clinical competence from the American Speech-Language Hearing Association in 2009. After gaining her certificate of clinical competence, Crystal enrolled in the Communication Disorders program at Louisiana State University under the guidance of Jan Norris, Ph.D. While studying at Louisiana State University, Crystal was a member of the Language Intervention Lab, focusing primarily on early language and literacy interventions. Crystal will be graduating with her Ph.D. in December 2012.