Effects of a Pre-Recorded Parent-Child Shared Reading Intervention on At-Risk Preschool Children’s Phonological Awareness Skills

Dissertation

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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2012

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Abstract

Two studies were conducted to examine the effects of an embedded parent-child shared reading intervention on children’s phonological awareness skills. Seven children considered at-risk for reading difficulty listened to 6 pre-recorded children’s books with embedded early literacy activities three times each with a parent. Children’s progress was monitored following completion of each book through a series of brief early literacy measures conducted at the children’s school. Data were analyzed through visual inspection of each child’s graphs for each outcome measure. This pre-recorded parent-child shared reading intervention had positive effects on five of the seven children’s early literacy skills. Positive effects demonstrate the potential for children at risk for reading difficulty to benefit from early literacy activities in the home. However, some parents had difficulty completing the activities. Increasing linkages between home and school may lend additional support for parents and children who failed to make progress.
I have been fortunate enough to receive the opportunity to work with Dr. Howard Goldstein over the past several years. In doing so, I have gained invaluable experience conducting important research aimed at improving children’s academic futures and ultimately, their lives. As I completed this study, there were snags along the way. His advice and motivation prevented the snags from becoming irreparable holes.

I would like to acknowledge the members of my committee, Dr. Diane Sainato and Dr. Laurice Joseph. They helped shape this paper with their insight and helpful comments and suggestions.

I was fortunate to have amazing coworkers who helped me stay focused and positive throughout this study, while also offering constructive feedback. Their contributions have not been overlooked.

I would like to thank my parents and my sister for being caring and supportive and still showing interest in my school work after all this time. I am as proud of you all as you are of me.

Finally, to my wife Jackie…This will be my last graduation, I promise. I love how you have always supported my decisions and never doubted me. Some things take longer than we expect them to, but they are usually worth the wait. Together we can accomplish just about anything—All we need is just a little patience.
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Major Field: Human Development and Family Science
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Chapter 1: Literature Review

Early literacy is an essential set of skills that children typically begin to learn early in life (Justice, Chow, Capellini, Flanigan & Colton, 2003). Obtaining skills such as phonological awareness and alphabet knowledge pave the way for future reading success (National Reading Panel, 2000; Justice et al., 2003). Research suggests that shared reading provides an opportunity to teach a variety of early literacy skills, as it involves active participation from the children (Ezell & Justice, 2000). Unfortunately, children living in poverty typically experience less frequent shared reading and literacy exposure in general (Hart & Risley, 1995). As a result, these children tend to have reading difficulties. However, promising interventions have been developed to increase shared reading and literacy exposure in at-risk populations. This study addresses the question of whether an automated early literacy intervention embedded in children’s books can help children in poverty learn early literacy skills by reading with parents at home.

Early Literacy Skills

Early literacy, or emergent literacy, refers to the skills learned early in life that are related to later reading and writing achievement (Justice et al., 2003; Whitehurst & Lonigan, 1998). Similarly, Roseberry-McKibbin (2008) defines emergent literacy as the skills, concepts, and behaviors that precede conventional literacy development. Children
begin to develop early literacy skills early in life (e.g., during infancy), and these skills contribute to the development of conventional reading and writing skills in kindergarten and grade school (Missall, McConnell, & Cadigan, 2006). For this paper, emergent literacy and early literacy are used synonymously since many researchers use the terms interchangeably.

The National Early Literacy Panel (NELP, 2002) identifies six sets of important early literacy skills found to be predictive of later literacy: alphabet knowledge, phonological awareness, rapid automatic naming (RAN) of letters or digits, RAN of objects or colors, letter or name writing, and phonological memory. Five other early literacy skills also may be important predictors, but lack strong empirical support: print knowledge, concepts of print, reading readiness, oral language, and visual processing. Further, Whitehurst and Lonigan (1998) identified oral language, phonological processing, and print knowledge as being related to future decoding skills. Roseberry-McKibbin (2008) identifies only two domains of emergent literacy: phonological awareness and print awareness. Due to differences in terminology, there is a great deal of overlap in these skills (e.g., phonological processing, phonological awareness).

Although all of these skill areas (domains) may be important predictors of reading ability, there are four commonly discussed domains of emergent literacy to which researchers typically confine their work: 1) alphabet knowledge, 2) print awareness, 3) phonological awareness, and 4) vocabulary and comprehension. These are the domains identified by the National Reading Panel (NRP, 2000) as being the most critical skills for learning to read. Other skills, such as visual processing, are not taught in the context of
literacy and therefore are not discussed in this paper. Several researchers suggest that phonological awareness and alphabet knowledge are the strongest predictors of future reading achievement (Ezell & Justice, 2005; Adams, 1990; Lonigan, Burgess, Anthony, & Barker, 1998). Therefore, for this paper, emergent literacy is discussed in the context of these two domains.

**Alphabet knowledge.** Alphabet knowledge refers to children’s expressive and receptive knowledge about letters (Justice & Ezell, 2004). Alphabet knowledge skills include understanding of both the appearance and names of the various alphabet letters and the ability to identify what sounds the letters produce. Specific skills in this domain that are commonly taught to preschool children include recognizing both upper and lowercase letters, identifying the first letter in their own name, and identifying what sounds the letters produce.

**Phonological awareness.** Phonological awareness refers to the ability to hear and manipulate the sounds of language (the phonological structure of the word), without regard for semantics (Trehearne, Williams, & Moore, 2003). It is an understanding that language consists of words, and words are made up of sounds. Phonological awareness consists of two main components: phonemic awareness and phonics (Trehearne et al., 2003). Phonemic awareness is a more narrow, more developed skill, related to the understanding of individual sounds in words, and phonics is an understanding of the existence of a meaningful relationship between letters and sounds. In early childhood, children learn several different phonological awareness skills throughout the school year. In fact, many preschool curricula focus heavily on this domain of early literacy.
Typically, the broad skills are thought to be easier, prerequisite skills to the more narrow skills such as those related to phonemic awareness (Trehearne et al., 2003). Children may learn at the beginning of preschool that sentences are made up of several words, or that words can rhyme (general phonological awareness skills). Skills such as being able to isolate the first sound of a word or blend words with three sounds (e.g., c-a-t) tend to be taught later in the year. These more narrow, sound-level skills are important parts of phonological awareness that lead to reading, and are considered phonemic awareness skills.

The Importance of Early Literacy

Learning early literacy skills like phonological awareness and alphabet knowledge early on can help children to be ready to enter school prepared for formal instruction and perform at their full potential. This ability to perform successfully with the typical classroom curriculum is referred to as their school readiness (Carlton & Winsler, 1999). School readiness is measured by general developmental tests as well as academic knowledge tests (Carlton & Winsler, 1999), although different schools may interpret the results of these tests differently. This term can encompass both being ready to learn the material as well as being ready to participate in a typical school context. For example, many kindergarten teachers claim that a large percentage of their children cannot follow directions (Wesley & Buysse, 2003). Bierman and colleagues (2008) labeled the two types of school readiness academic readiness and social-emotional readiness. If children are to meet their full potential, they must enter school equipped with both aspects of school readiness (Bierman et al., 2008). Behavior instruction may
help promote social-emotional school readiness, and effective instruction on early literacy skills may help promote children’s academic school readiness. Children who are not adequately prepared often struggle to keep up with their more ‘school-ready’ peers (Carlton & Winsler, 1999).

One of the primary hopes of the National Education Goals (NEGP, 1991) was that “all children will begin school ready to learn.” Focusing on academic readiness, this policy emphasized the need to promote literacy development as early as preschool to prepare children for reading instruction (Wesley & Buysse, 2003). To fully promote literacy development, young children must receive effective instruction in all domains of emergent literacy. Emergent literacy exposure helps to prepare children for the more formal, more in-depth instruction they might receive upon entering grade school. School readiness gives children a head start in learning these skills that are sometimes difficult to learn. Whitehurst and Lonigan (1998) report that alphabet knowledge at the time the child enters school is a strong predictor of future literacy success. Similarly, Trehearn and colleagues (2003) found that children who enter school with adequate phonological awareness skills have a head start in learning the skills necessary to read and write. The authors suggest that phonological awareness knowledge at school entry is one of the strongest predictors of reading success during grade school.

School readiness is an important mark of emergent literacy development. However, emergent literacy skills may predict academic success beyond school entry. Many researchers examine the predictive value of emergent literacy skills on future academic success. For example, Justice and Kaderaveck (2004) report a plethora of
research evidence demonstrating powerful predictive abilities of phonological awareness, print awareness and alphabet knowledge on children’s future reading. Other researchers report similar findings, suggesting that emergent literacy skills (particularly phonological awareness skills) are important for children’s ability to learn to read (NELP, 2002; Hart & Risley, 1995; Ziolkowski & Goldstein, 2008; Scarborough, 1998; Chaney, 1998).

Although studies have demonstrated that skills in all four domains of emergent literacy impact children’s school readiness in important ways, phonological awareness and alphabet knowledge might be the most important skills for children to learn in order to learn to read (Ezell & Justice, 2005; Adams, 1990; Lonigan et al., 1998). Researchers have consistently found skills in these domains to be important predictors of school readiness as well as future academic success.

**Learning Early Literacy**

Emergent literacy development begins in infancy and continues through preschool and kindergarten (Missall et al., 2006). Although children can learn through observing others and through play-based activities, most researchers suggest that explicit teaching of emergent literacy skills is the most effective approach (Justice et al., 2003; Petursdottir et al., 2009). Some combination of indirect learning and explicit teaching is probably ideal. Research has shown that some emergent literacy skills are learned primarily through observations (e.g., print awareness), and others require effective, direct instruction (e.g., phonological awareness; Stahl & Murran, 1994).

Phonological awareness skills often require a great deal of explicit instruction for children to show mastery (Stahl & Murran, 1994). Many children struggle learning skills
in this domain and must participate in focused, explicit instruction. Phonological awareness is a unique domain of emergent literacy in that children must disregard the meaning of words to hear the sounds. For example, a child with some phonological awareness skills can tell you that the words cat and hat rhyme, because the words sound alike. However a child who has not mastered skills in this domain will likely claim that cat and dog rhyme, because they are both animals. Children must be taught the meaning of ‘rhyme’ and must understand that there are different sounds in words and that they can be manipulated. Research has shown that children benefit greatly from explicit phonological awareness instruction (see Ziolkowski & Goldstein, 2008). Phonological awareness skills are typically learned gradually over time (Trehearne et al., 2003) and are learned according to a hierarchy of skills (Ziolkowski & Goldstein, 2008). Children typically learn to manipulate large units (e.g., compound words) before learning to manipulate smaller ones. For example, children are usually able to identify rhymes (typically multiple phonemes; e.g., bite and kite) before they are able to identify examples of alliteration (single phoneme; e.g., box and bug).

Alphabet knowledge, specifically letter naming ability, may be highly related to other literacy-related abilities such as print awareness (Adams, 1990). Teaching letter names may allow children to name the letters, but this is only a surface skill, meaning that knowing letter names does not mean the child has well-developed alphabet knowledge (Trehearne et al., 2003). Alphabet knowledge seems to be a hierarchical domain, with letter-naming being a basic, prerequisite skill and letter-sound correspondence being a more difficult skill. Letter-sound correspondence must be
explicitly taught, and children must first be able to recognize the letters of the alphabet (Trehearn et al., 2003).

Children learn emergent literacy skills in a variety of environments, including but not limited to the classroom and the home. The preschool classroom should be a literacy-rich environment that provides children with limitless opportunities to engage in literacy-based activities. Teachers can promote literacy development by having literacy-based large group activities as well as small group and individual activities related to language and literacy. Parents also play a crucial role in their children’s development of emergent literacy skills (Lonigan & Whitehurst, 1998). Parents can promote skills such as print awareness, vocabulary and comprehension, alphabet knowledge, and even phonological awareness, through literacy-related behavior such as shared reading (Ezell & Justice, 2005). Children who are read to frequently are likely to be more engaged in reading-related activities, which ultimately lead to learning to read (Sulzby & Teale, 1987).

For older children and adults, studies have demonstrated the power of listening to stories and passages while reading to improve such skills as reading fluency (Skinner et al., 1993), comprehension, (Hale et al., 2005; Rasinski, 1990) and even literacy (Moffett, 1973). Listening while reading (LWR) presents children with both auditory and visual stimuli simultaneously with the goal of strengthening children’s ability to associate print with sounds (Schneeberg, 1977). However, comparisons between LWR and repeated reading often suggest that both methods are effective but neither method is significantly more effective (Winn et al., 2006; Rasinski, 1990).
For preschool children, repeated reading—or repeated listening—is much more applicable than listening while reading. Since preschool children typically look at pictures rather than text while listening to stories, they would not get the same dual input of auditory and print stimulus as older children would get. Shared reading may be a more age-appropriate means of teaching preschool children (Justice & Kaderavek, 2004). Shared reading allows the opportunity for direct instruction to be conducted in a naturalistic environment. This activity provides a way to teach children the essential early literacy skills while keeping children engaged and interested. Researchers have demonstrated the potential of shared reading to improve children’s vocabulary (Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999) and phonological awareness skills (Ziolkowski & Goldstein, 2008). Unfortunately, not all children receive the same quantity and quality of shared reading (Bracken, 2008). This inequality may have significant long-term effects on reading ability (Bus, van IJzendoorn, & Pellegrini, 1995).

**Reading Difficulty and Poverty**

Reading difficulties exist in children of all ages, from those struggling with emergent literacy in preschool and kindergarten to those struggling to read later in school. Estimates from the National Assessment of Educational Progress (2003) suggest that nearly 70% of fourth graders are reading below a proficient level (Manzo & Galley, 2003). Further, the NELP (2002) reports that more than a third of fourth grade students struggle to complete schoolwork due to difficulty reading. The prevalence of reading difficulty is higher in children in SES environments, in Latino and African American
students, and in students who do not enter school with the necessary emergent literacy skills (Bursuck & Blanks, 2010; Hart & Risley, 1995; NELP, 2002).

Low SES is one of the most studied sources of reading difficulty in children (see Ezell & Justice, 2005; Hart & Risley, 1995) and may be the single strongest predictor of academic success (see Roseberry-McKibbin, 2008). Unfortunately, the National Center for Children in Poverty estimates that 40% of American children live in low-income households (Roseberry-McKibbin, 2008). Children from low SES backgrounds (and families with low maternal education) often struggle in all academic areas, and especially in emergent literacy and reading success. Compared to children from middle and high SES families, preschool children from low SES families tend to have less developed letter knowledge and phonological awareness skills (Lonigan et al, 1998). In fact, low SES has a bigger impact on academic success during the preschool years than any other time in life (Roseberry-McKibbin, 2008). Part of this problem stems from a lack of resources and exposure to language and literacy in the home (Bracken, 2008; Hart & Risley, 1995). Evidence shows that children in low-SES homes experience much less shared reading than their middle- and high-SES peers (Adams, 1990; Lonigan & Whitehurst, 1998).

**Shared Reading as Intervention Context for Struggling Pre-readers**

Some children have little trouble learning to read. These children develop the critical early literacy skills and use those skills to build success in reading. However, many other children struggle early on, and the achievement gap often continues to increase throughout school. Overall, children from low SES families fall further behind
their higher SES peers in many academic areas, perhaps no more drastically than in reading achievement (Ziolkowski & Goldstein, 2008). Therefore, it is important to intervene early in children’s lives to try to narrow the achievement gap between struggling and proficient readers.

Although most interventions for struggling readers begin in the grade school years, some more recent interventions are intended to address risk for reading failure in preschool and even during the toddler years. Regardless of exactly when an intervention begins, evidence indicates that it should occur early and often for optimal results (Bus et al., 1995). Interventions for young children have included primarily the children’s teacher, parent, or both. Researchers have found both teacher involvement and parent involvement in the intervention process to be effective.

Direct instruction may be the most useful method of teaching children some of the essential skills for learning to read. However, the context in which children are taught seems to be very important. Hoffman, Norris, and Monjure (1990) suggest that teaching in a naturalistic environment may be the best way to keep the children engaged during the instruction. Children’s levels of interest and engagement in shared reading seem to be vital for success in learning early literacy skills through shared reading (Scarborough & Dobrich, 1994). Interesting and engaging shared reading at home can provide meaningful experiences that can help in children’s development of emergent literacy and their overall interest in reading (Ezell & Justice, 2005).

Shared reading may be the most important activity parents can do with their children to help them develop early literacy skills that will increase their chances for
success in school (Commission on Reading, National Academy of Education, 1985). Further, Kaderavek and Justice (2002) suggest that shared reading can be used as an intervention context to teach struggling children. Research has shown that children can learn skills and information in several domains of early literacy during shared reading (Kaderavek & Justice, 2002). In a meta-analysis of shared reading studies, Bus, van IJzendoorn, and Pellegrini (1995) found that the effects of shared reading are not dependent upon SES. Shared reading between parents and children improved children’s success in reading even in low SES families where parents have low literacy levels (Bus et al., 1995). In fact, number of books in the home and frequency of parent-child reading may be stronger predictors of children’s reading success than maternal education (Christian et al., 1998). This suggests that early literacy activities such as shared reading can potentially be beneficial to various populations of children, including those in poverty.

Recently, shared reading has also been presented as a means of teaching other domains of early literacy, including phonological awareness (Justice et al., 2005; Ziolkowski & Goldstein, 2008). For example, Justice and colleagues (2005) conducted a shared reading intervention where parents read to their children and attempted to teach them rhyming and alliteration tasks. In this study, activities were completed after the book was read. Justice and colleagues’ intervention books included relatively few planned opportunities for children to be actively involved in the intervention activity (e.g., ‘lift-the-flap’ in only 4 of the 10 books). Parents in the experimental group were given a set of 10 books, each of which included two activity cards in the back of the
Parents were instructed to help their children with the rhyming and alliteration tasks as much as they needed to for the children to learn the task on the card. The tasks included finding words in the book that rhymed with the word on the card, or that started with the same sound as the word on the card. Parents were instructed to model the task for their child and to withdraw support over time. In the control group, children completed vocabulary tasks instead of phonological awareness tasks. Children’s growth in rhyming was accelerated in the experimental group, but not in the control group. However, alliteration was not significantly impacted by the intervention. Despite the apparent demand of the intervention, parents responded positively on the questionnaire about their enjoyment of the intervention. The parents who participated in the study were mostly college graduates, and most of the children were Caucasian and lived in two-parent, middle-class households. The authors recommend conducting a similar study with a more heterogeneous sample. Parents with different educational backgrounds may have different experiences with implementing this intervention.

Another early literacy intervention embedded in storybooks was developed by Ziolkowski and Goldstein (2008). In this study, a multiple-baseline design across behaviors was used to examine the effect of a phonological awareness intervention with low SES children with language delays. Children participated in two intervention conditions: Rhyme Time and Initial Sound Off. The order in which children completed these conditions was counterbalanced, so that half of the children were in Rhyme Time first, and the other half was in Initial Sound Off first. A graduate student read all children one storybook in small groups each morning in their preschool classroom. During this
reading, children in the Rhyme Time group participated in brief rhyming activities embedded throughout the book. Children were provided a pair of rhyming words and asked to repeat them during each brief activity. For example, the interventionist would say “Bug sounds like rug. Bug sounds like ____.” The child is asked to complete the rhyme with the word that was provided. In the Initial Sound Off group, children are asked to name the letter presented on the page and repeat the provided prompt. For example: “Bear starts with the /b/ sound. Bear starts with the ______ sound.” Progress monitoring was completed using a rhyme production measure developed for the study, the Rhyming and Alliteration versions of the Individual Growth and Development Indicators (IGDIs), and the Initial Sound Fluency portion of the Dynamic Indicators of Early Literacy Skills (DIBELS). Results indicated that children’s rhyme and alliteration skills improved as a result of the intervention. The researchers concluded that shared reading can improve children’s phonological awareness skills when children are given repeated opportunities to practice these skills.

**Purpose of the Current Study**

Despite an understanding of which early literacy skills are critical for future academic success, children often do not get sufficient exposure to and practice with these skills in the preschool classroom. A recent evaluation of classroom instruction across 57 classrooms revealed substantial variability in the amount of teacher support provided to children for language and literacy (Carta, Atwater, & Bradfield, 2010). Further, classrooms consistently received low ratings for instructional support. Since children
from low-SES homes also typically receive little language and literacy support at home, these findings provide more evidence for the importance of providing early intervention.

Previous studies have evaluated the effectiveness of shared reading interventions, both in schools and in the home. Although teachers are influential, parents also seem to be important contributors to young children’s success in reading. Findings indicate that shared reading can be a powerful means of early language and literacy instruction for young children. One limitation of previous studies is that the interventions typically place considerable demands upon the teacher or parent. For example, most such interventions require that the parents participate in multiple training sessions or to read lengthy scripts during the book reading to conduct the intervention sessions. In low SES families, parents sometimes are not proficient readers themselves. This hinders the viability of such shared reading interventions. To prevent intergenerational transmission of reading difficulty, an intervention that does not rely on parental reading ability may be more effective. Finally, the majority of shared reading interventions focus on teaching oral language and vocabulary. However, phonological awareness and alphabet knowledge skills are more closely related to future reading achievement (Adams, 1990; Lonigan et al., 1998). Without adequate knowledge of these two domains, children have difficulty developing the ability to recognize and decode words (Pullen & Justice, 2003).

This report includes two studies that were designed to evaluate the effects of a pre-recorded intervention embedded in children’s books utilized in the context of parent-child shared reading to teach phonological awareness skills (specifically alliteration) to low-SES preschool children. The intervention targets an increase in early literacy skills
of the children as well as an increase in exposure to early literacy through frequent and meaningful shared reading in the home. This intervention places relatively little demand on parents and may be especially helpful to parents who are not proficient readers or English speakers. Whereas other interventions rely on the parents to read the books to their children, the automated nature of the current intervention allows the parent to simply accompany their child as they listen to the story’s narration and participate in the activities. Feedback is provided in the narration, which allows the parent to focus more on assisting the child with other aspects of reading such as turning the pages. Also, the number of opportunities to respond to meaningful questions is consistent across books, so parents do not have to know when to interrupt the story for questions or follow a script. Justice and Kaderavek (2002) suggest ways to improve the potential of shared reading to improve children’s emergent literacy skills. Strategies include using books with flaps and pictures that are appealing to young children to increase engagement during the reading. Both of these strategies were used in the development of the books used in the current study. Previous studies have demonstrated a mediating effect of parental reading ability on children’s ability to benefit from parent-child shared reading interventions (Sénéchal, Pagan, & Lever, 2008). However, children should benefit from this automated storybook intervention despite potential limitations in their parents’ reading ability.
The following research questions are addressed in each study:

1) To what extent does a pre-recorded parent-child shared reading intervention embedded in children’s storybooks improve preschool children’s phonological awareness skills?

2) How reliably are parents able to implement this automated shared reading intervention in the home with their child?
Chapter 2: Method

Two studies were conducted over two school years, producing data from two cohorts of children who received the same intervention. Three children participated in the first study, and four children participated in the second study. This resulted in an overall sample size of seven children.

Participant Selection Criteria

To qualify for the intervention, children had to meet several criteria. First, their teacher recommended children as needing additional support in phonological awareness. Teachers reported having some concerns or having major concerns about the child’s phonological awareness skills. Children also had to produce low and stable baselines on two early literacy measures (see baseline and progress monitoring measures below).

For descriptive purposes, each child was administered the phonological awareness and print knowledge subtests of the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007). Children in Study 1 were also administered the PPVT-IV to ensure they had minimal oral language skills, which are vital for success in the intervention. For Study 2, children’s language was measured by the Picture Naming Individual Growth and Development Indicator (IGDI; Missall & McConnell, 2004), which was done to reduce the amount of testing for the children. Scores on descriptive measures can be seen in Table 2 for Study 1 and Table 4 for Study 2.
Participants - Study 1

Four children (2 boys, 2 girls) were selected from three preschool classrooms in a child care center serving a diverse population consisting of children of university faculty and staff who are funded by their families as well as children living in low-income communities who are funded by CDC Head Start and the local public school district. Three children were enrolled in full-day classrooms, and one child was in a half-day classroom. All participants in this study were enrolled in the center through Head Start or the public school district. Children were selected based on teacher recommendation as well as low and stable baseline scores on two early literacy measures. In addition, children had to demonstrate sufficient vocabulary for participating in the intervention based on an oral language measure.

No children were excluded from the intervention since all four children met selection criteria. However, only three participants were able to complete the intervention. One parent returned all materials and refused to complete the readings after being prompted several times to return the second book.

Participants (n = 3) ranged from 52 months to 59 months of age at the start of the study (M = 55.0, SD = 3.61). All three children were African American. Only one of the three parents had some education beyond high school. All children in the study live in households that fall below the poverty line established by the US Department of Health and Human Services for 2011, according to their income as reported on the family survey. Family survey information is presented in Table 1, and descriptive data are presented in Table 2.
### Table 1. Family Survey Information for Study 1.

<table>
<thead>
<tr>
<th>Child</th>
<th>Age (months)</th>
<th>Gender</th>
<th>Maternal Education</th>
<th>Number of children in the home</th>
<th>Frequency of book reading at home (last week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keisha</td>
<td>55</td>
<td>F</td>
<td>High School diploma</td>
<td>3</td>
<td>Every day</td>
</tr>
<tr>
<td>Jaimee</td>
<td>59</td>
<td>F</td>
<td>Some education after High School</td>
<td>4</td>
<td>Every day</td>
</tr>
<tr>
<td>Danny</td>
<td>52</td>
<td>M</td>
<td>GED</td>
<td>1</td>
<td>3 or more times</td>
</tr>
</tbody>
</table>

### Table 2. Scores on Descriptive Measures for Study 1.

<table>
<thead>
<tr>
<th>Child</th>
<th>PLD (PA)</th>
<th>TOPEL PA*</th>
<th>PPVT*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keisha</td>
<td>2</td>
<td>101</td>
<td>101</td>
</tr>
<tr>
<td>Jaimee</td>
<td>2</td>
<td>88</td>
<td>97</td>
</tr>
<tr>
<td>Danny</td>
<td>3</td>
<td>98</td>
<td>117</td>
</tr>
</tbody>
</table>

*Note: * (M = 100, SD = 15).
Participants - Study 2

Ten children (4 boys, 6 girls) were selected from two sites: an early childhood center serving a diverse population or a preschool classroom serving primarily low-income families in a local public school district. Nine children were enrolled in full-day classrooms, and one child was in a half-day classroom. All participants in this study were enrolled in their school through Head Start or the public school district.

Two children were excluded from the intervention for having high scores during baseline. Although children with higher scores on these measures could potentially benefit from the intervention, high scores prior to intervention limit the potential to demonstrate growth in performance. Because the current study is an evaluation of the intervention’s ability to improve early literacy skills of struggling children, only children with relatively low scores were included.

Of the remaining eight children who were enrolled in the intervention, four were unable to complete the intervention. One child’s parent returned the materials during the first week and refused to participate due to lack of available time. One participant’s parent returned the materials during the 2nd week of intervention. This parent said that the child did not enjoy participating and they did not wish to continue. Another participant had poor attendance (came to school only two days in one month), and the parent had no communication with the teachers or with the researcher. Another child became very ill and could not return to school. This child eventually moved out of state.

Four children remained and completed the intervention. These participants ranged from 50 months to 55 months of age at the start of the study (M = 52, SD = 2.45).
All participants lived in households considered below the federal poverty line. All four of the children are African American. Three of the four children’s parent reported having some education beyond high school. All children in the study live in households which fall below the poverty line established by the US Department of Health and Human Services for 2011, according to their income as reported on the family survey. One child (David) was identified as having a developmental delay while participating in the study. This child was enrolled in special services and switched to half day pre-school. Family survey information is presented in Table 3, and descriptive data are presented in Table 4.

Table 3. Family Survey Information for Study 2.

<table>
<thead>
<tr>
<th>Child</th>
<th>Age (months)</th>
<th>Gender</th>
<th>Maternal Education</th>
<th>Number of children in the home</th>
<th>Frequency of Book reading at home (last week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myra</td>
<td>53</td>
<td>Female</td>
<td>Some education after high school</td>
<td>2</td>
<td>3 or more times</td>
</tr>
<tr>
<td>Maria</td>
<td>50</td>
<td>Female</td>
<td>Some High School</td>
<td>3</td>
<td>3 or more times</td>
</tr>
<tr>
<td>David</td>
<td>55</td>
<td>Male</td>
<td>Some education after high school</td>
<td>4</td>
<td>Once or twice</td>
</tr>
<tr>
<td>Steven</td>
<td>50</td>
<td>Male</td>
<td>Some education after high school</td>
<td>3</td>
<td>3 or more times</td>
</tr>
</tbody>
</table>
Table 4. Scores on Descriptive Measures for Study 2

<table>
<thead>
<tr>
<th>Child</th>
<th>PLD (PA)</th>
<th>TOPEL PA*</th>
<th>Picture Naming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myra</td>
<td>3</td>
<td>79</td>
<td>4</td>
</tr>
<tr>
<td>Maria</td>
<td>3</td>
<td>87</td>
<td>5</td>
</tr>
<tr>
<td>David</td>
<td>3</td>
<td>79</td>
<td>9</td>
</tr>
<tr>
<td>Steven</td>
<td>3</td>
<td>76</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: * (M = 100, SD = 15).

Measures

Screening measures.

1) Peabody Picture Vocabulary Test—4th Edition (PPVT-IV). The PPVT-IV (Dunn & Dunn, 2007) is a standardized measure of receptive vocabulary that can be given to anyone at least 2 years 6 months old. Each item includes four pictures on one page. The administrator presents the child with a word and the child is asked to point to the picture that corresponds with the word (e.g., “Which picture shows mountain?”). High reliability and validity have been reported (Dunn & Dunn, 2007). The authors report a test-retest reliability of $r = .91$ for 2-4 year olds, and $r = .94$ for 5-6 year olds.

2) Picture Naming IGDI. Picture Naming is a 15-item measure that asks children to name pictures on flash cards. Children are presented with a set of flash cards, each of which contains just one picture. Pictures include objects that might be found in a child’s natural environment, such as a comb or an apple. Scores are based on the total number of correct responses. A score above the cut point for Picture Naming (4 or more) indicates that the child has sufficient language to participate in a phonological awareness
intervention. A score below the cut point (3 or less) on this measure would indicate that the child’s language is limited and the child would likely have difficulty participating in the intervention.

**Baseline and progress monitoring measures.**

1) **Mastery Monitors.** The Mastery Monitors include pre-test and post-test measures that are uniquely created for each intervention story. Children are presented with flash cards and asked various questions, depending on the content of the week’s intervention. The pictures on the flash cards are exactly the same as the pictures in the intervention. The questions match those asked in the intervention activity. Although the other progress monitoring measures assess whether the child has mastered the general skills being taught, the Mastery Monitors only assess children’s mastery of the specific information taught in each book. Each Mastery Monitor contains ten items, taken directly from the book that was read during that week. Children are given a pre-test prior to reading each book, and a post-test after reading the book three times. The pre-test and post-test contain the same items, therefore measuring children’s progress on the specific information included in each book.

2) **Alliteration IGDI 2.0.** In the Alliteration IGDI 2.0, item cards have two pictures placed horizontally. The task is an identification task where the child must identify a word that starts with the correct sound. The child is shown a card and the administrator asks (for example), ‘ball, mop…Which word starts with /b/?’ For the current study, the cards are shuffled, and the child is presented with item cards for two
minutes. The total number of correct responses in two minutes comprises the child’s Alliteration IGDI 2.0 score.

**3) First Sound Fluency (FSF).** First Sound Fluency (Good & Kaminski, 2002) is a one-minute measure that requires the child to produce the first sounds of a set of words. This measure includes no pictures. There is a booklet containing 20 item sets, or word lists. For each session, the child is given a new item set. First, the researcher demonstrates three sample items and provides corrective feedback when necessary: “The first sound you hear in the word man is /mmm/. Listen. /mmm/. Man. What is the first sound in the word man?” After completing the sample items, the child begins the test items. The researcher reminds the child to say the first sound in each word and then proceeds to say the test items. Two points are given for a correct response, and one point is given for a partially correct response. For example, for the word *grass*, the correct answer is /g/, and partially correct answers are /gr/ and /gra/. The child’s score is determined by the number points obtained in a one-minute period. The test is discontinued if the child receives a score of 0 for each of the first five test items.

**Descriptive measures.**

**1) Test of Preschool Early Literacy (TOPEL).** The TOPEL is a standardized measure (M = 100, SD = 15) designed to identify children at risk for early literacy problems. The TOPEL consists of three subtests: print knowledge, definitional vocabulary, and phonological awareness. Low standard scores (below 90) for each subtest serve as general indicators of reading related literacy problems. For the current study, only Subtests 1 (print awareness) and 3 (phonological awareness) were
administered. Subtest 2 (definitional vocabulary) was not administered, since another measure was used to measure oral language (see below). The print awareness subtest includes 36 items that assess children’s alphabet knowledge and forms and conventions of written language. Children are administered multiple-choice questions (with pictures) where they are asked to distinguish letters from numbers (e.g., “point to the letter”), identify certain letters (e.g., “point to the M”), and identify letters according to their sounds (e.g., “which one makes the /b/ sound?”). They are also asked open-ended questions (without pictures) about letters (e.g., “what is the name of this letter?”) and letter sounds (e.g., “what sound does this letter make?”). The phonological awareness subtest includes 27 items that assess children’s sound blending and elision abilities. Children are asked to point to (or say) the word that is left when part of the word is removed (e.g., “say mailbox without box”). Then they are asked to point to (or say) the word that is produced by combining sounds (e.g., “what do these sounds make: base…ball?”). Both tasks include blending and segmenting compound words and the more difficult task of blending and segmenting one-syllable words (e.g., d-o-g). For both subtests used in the current study, reliability was evaluated across content, time, and scorer and was high for each type. For print awareness, reliability coefficients were reported as .95, .89, and .96, respectively. For phonological awareness, coefficients were .87, .83, and .97, respectively. The examiner manual also provides evidence of the validity of the TOPEL. Correlations with other criterion tests, including the Get Ready To Read, ranged from ‘large’ to ‘very large.’
2) **Performance Level Descriptor (PLD)**. The PLD is a teacher nomination form that asks teachers to indicate each child’s ability in two domains: alphabet knowledge and phonological awareness. The teacher is asked to check the box next to each child’s name that most accurately describes the child’s ability related to the domain: 1) no concerns about the child’s ability, 2) the child has some emerging skills, but there are some concerns, or 3) there are major concerns about the child’s ability in the domain.

3) **Family Survey**. The Family Survey is a 19-item self-report questionnaire that collects demographic information about the child and the parent, the child’s home literacy environment, and the parent’s socio-economic status. Questions focus on quantity and type of books in the household, language(s) spoken at home, frequency of parent-child reading activities, household income, and parental education.

**Setting**

There were two primary settings in which the study took place. First, the intervention (parent and child listening to pre-recorded book) occurred in the children’s homes. The parents were asked to read with their children in their ‘usual reading spot,’ if they had one designated. If they did not have a usual reading spot, they were asked to find a place that is as quiet and comfortable as possible. A likely place would be the child’s bedroom. If possible, parents were encouraged to read at approximately the same time each night so that the child becomes accustomed to the routine.

Second, assessments were always administered in a quiet area at the child’s school. Prior to the start of intervention, the author talked with some of the teachers and developed a plan for time and place of assessments. On most days, assessments were
done in an empty meeting room. On occasion, the library was used if the meeting room was unavailable or if more than one child was being assessed simultaneously. Children were pulled from class during free play time or center time. Children were not pulled from class during large group or circle time, when explicit, teacher-led preschool instruction typically occurs most. The lead teacher in the classroom completed the PLD teacher questionnaire.

Materials

One set of the following materials were used for each child:

- one training book
- six books with embedded interventions
- one Mp3 player
- one set of speakers
- one audio cassette recorder
- six blank audio cassettes
- two large plastic bags for transportation of materials.

Books. A series of 18 children’s books were written by the author and colleagues for a previous study. Of the 18 books, 6 (with alliteration intervention) were used for the current study. The first three books in this study include the same characters – the Forest Friends. The next three books have new characters – the Jungle Friends. The books are all between 14 and 18 pages in length, and each contains a similar cadence. Each page contains just four lines of text and ends in a rhyme. Stories were illustrated by a professional illustrator and were made into printable form using a graphic design
program. The files were then sent to a printing company for production. Audio tracks of stories were recorded to Mp3 files by a professional voice recorder.

The stories had a narrator: a character named Sally the Sound Seal. The narrator read the stories and asked the child to respond aloud to the intervention activities that were embedded in the story. The narrator offered corrective feedback (e.g., ‘did you say ball? Ball starts with /b/.’) and praise (e.g., ‘great job!’) during the interventions. Activities were presented in a way that was intended to maintain the child’s interest during the individual story and throughout the series of stories. The child was asked to “help the characters” during the readings. For example, the child might be asked, “Help Pablo Porcupine to find the letter P” or “Pablo needs your help finding words that start with /p/.”

Each story contained a total of six intervention activities, plus a review of some of the activities. Before the story began, there were two activities that introduced the child to the task. These activities included demonstrations as well as opportunities for the child to respond. Within the story, there were four interruptions for intervention activities. After the story, there were four to six review items taken from the interventions within the story. During each interruption, the narrator modeled the activity and asked the child a series of questions. She then paused, allowing the child to respond. Finally, she provided feedback for their responses. For example, “Tell Pablo which word starts with /s/. Is it pie or soap? (pause) Soap! Soap starts with /s/. Listen...sssoap. Great job!”

Intervention activities were on separate pages from the story text, so that the children were not distracted by the story’s illustrations during the activities. This allowed
them to focus on the activity itself. The narrator read the page of text from the story and then instructed the child to “turn the page.” On the intervention pages, there were two sets of double doors glued over top of the images used in the activity. There were a set of blue doors on the left page and a set of red doors on the right page. Under each set of doors was a group of images corresponding to the activity. Children were asked to “Open the blue doors” to participate in the activity. Then they were instructed to “Open the red doors” for the next activity. The two sets of activities under the blue doors and red doors comprised a single interruption. Each interruption for interventions lasted approximately one minute, and the complete time of the book with interventions was approximately 10-12 minutes. During the intervention activities, children received several opportunities to respond. In fact, each interruption included about six opportunities to respond, totaling approximately 30 opportunities for children to respond during each reading. This promoted active participation among the children and aimed to compensate for potentially limited opportunities for children to respond to instruction during their everyday classroom routine.

Procedures

The researcher first selected a group of children who were thought to be appropriate candidates to receive the intervention, based on teacher recommendation. Teachers recommended children they thought would benefit from additional early literacy support. Once the group of children was selected, the researcher placed flyers in selected children’s mailboxes in the classroom. These flyers contained information about the study including rationale, parent/child reading procedures, potential benefits to their
child, testing procedures, and incentives (grocery store gift cards). The flyer also asked that any parent interested in participating meet with the researcher during child pick-up. The researcher scheduled meetings with the parents during this time to discuss participation. Parents who were interested in participating were asked to read and sign a consent form to enroll the child as well as themselves in the study. The consent form provided more details on the information presented on the flyer. After signing the consent form, parents were asked to complete the family survey.

**Parent/child reading.** After agreeing to participate in the study, each parent was asked to attend a brief (10-15 minute), individual instructional session on the procedures for completing the intervention. The session was led by the researcher at the end of the school day and included instruction on using all materials; procedures for before, during, and after book reading; and the exchange process for materials, including incentives. Upon completion of this session, parents were given the necessary materials to begin the readings, and the researcher began collecting baseline data.

Parents were provided with the necessary materials when they came to pick up their children from school. The two plastic bags were labeled “Keep at home” and “Return to school.” The “Keep at home” bag contained the cassette recorder and the pair of speakers to be plugged into the Mp3 player. There was no need for parents to return these materials each week. The “Return to school” bag contained one book, the Mp3 player with the matching audio file for the book, and a blank cassette tape. These materials, along with a Fidelity Checklist were returned to the child’s classroom following completion of protocol. New materials were then sent home.
“Rules” for the parents during the book readings were minimized to make the process simple to implement and enjoyable for the parents as well as the children (see Appendix A). For example, any adult caregiver could read with the child, as long as they completed the checklist and followed all procedures. The term *parent* will be used to refer to any adult caregiver. The parent was asked to read with only the participant child as a dyad three times, all of which must be recorded. This ensured that the participant child will receive the desired parental attention for the minimum of three readings. Having only the parent and child participating during recorded sessions allowed the researcher to more easily hear the participant child’s verbal responses. Siblings or friends were permitted join in on additional readings, which were not necessary to record; however, parents were asked to make note of additional readings or related activities on the checklist form. Parents were asked to complete the book readings at the same time each night (e.g., right before bed), as much as possible, to build a routine for the child. They also were asked to encourage their children during the book reading and make the process enjoyable as much as possible to maximize their child’s engagement and learning of these important skills. Children should be encouraged to respond verbally so their responses could be heard on the recording. During the reading, parents were able to pause the reading if necessary (e.g., in the case of an important phone call or an emergency). However, frequent pausing of the reading was discouraged as it would likely make the recording difficult to follow.

Before the book reading, parents were asked to bring the child to their quiet reading place, then insert the blank cassette, turn on the audio recorder and start
recording. Then they were instructed to give the child the book and begin playing the audio by pressing the ‘play’ button on the Mp3 player. During the story’s introduction, the parent was asked to fill out the first part of the reading fidelity checklist (see Appendix B) placing check marks on the lines asking if the audio recorder has been turned on before reading has begun and that the child has a book. Then the parents were to sit with their child and complete the reading together. Parents were encouraged to help the child when necessary, including with turning pages. Parents also were asked to provide the child with frequent praise and positive feedback. Upon completion of book reading, parents were to stop the audio recorder, turn off the Mp3 player, and return the materials to the large plastic bag that was provided. Then they were to fill out the rest of the fidelity checklist, which asked whether the children listened to the story with the parent, and whether the recorder was turned off after book reading was completed. There was also a space to record the three dates the story was read and the parent’s initials.

Parents were asked to read each book with their child at least three times during the week. Parents were asked to return the audio cassette containing three recordings, the book, Mp3 player, and checklist in the plastic bag every week to receive the next week’s materials. To remind the parents to return the books, the researcher frequently left notes for children to take home and met with parents when they picked up their child at school. If the parent and child had not read the book three times, the researcher asked the parent to finish the three readings and return the materials the following day. Each time the parents returned the materials with the completed checklist for three readings, they received an incentive (ten dollar gift card for a local grocery store).
Testing. Each time the child returned a book to school along with the cassette tape and Mp3 player, the researcher took the child out of the classroom for 5-10 minutes to complete the early literacy measures. Each teacher suggested the preferred time for their students to be removed from class so they did not miss any group instruction. All teachers preferred free play time or center time. One child had to be tested at home during the final three assessment points. The child was removed from the school after multiple suspensions, but the parent agreed to continue participating in the study.

Experimental Conditions

Baseline. During the Baseline phase, parents were asked to listen to a training book one time with their child and audio record the session. This training book allowed children to work on skills that are important for the delivery of the intervention. Children were introduced to the characters, taught how to lift the flaps that relate to the activities, and to actively respond to the narrator. The audio recording allowed the researcher to make sure the equipment was functioning correctly and the parent was able to correctly record the reading session.

During baseline, each child completed a minimum of three testing sessions to establish a trend in the data. Children with relatively low and stable baselines were placed into the first group to begin treatment. Other children remained in baseline until a minimum of two treatment data points had been collected from the first group of children. The third group remained in baseline until a minimum of two treatment data points had been collected from the second group.
**Intervention.** During the intervention phase, each child read a series of six books with embedded interventions. Interventions focused on alphabet knowledge, first sound identification and first sound production. The scope and sequence of the intervention and examples of tasks can be seen in Table 5.

<table>
<thead>
<tr>
<th>Week/Book</th>
<th>Skill/Letters</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Sound Identification / S, G</td>
<td>Which word starts with /s/: sock or mud?</td>
</tr>
<tr>
<td>2</td>
<td>First Sound Identification / B, T</td>
<td>Which word starts with /b/: chair or ball?</td>
</tr>
<tr>
<td>3</td>
<td>First Sound Identification / P, M</td>
<td>Which word starts with /p/: pan or tape?</td>
</tr>
<tr>
<td>4</td>
<td>First Sound Identification / C, D</td>
<td>Which word starts with /k/: cat or bird?</td>
</tr>
<tr>
<td>5</td>
<td>First Sound Production / S, G, B, T</td>
<td>What is the first sound in the word sock?</td>
</tr>
<tr>
<td>6</td>
<td>First Sound Production / P, M, C, D</td>
<td>What is the first sound in the word pan?</td>
</tr>
</tbody>
</table>

The interventions address first sound identification, first sound production, and alphabet knowledge. Alphabet knowledge instruction was used in combination with first sound identification (e.g., *B makes /b/...Which word starts with /b/: light or ball?*) and was taught in the first four books in this condition. Eight consonant letters were chosen (two per book: S/G, B/T, M/P, C/D), based on several factors including high utility, relatively easy pronunciation (e.g., not R), and ease of auditory recognition on audio recordings (e.g., not F). Letters that produce a different sound in Spanish (e.g., J) also were not included. Vowels were not used because of the range of sounds they can produce. In addition to alphabet knowledge (two letters and sounds per book, for a total
of eight letters and sounds), first sound identification was the focus of the first four books in the series. In the first sound identification task, children were asked which word (choice of two) begins with the target sound. The target sounds corresponded with the letters that are being taught in a given week. For example, during an embedded activity, the child may be asked to participate in the following activity:

“Look at the letter B. The letter B says /b/. Pablo knows that the word bed starts with /b/… Now you tell Pablo, which word starts with /b/: moon or boy? (pause) Boy! Boy starts with /b/. Listen, /b/ boy. Let’s sing! Boy starts with /b/, boy starts with /b/. Words are made of lots of sounds, boy starts with /b/. Way to go!”

In the fifth and sixth books, children were asked to produce the first sounds of words. The sounds that the children were asked to produce were the same sounds they learned in the previous four weeks (see Table 5). Also, some of the activities included some modeling and reinforcement to help the children with the task. For example:

“The first sound in bike is /b/…Listen, /b/ bike. Tell Pablo, what is the first sound in the word boy? /b/. Boy starts with /b/…/b/ boy. Nice going! Let’s sing! Boy starts with /b/, boy starts with /b/. Words are made of lots of sounds, boy starts with /b/. Way to go!”
For an example of an embedded lesson, see Appendix C.

**Modeling Scheme**

Each book contained a series of interruptions containing the intervention activities. Each set of intervention activities followed a specific hierarchical pattern of instructional support. There was a great deal of modeling of the activities in the beginning of the book, but by the end of the book the modeling was removed, allowing the children to generate responses on their own. This pattern was consistent in each book. There were three levels of modeling within each book: full model (FM), where the activity was fully demonstrated for the child; partial model (PM), where a similar task was demonstrated for the child prior to the child being asked to do the task; and no model

<table>
<thead>
<tr>
<th>Support level</th>
<th>Intervention modeling scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Model (prior to the start of the story)</td>
<td>Time to help our friend Pablo! Open the blue door. I see Pablo’s map! Point to the map. Pablo knows that the word - map - starts with /m/ . Say mmmmap. (2) Point to the moon. Say mmmoon. (2) The word - moon - starts with /m/. Tell Pablo, which word starts with /m/, moon or sun? (2) Moon. mmmoon! Moon starts with /m/!</td>
</tr>
<tr>
<td>Partial Model 2 (1st and 2nd interventions within the story)</td>
<td>Now open the red door. Remember, moon starts with /m/. mmmoon. Now point to the mouse. Say mmmouse. Tell Pablo, which word starts with /m/? Gum or mouse? (2) mouse. mmmouse. Mouse starts with /m/.</td>
</tr>
<tr>
<td>Partial Model 3 (3rd and 4th interventions within the story)</td>
<td>Now open the blue door. Mop starts with /m/. mmmop. Tell Pablo another word that starts with /m/. Is it kite or match? (2) Match. mmmatch. Match starts with /m/.</td>
</tr>
<tr>
<td>No Model (after the story)</td>
<td>Now open the red door. Tell Pablo, which word starts with /m/? Ball or mud? mmmud. Mud starts with /m/.</td>
</tr>
</tbody>
</table>
(NM), where the child no longer received support prior to his or her response. Within the partial model, modeling was divided into sub-levels PM2 and PM3, with PM3 including less support. Despite the difference in modeling, the amount and style of feedback remained constant throughout the book. See an example of the modeling scheme for each condition in Table 6. Numbers in parentheses indicate pauses in seconds.

Design

To examine the impact of the intervention on children’s phonological awareness skills, both studies employed multiple baseline designs across participants. Three tiers of baselines were included in the design for each study, allowing for three replications of the treatment. When using multiple baseline designs, we have repeated opportunities to predict the pattern of behavior on the basis of baseline observations. For example, based on baseline observations one might find a low rate of correct responding without an upward trajectory. If implementation of intervention results in a higher rate of correct responding and an upward trend, this differs from what one would expect. If this change in the pattern of responding is replicated each time the intervention is implemented in a staggered fashion, one gains confidence that it is indeed the intervention that is responsible for this demonstration of learning.

A strength of this design is that it can be used to measure the effects of an independent variable for which the behavior cannot be reversed. For example, it is not feasible to teach a child a skill (e.g., rhyming) and then remove the independent variable and expect the behavior to be reversed. The multiple baseline design is also flexible and somewhat simplistic. Only two tiers of baselines are needed to show a replication of the
effect (Kennedy, 2005). In addition, participants can serve as their own control in a multiple baseline design (McReynolds & Kearns, 1983). Thus, multiple baseline designs can be used when it is not feasible to have a large number of participants to conduct a randomized control trial. Further, multiple baseline designs allow for examination of data among individual children at several time points during intervention.

Like any design, multiple baseline designs have their weaknesses as well. One weakness is that it is difficult to conduct statistical analyses. Typically, effects generated by the multiple baseline study are judged using visual analysis. Another weakness is that some participants may remain in baseline for an extended period of time. Overall, to examine the effects of an independent variable on the behavior of participants, the multiple baseline design can be useful.

Some threats to internal validity must be considered in any multiple baseline study. The variation in length of baselines helps minimize the threats of maturation and testing. Children are assessed several times during baseline. If progress is made during this time, then experimental control is lost and effects cannot be attributed to the intervention. However, if children demonstrate low and stable baselines and only show gains during treatment, then the effects can be attributed to the treatment. If groups of children show treatment effects after beginning treatment at different points in time, it would demonstrate that children didn’t make gains as a result of some occurrence that happened (e.g., a new classroom teacher, change in weather, etc). In addition, treatment effects that are observed close to the start of treatment appear stronger than delayed effects. External validity can also be a concern for multiple baseline studies. Particularly
when studying a small number of participants from a population (e.g., low-income children with limited literacy skills), it is difficult to generalize treatment effects to the population initially. However, confidence is gained through multiple replications.

In Study 1, two children began baseline at the same time, but started treatment at different times, after a minimum of three baseline points. The third child began baseline later, because he was a new student at school. Treatment for the third child began after the other two children were in treatment for several weeks.

For Study 2, all children began baseline at the same time. The four children began treatment at three different time points. After the first group began receiving treatment, the second group did not receive any treatment until the participants in the first group had a minimum of two treatment data points. During the first two treatment points for group 1, group 2 was held in Baseline. Group 3 was held in baseline until group 2 received a minimum of two treatment points. A multiple probe technique was used for group three at baseline to avoid testing fatigue. Due to delays in treatment (e.g., frequent absences, illnesses), there were several weeks in between the treatment start dates for some participants.

**Data Collection**

Two types of data were collected for each book during intervention: mastery monitoring (MM) data and general outcome measure (GOM) data. Mastery monitoring data measured exactly what was taught during the week of intervention (refer to baseline and progress monitoring measures on pg 23). At each measurement point, the child would be administered different mastery monitoring items that are directly extracted from
the book they read. GOMs are different from the mastery monitoring measures in that GOM data do not indicate mastery of specific items covered in the intervention. Instead, GOMs measure children’s performance related to a skill set (e.g., alliteration). GOMs are designed to be efficient, replicable, and sensitive to growth over a short period of time (Greenwood et al., 2002). For the current study, GOMs included the Alliteration IGDI and the First Sound Fluency measure.

Each child participated in between 9 and 11 testing sessions, including up to 6 testing sessions during the treatment condition. Children’s progress on progress monitoring measures and content-specific Mastery Monitors were assessed after the completion of each book during intervention. Mastery Monitor pretest and posttest were given before and after each book to measure children’s performance on content-specific measures, based on which book they read on a given week. The initial pretest was administered prior to the children reading any intervention books. The proposed schedule for data collection is presented in Table 7. However, parents often took several weeks to

Table 7. Administration Schedule.

<table>
<thead>
<tr>
<th>Prior to Week 1</th>
<th>Week 1 MM pretest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Week 1 MM posttest, Alliteration IGDI, FSF, Week 2 MM pretest</td>
</tr>
<tr>
<td>Week 2</td>
<td>Week 2 MM posttest, Alliteration IGDI, FSF, Week 3 MM pretest</td>
</tr>
<tr>
<td>Week 3</td>
<td>Week 3 MM posttest, Alliteration IGDI, FSF, Week 4 MM pretest</td>
</tr>
<tr>
<td>Week 4</td>
<td>Week 4 MM posttest, Alliteration IGDI, FSF, Week 5 MM pretest</td>
</tr>
<tr>
<td>Week 5</td>
<td>Week 5 MM posttest, Alliteration IGDI, FSF, Week 6 MM pretest</td>
</tr>
<tr>
<td>Week 6</td>
<td>Week 6 MM posttest, Alliteration IGDI, FSF</td>
</tr>
</tbody>
</table>
return books. Despite the proposed schedule of 6 weeks, participants took between 8 and 16 weeks to complete the intervention.

**Data Analysis**

The data for the study were analyzed using visual analysis, which allowed the researcher to examine each child’s progress across time. Progress monitoring was done following the completion of each book, and was graphed in Microsoft Excel. These graphs were analyzed for their trend, slope, and level. These aspects of the graphs were used to compare children’s performances during the baseline and treatment conditions.

**Treatment Fidelity**

Three measures of treatment fidelity were used for this study, including one measure completed by the parent and two measures completed by the researcher. Parents completed the Reading Checklist after each reading session. Parents responded by checking ‘yes’ or ‘no’ for four statements: 1) the audio recorder was turned on, 2) the child has a book, 3) the child listened to the story, and 4) the audio recorder was turned off. To calculate treatment fidelity from this measure, the researcher divided the number of ‘yes’ responses for each question (1-4) by the total number of questions asked. Further examination determined whether treatment fidelity was equal across the three recording days (i.e., were parents more likely to respond ‘yes’ on the 1st reading day, compared to the 3rd reading day?).

The researcher completed the Treatment Fidelity (See appendix D) form after listening to the recorded reading sessions. The researcher indicated whether the reading
was complete, the child was present during the reading, and an adult was present. They also indicated whether other distractions (e.g., radio) can be heard during the reading.

The researcher completed the Responsiveness and Engagement form after the parent recorded the readings. The researcher created separate Responsiveness and Engagement Forms (see Appendix E) for each book. Each time the child was asked to verbally respond during the reading, the researcher indicated if 1) the child provided a correct response, incorrect response, no response, or a response that was not audible, 2) the parent provided any assistance during the intervention including corrective feedback, praise, encouragement, extra instruction, or participation in the activity, and 3) anything noteworthy occurred during the intervention, including self-corrections by the child. To calculate implementation fidelity, the researcher listened to each recording and completed the Responsiveness and Engagement Form. A second scorer listened to 33% of the audio recordings (evenly distributed between first, second, and third reads) for reliability.

**Reliability**

For reliability of assessments, inter-observer agreement (IOA) was calculated for 24% of assessments for Study 1 and 48% of assessments for Study 2. A graduate student observed the administration of assessments live or via digital audio recorder and scored them individually on separate score sheets. At least one assessment was observed for each participant. For Study 1, both scorers agreed on the total number of correct responses on seven of eight administrations (IOA = 88%). For Alliteration IGDI, IOA was 75%, and for FSF, IOA was 100%. For Study 2, IOA was calculated by dividing the
number of agreements by the total number of agreements plus disagreements. IOA across all assessments was 97%. IOA was 96% for Alliteration IGDI and 100% for FSF.

For IOA of treatment fidelity (i.e., child engagement), a secondary scorer listened to 33% of all audio recordings (primary researcher scored 100% of them) and completed separate Responsiveness and Engagement Forms. Child engagement measured how often children responded correctly to the questions and prompts presented by the narrator. On the form, the scorers marked whether the response was correct, incorrect, or no response was given. Reliability was calculated by dividing the number of agreements by the total number of agreements plus disagreements. For Study 1, reliability of child engagement was .95. For Study 2, reliability of child engagement was .94.
Chapter 3: Results

The current study was designed to address two primary research questions: 1) to what extent does the automated intervention improve children’s phonological awareness skills and 2) how reliably were the parents able to implement the automated shared reading intervention at home? A secondary question also was examined: what was the level of child engagement during the intervention?

Intervention Effects for Study 1

Results indicate that all children were able to make clear gains on one or both measures of phonological awareness. After children had low and stable baselines for both measures, only Keisha did not make progress on First Sound Fluency, although she did make progress on Alliteration. Jaimee and Danny made gains on both measures, according to visual inspection of the graphs.

Keisha made no progress on the FSF measure. Although she produced a low and stable baseline, her scores did not increase during treatment. Following a low and stable Baseline, Keisha showed a slightly delayed treatment effect for Alliteration. After two points without visible improvement, her data showed an increase in slope and level. The slightly downward trend during Baseline was reversed during Treatment. Keisha has no data point for book 6, because she moved and was unable to complete the final book.
Figure 1. Study 1 GOM Data.
Figure 2. Study 1 Mastery Monitoring Data.

Note: For books 1-4 (targeting alliteration), Mastery Monitors had 2 choices (chance = 50%). For books 5-6 (targeting first sound production), no choices were available.
Jaimee’s Baseline for Alliteration showed some variation, but only for one point. The data were mostly stable and relatively low. Data showed an immediate increase in slope for Alliteration that continued to increase throughout the treatment phase. Following a low and stable Baseline, she showed a slightly delayed effect for First Sound Fluency (FSF). Her scores on FSF continued to increase throughout the treatment phase.

Danny showed similar patterns for Alliteration and FSF. During baseline, Alliteration data demonstrate a slight downward trend. This was followed by an immediate increase during treatment. After one treatment point, there was a downward trend in the data, followed by a reversal to an upward trend toward the end of the study. Baseline data for FSF were low and stable. During treatment, there was an initial increase in score, followed by a regression to the Baseline score. This was followed by an increase in score toward the end of treatment.

Mastery Monitoring data indicated that children’s scores typically improved from pre- to post-test. Of the 14 data points containing both a pre- and post-test score, children’s scores increased 10 times. Keisha improved from pre- to post-test for every book except book 5, which presents a more difficult skill. In books 1-4, the items include choices for the children’s responses. However, in books 5-6 there are no choices, which makes the task more difficult. Danny has no Mastery Monitoring data for book 4-6 because testing became very stressful for him. The Mastery Monitor was eliminated in order to make testing sessions shorter.
**Intervention Effects for Study 2**

In general, results indicate that children had difficulty making gains on the progress monitoring measures. Only one of the four participants (Steven) made progress on the First Sound Fluency measure. Although Myra made some initial gains during treatment, these gains regressed toward the end of treatment. Two of the four participants, Myra and Steven, showed effects on the Alliteration measure. Two participants (Maria and David) showed no effects for either measure.

**Effects of intervention.** Myra produced a moderate effect for the Alliteration IGDI, including a reversal of the downward trend observed during baseline. Four of her six treatment data points were higher than all Baseline points. During her fourth treatment point, the researcher noted a lack of attention during the testing session. This was her lowest data point during the intervention phase. Since she completed the intervention much earlier than all other participants, a maintenance point was also collected, which indicated that she maintained her high scores on Alliteration. However, she made no progress on the FSF measure.

For Maria, no gains were observed for either measure. Data were fairly stable during baseline, and remained at the same level during the intervention. Most treatment points were below her last two baseline points for FSF. Maria scored zero on FSF at every point in the study. The researcher recorded several notes during testing sessions related to lack of attention during testing. The teacher indicated having similar experiences in the classroom related to lack of attention.
Figure 3. Study 2 GOM Data.
Figure 4. Study 2 Mastery Monitoring Data.

Note: For books 1-4 (targeting alliteration), Mastery Monitors had 2 choices (chance = 50%). For books 5-6 (targeting first sound production), no choices were available.
David also showed no gains on either measure. Other than one point during baseline, his data were very stable throughout baseline and intervention. No increase was observed during treatment for either measure. Similar to Maria, David scored zero on FSF during every point in the study.

Steven showed an immediate increase in Alliteration after treatment began. Baseline data were fairly stable and had a slightly downward trend. During treatment, the level of the data was higher than in baseline. Steven consistently scored between 12 and 16 on Alliteration during treatment, but scored 10 or below during four out of five baseline points. For FSF, during baseline Steven scored zero on four of five points. In treatment, he only scored zero one time, while scoring as high as six on his fifth point.

While children were sometimes able to make gains on the Mastery Monitors from pre- to post-test, results were not as impressive for Study 2 as for Study 1 on this measure. Some children struggled to make gains, and some produced lower scores on the post-test that they did on the pre-test. The largest gains were made by David on book 1 and by Steven on book 2 and 4. David has no Mastery Monitoring data on books 4-6 because testing was done at the child’s home. Time was very limited and several people were present during testing. The Mastery Monitor was eliminated to shorten testing sessions.

**Completing the Intervention – All Participants**

**Completing recordings.** To assess parents’ abilities to administer the intervention, parents were asked to complete a Reading Checklist each time they listened to a book with their child. They were to indicate the date of each reading and whether or
not the audio recorder was turned on, the child had the book, the child listened to the story, and the audio recorder was turned off after the story was finished. Most participants were able to return the majority of books with the Reading Checklist. However, some parents had difficulty returning the checklist with the book.

The researcher completed the Treatment Fidelity Checklist for 100% of recorded reading sessions. Seven participants were scheduled to each complete three readings of six books, for a total of 126 recordings. Overall, 81 (64.3%) of the scheduled recordings were fully complete (i.e., the entire book was recorded), 2 (1.6%) were partially completed, and 43 (34.1%) were not completed.

**Child engagement and parent involvement.** According to results from the Responsiveness and Engagement Form, children responded correctly to 60% of all targets among the completed books. Study 1 children correctly responded to 44% of targets, and Study 2 children correctly responded to 74% of targets. During the first read, children responded correctly to 64% of all targets. During the second read, children responded correctly to 60% of all targets. During the third read, children responded correctly to 53% of all targets. Although the percent of correct responses to targets was fairly high, children did not complete the same number of readings. Of the 18 possible readings, the actual number of recorded readings sessions ranged from 2 (11%; Steven) to 17 (94%; Myra), with an average of about 12 (65%). Jaimee’s mother was very responsive during the readings. However, for the rest of participants, parental responding occurred infrequently. Although a parent could often be heard on the recording, they typically
spoke quietly and generally only helped with encouraging the children to participate in the activity.

**Consumer Satisfaction**

All participants completed the consumer satisfaction survey (Appendix F) upon completion of the intervention. Each item had a scale of one to six, with six indicating they ‘strongly agree’ with the statement and one indicating they ‘strongly disagree.’ Item-level results are presented in Table 8.

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean Score (out of possible 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Book reading is an important aspect of preschool learning.</td>
<td>5.8</td>
</tr>
<tr>
<td>2. In general, the reading activities were appropriate for use with my child at home.</td>
<td>5.7</td>
</tr>
<tr>
<td>3. My child benefited from participating in the reading activities.</td>
<td>5.7</td>
</tr>
<tr>
<td>4. My child enjoyed the reading activities.</td>
<td>5.5</td>
</tr>
<tr>
<td>5. The length of the reading activities was appropriate for my child.</td>
<td>5.7</td>
</tr>
<tr>
<td>6. My child enjoyed listening to the same book three times.</td>
<td>4.2</td>
</tr>
<tr>
<td>7. I was given the necessary audio equipment to conduct the readings at home.</td>
<td>5.7</td>
</tr>
<tr>
<td>8. My child has talked about the reading activities after listening to the story.</td>
<td>5.0</td>
</tr>
<tr>
<td>9. My child needed my help to complete the activities.</td>
<td>3.0</td>
</tr>
<tr>
<td>10. It is possible for parents to complete the reading activities with their child at home.</td>
<td>5.5</td>
</tr>
<tr>
<td>11. The listening center activities fit well into my schedule and did not take too long.</td>
<td>5.2</td>
</tr>
<tr>
<td>12. I would recommend that people do the reading activities with their children.</td>
<td>5.7</td>
</tr>
</tbody>
</table>
Chapter 4: Discussion

The majority of children (5 of 7) benefited from the intervention by showing gains on one or both measures. This demonstrates the potential for an at-home parent-child reading intervention to successfully help at-risk children improve their phonological awareness skills. The ability to discriminate sounds in words, which is measured by the FSF measure, is a more advanced task. Perhaps more exposure and practice with this skill would result in larger gains on the FSF measure. Although five children showed gains, two children failed to make progress on either measure as a result of the intervention.

Several potential reasons exist as to why children struggled to make progress. One reason may be that the children have had limited exposure to phonological awareness instruction. Children’s scores on the phonological awareness subtest of the TOPEL indicate that the two children who struggled to make progress during the intervention had limited skills in this domain. Those children scored nearly two standard deviations below the norm on this measure on average, with both scoring in the bottom 8th percentile. The children who made progress during the intervention produced a range of scores on the TOPEL, from 76 to 101. Phonological awareness is unique to other emergent literacy domains in that domains such as vocabulary and print knowledge consist of learning individual words or rules of language, whereas phonological
awareness requires that children grasp an abstract concept that the sounds of language can be manipulated. Many children struggle to separate the sounds of language from the meaning of language, which makes it difficult for them to perform on tasks where they are asked questions based on sounds (e.g., what is the first sound in the word man?).

Although most parents indicated on the family survey that they read to their child 3 or more times per week prior to participation the study, they were often unable to complete the requested quantity of three readings in a given week. Children experienced events such as birth of siblings, moving, and illnesses that made it difficult to complete readings. Difficulties in getting parents to complete tasks have reported by other studies attempting to intervene in low-income homes as well (Hindin & Paratore 2007; Whitehurst et al., 1994). Low response rates appear to be the norm, rather than the exception, when working with low-SES families.

As researchers, we often underestimate the impact of poverty on people’s lives. Poverty can be distinguished from other variables by the breadth and depth of impact it has on its victims. Poverty is a setting event that impacts all aspects of life, often more than we understand. When conducting research in the home, we often expect that any proposed intervention will be completed with high fidelity, especially when incentives are offered. However, when doing so, we fail to recognize the grave impact of poverty.

People living in poverty struggle to meet their basic necessities – food, shelter, and clothing for all members of their immediate family. Although many people may easily complete the intervention, it may be incredibly difficult for some people to consider the intervention a priority. After all, completion of the intervention does not
contribute to meeting basic needs. Only those who have a firm grip on all their basic needs may be able to freely participate in additional activities. When considering the strain poverty places on families, perhaps it is inappropriate to hold the same expectations for low-SES and high-SES families. A glimpse of the impact of poverty on children’s lives was revealed in many of the children’s experiences during the study.

Children’s Experiences – Study 1

Keisha experienced many difficulties in completing the intervention. Most apparent were poor attendance at school and lack of communication from the parent. Keisha was able to complete five books before moving and no longer attending school. Due to accumulating absences, her place in the school roster was given to another child and she was no longer able to attend school. Some testing was done (e.g., the last treatment point) at her home. However, the situation was not conducive to accurate data collection due to the quantity of people and the noise level in the home. Keisha was fully engaged in most of the readings, responding correctly to 68% of all targets throughout each book that she completed. She completed 78% of reading sessions. Her mother was present and sometimes offered praise, but did not assist her with the questions. Keisha’s mother reported to the researcher that the intervention helped herself as well as her daughter. Thus, it is possible that the parent did not respond to most questions because she was sometimes unsure of the correct response.

Jaimee also had some difficulty in completing the intervention in a timely fashion. Her mother often would not respond to phone calls or emails from the researcher or the classroom teacher. Jaimee’s mother is a single mother with several young children living
in the household. This also made it difficult for her to find time to read the book with Jaimee in a quiet place in the home. Like Keisha, her attendance at school was also poor. However, Jaimee was typically very engaged during the readings. She correctly responded to 69% of all targets and completed 78% of reading sessions. Her mother participated more than all other parents, often encouraging Jaimee to respond and providing some additional instruction after incorrect responses.

Danny had relatively little trouble in completing the intervention in time. Other than one instance where he was not at school for several weeks due to a difficult living situation, he was able to return the majority of books on time. However, engagement during the readings was unusually low for Danny. Also, there was no parental involvement during the readings. Although a parent was present to assist with the recording the readings and ensure he was on the right page, they did not encourage Danny to respond more or help him answer the questions presented during the book. Although 83% of reading sessions were completed, he responded correctly to just 10% of targets across the six books.

**Children’s Experiences – Study 2**

Myra completed each book in the allotted time of one week, while also recording nearly all readings. Myra’s mother was able to correctly complete all forms, including the reading checklist and the consumer satisfaction survey. Myra seemed to have no difficulty completing the intervention, and she responded correctly to 77% of all targets and completed 94% of all reading sessions.
Maria had ongoing struggles with returning the book on time. Some books were at her home for nearly three weeks, which caused delays in testing since the researcher needed to make sure the readings were completed prior to testing. Reminders to return the book were sent home with her mother each week, often several times throughout the week. Telephone reminders were also conducted. On two occasions, the researcher visited the child at her home to exchange the materials. Maria was engaged during the readings, responding correctly to 69% of all targets. However, she only completed 61% of reading sessions.

David was able to return the first three books on time, with no difficulty. However, during the time when he was supposed to return the fourth book, several events happened. First, his mother gave birth to a child, so they were unable to complete the readings. Also, David was not at school for several days during this time. Also during the time when David had the fourth book at home, his family moved to a new house, which delayed completion of the readings. David was also diagnosed with a developmental disability and moved to half days at preschool. This allowed him to visit with a specialist during the afternoons. Finally, David was suspended from school multiple times, and eventually was not allowed to return to school. The researcher contacted the father, who agreed to the child working with the researcher at their home. Materials would also be exchanged at the home. David correctly responded to 77% of all targets but completed just 50% of reading sessions.

Steven had the most difficulty completing the intervention and returning the books on time. Each of the first three books were at his home for at least 2 ½ weeks.
Despite the researcher emailing the mother, sending notes home with the child, sending her reminders via text messages, and even meeting with her in person when she came to pick up Steven at school, the mother was unable to return the materials at a reasonable rate. Even at the request of the teacher, she had difficulty returning the materials. At school, Steven’s teacher often sent home notes to the mother about his behavior, and he was suspended multiple times for repeated behavior issues in the classroom. Steven was engaged during readings, responding correctly to 68% of targets. However, he only completed 11% of the scheduled reading sessions. His mother indicated that he was in fact reading the books, but they were not all recorded.

**Child Experiences and Results**

Six of the seven children who participated had some complications with school, home, or both, which impacted their ability to complete the intervention in a timely fashion. These complications were reported to the researcher by teachers or parents, or were observed directly (e.g., frequent absence from school, poor communication with parent). Only one participant (Myra) had no observable difficulties.

The impact of these complications is difficult to capture, because some children who experienced a great deal of difficulty in completing the intervention were still able to produce marked gains in at least one measure. For example, Keisha, Jaimee and Steven had several experiences that delayed completion of the intervention and made it difficult for them to participate. However, all of these children were able to make clear gains on Alliteration. Further, two of the children (Jaimee and Steven) made gains on First Sound Fluency. Maria and David also had several experiences that impacted their ability to
complete the intervention. Unfortunately, these children were not able to show gains on either measure.

After examining whether children’s performances were impacted by their level of engagement during readings as well as involvement from their parents, results are inconclusive. The children who correctly responded to the highest percentage of targets were Myra and David, each responding correctly to 77% of targets. Myra made gains in Alliteration, but David did not make gains on either measure as a result of the intervention. Danny was mostly nonresponsive during the readings, but he was able to make gains on both measures. The effect of the intervention may be dependent upon not only correct responses but also level of attention during the readings, which cannot be easily measured via audio recordings. Although Danny did not orally respond with correct answers, he may have been very focused during the activities, which allowed him to learn the material.

Only one parent (Jaimee’s mother) showed frequent and meaningful engagement during the readings. In addition to providing praise, Jaimee’s mother also provided corrective feedback and additional instruction when incorrect responses were given. This may have helped Jaimee learn the skills presented in the activities. This example demonstrates the possibility of parental involvement being a key aspect of the at-home intervention. However, other parents demonstrated little verbal participation. Some parents offered praise on occasion, but typically only helped by encouraging the children to respond or did not assist the child during the recording.
Implications of the Current Findings

Five of the seven children who completed the study showed gains on the early literacy measures after beginning the intervention, and three children showed gains in both measures. These results demonstrate the potential of the parent-child intervention to improve the early literacy skills of at-risk children. Such an intervention which is done in the home can help to improve children’s home literacy environments, build children’s confidence in the classroom, and improve their chances of becoming successful readers and successful students in the coming school years. For some children, the everyday preschool curriculum that they experience at school is not enough for them to learn critical skills that are important for their future reading success. However, not all schools have the resources to provide individual children with additional support. Further, many people working in schools might believe that intervening at such a young age is unnecessary. However, previous research suggests intervening early is crucial (Bus et al., 1995). If parents can successfully complete a parent-child intervention in the home, children could have the opportunity to get that extra support that they do not have access to at school.

Unfortunately, the current report suggests that not all parents will be able to complete such an intervention in the home. However, despite the difficulty in completing the intervention, parents indicated on the Consumer Satisfaction survey that their children enjoyed participating in the intervention and benefitted from the intervention. Parents also indicated that the intervention fit into their personal schedules and did not take too long. Some parents wrote additional comments at the end of the survey indicating that the
main problem with completing the intervention was that there were other children in the home, which made it difficult to complete the intervention.

Some parents are more involved in their children’s schoolwork than others. Also, some parents have more time to invest in spending time working on early literacy with their children at home. Parents who feel like early literacy is important may also be more likely to be committed to completing the intervention at home. However, all parents indicated that they felt like reading is an important activity for their children to experience. In summary, the studies present two arguments. The first is that, parent-child early literacy interventions can successfully improve children’s early literacy skills. The second is that, when working with low-income families it may be difficult for parents to find the time to complete the intervention.

Working in schools allows us to see huge differences in children’s performances based on the behavior of the teacher. This includes behavior that occurs during group instruction, small group activities, and one-on-one interactions with the children. In classrooms where children are good listeners, follow directions well, and actively participate in the activities, the teachers are generally positive in their interactions. The teachers often use praise, are authoritative figures, and show interest in how well the children performed during the intervention and testing. In turn, the children in these classrooms often report back to the teacher to let them know they listened well, and the children are interested in getting praise from the teacher. In classrooms where children are poor listeners, show little attention, and do not participate in the activities, teachers
tend to be relatively disengaged and uninterested in receiving daily feedback on their children’s performances.

It is possible that this effect exists between the child and their parent during the at-home intervention. For the most part, parents in this study seemed to be fairly unmotivated to participate in the study with their children. Many parents required a great deal of prompting from the researcher to complete the reading, despite receiving gift cards for participating. Some parents took nearly a month to return books, despite receiving emails, text messages, hand-written notes, and in-person reminders to return them.

With the exception of Jaimee’s mother, most parents did not seem to be closely involved with the activities in the books. It should be noted that a noticeable increase occurred in Jaimee’s engagement when her mother helped her with the activities. However, several other children performed well during the activities, even in the absence of input such as corrective feedback and encouragement from parents. Further, there was no clear relationship between amount of parental involvement or amount of correct child responses during the readings and children’s performances on the early literacy measures. Although the children may not have performed better on the early literacy measures due to parental involvement, children whose parents helped them during the readings may have still gained important experiences such as parent-child bonding, feelings of support, and an increase in parental proximity to and involvement in the child’s literacy experience.
Factors out of their immediate control may influence their involvement in their children’s home literacy experiences. One of the parents in the study was a single mom with three young children at home. This made it difficult for her to find time to read the story in a quiet place. Another child was suspended from the school three different times during the study, and was eventually unable to return to school. The child was evaluated for socio-emotional difficulty and was assigned an IEP and forced to attend half days at a new preschool program. This child’s mother also gave birth to another child during the study, making it difficult for her to complete the readings in a timely fashion. In summary, the home lives of the children enrolled in the study were somewhat chaotic. For the parents, and sometimes the children, reading the story at home was not the first priority. Perhaps it is necessary to intervene in a broader context in order to truly impact the lives of these children.

**Ecological Systems Theory – A broader perspective**

Systems theory posits that the system (i.e., the whole) is greater than the sum of its parts (Bertalanffy, 1968). This is to say that a system is much more complex than just a set of individual parts. A crucial assumption of general systems theory is that individuals functioning as part of a system will behave differently when a change occurs in that system (Bertalanffy, 1968). The parts of a system are related such that a change in one part of a system creates change in all other parts of the system. For example, in a child’s home life, the child may have a system consisting of the parent, the child, and their home. In this system, any change in the child’s behavior will cause a reaction by
the parent, which creates a response in the child. This change impacts the entire system of the household.

As systems theory suggests that all parts of a system influence one another, ecological systems theory adds that in addition to parts of systems being connected, different systems are also interconnected, and change in one system can create change in other systems (Bronfenbrenner, 1977). In this example, the child’s home and the child’s classroom are both Microsystems, including the child and the immediate setting that holds the child. These Microsystems interact with one another to create the child’s mesosystem.

To apply this theory to the child’s literacy experience, a change in the home should cause a change not only in the child and parent, but also in the child’s behavior at school. This can be seen in terms of a negative change (e.g., divorce, moving, verbal or physical abuse) or a positive change (e.g., parent gets a job, birth of a sibling) in the home causing change in behavior at school. For example, a child experiencing the divorce of parents may show signs of anger or confusion at school. This will likely impact the child’s academic performance.

The home environment is very important to children’s literacy development (Payne, Whitehurst, & Angell, 1994). Putting two children with very different home literacy environments in the same classroom with the same instruction may produce different results. A child with a positive home literacy environment will likely be more actively engaged in the instruction taking place in the class. The idea of the current intervention conducted in the home was to create a positive change in the child’s home
literacy environment. This should also create positive changes in the child's behavior at school. For example, if the child receives more early literacy experience at home, he may be more likely to understand instruction in the class and more likely to participate actively in that instruction.

Linkages between the home literacy environment and the classroom literacy environment may influence how the children respond to the input (instruction in the classroom). These linkages may also influence how well the parent is able to implement the intervention. In the current study, the teacher reported that Myra’s mother was very involved in school functions and regularly attended parent-teacher meetings. In this case, there seems to be a strong link between Myra’s home environment and school environment. For Myra, her difficulty seemed to not be related to a poor home literacy environment, but perhaps to other factors that made it difficult for her to make large gains on the literacy measures. For the other children, the home environment (several children in the household, with single parents) and lack of linkages between the home and school seemed to be more influential. These parents had more difficulty returning the materials, and also (according to the teacher) were not as involved in school activities such as parent-teacher meetings.

Although a change in one environment (home) may create change in another environment (class), intervening in only one environment may not always be sufficient for creating meaningful change in the child. Successfully intervening in class when the child has a poor home literacy environment may be difficult. At the same time, intervening at home may be difficult if the child has poor experiences at school. To take
another perspective, creating changes in the home literacy environment may prove difficult if the parent is having problems with the home environment, work environment, or even the school environment. Parent behavior is often influenced by multiple environments. For example, if a parent loses a job, that parent may find it difficult to invest sufficient effort into participating in a reading activity at home. Further, problems occurring at the exosystem or the macrosystem may further increase the difficulty of parent-child intervention conducted in the home.

For the CRTIEC project, we attempt to improve child outcomes by engaging children in literacy activities in the school. We provide them with more opportunities to respond than they would typically receive in a day of classroom instruction. Although we may be drastically increasing the number of opportunities a child has to respond to literacy instruction in a day of preschool, the child still may not fully benefit from the intervention.

Similarly, for the current project, I attempt to improve child outcomes by engaging the child in literacy activities at home. The intervention provides children with several opportunities to respond to literacy activities, although they may not get any such opportunities at home without the intervention. Still, these children often struggle to make progress on early literacy measures.

What Bronfenbrenner’s theory suggests in relation to the CRTIEC study and to the current parent-child intervention study is that intervening at school may not be enough. Similarly, intervening in the home also may not be enough. It is difficult to create change at the exosystem and macrosystem levels. These are changes which
typically require a great amount of time to take place. However, it is much more feasible to intervene at the mesosystem level. Bronfenbrenner often refers to linkages between different settings or systems. Improving children’s home literacy environment in addition to their school literacy environment is one option for creating strong linkages between children’s Microsystems. The school and the home environment are both critical for children’s development, particularly during the early school years. Influencing one environment and neglecting the other may be inconsequential for some children. Rather, a balance of focus on both of these critical systems may be necessary.

Conclusions and Future Research

One goal of this parent-child intervention conducted in the home was to improve the home literacy environment of these children by having the parent and child listen to stories together on a nightly basis. Many children showed improvement on early literacy measures as a result of the intervention. This provides evidence for the potential of parents to help improve their child’s early literacy skills at home with minimal training.

Although the majority of children benefited from the intervention, some children struggled. There were many issues that limited some parents’ abilities to read the stories each night. The children that need the intervention the most—as indicated by their test scores during screening as well as recommendation from teachers—are the children for whom it was most difficult to complete the readings with a parent.

At this point in children’s lives it may be difficult to rely on parents who have very busy schedules and limited time available to complete the intervention activities with their children at home. One possibility is to ask the parents to listen to the stories
when they come to drop their child off or pick their child up at school. Although parents are often in a hurry during these times of the day, it may be more feasible than finding time to read at home. Reading during this time may increase parent-child literacy experiences, but would not directly impact the home literacy environment. Further, although recording the reading sessions did not seem to be problematic for many of the parents, it is possible that if they were not asked to record the reading, asking the parent to simply play the story and let the child read it may be easier for parents to find motivation to do. For the current study, it was necessary to have parents record the reading sessions in order to evaluate child engagement, and to assure the readings were completed. Also, one of the research questions was whether the parent would be able to facilitate the intervention in the home. However, future studies may investigate whether parents can more easily participate with the child at school. For the current study, we must conclude that the intervention was effective for some children, but it was too difficult for some of the parent participants to effectively facilitate the embedded intervention in the home. Perhaps with some adjustments (e.g., strengthening linkages across settings), the intervention has the potential to increase early literacy skills of more struggling children.

My recommendation for future research on the topic would be to intervene both in the classroom and in the home simultaneously, while also building strong connections between parents and teachers who are involved. When parents are conducting intervention in the home it is crucial to have their full support, which often means ensuring they understand the importance of the work as it relates to the child’s future
academic success. Perhaps rather than individual meetings with the researcher and teacher, and the researcher and parents, meetings may be more effective if all three parties are present and if meetings occur at a pre-determined time (e.g., every Monday after school). Encouragement that comes from the teacher as well as the researcher may influence some parents to be more involved in the intervention in the home. This may also increase the chance that the parents will complete the readings on time and return the materials to school.

One way to intervene in the school and in the home may be to send materials home with parents each week (e.g., book, tape, mp3 player) and have the teacher read the same book in the class that week. Doing so may have several purposes. The parent may feel more of a sense of urgency to return the book so the child can receive the next book knowing that the class will move on to the next book. Also the child would have the opportunity to see that the work being done at home is similar to what is happening in school. This may give the child a sense of importance, and also may make them feel like their home life is more connected to school. Children may get the feeling like school is a place to learn, but home is not. Building stronger connections between school and home may make children and parents realize that the home can be a place to learn valuable skills. This may especially be true in homes that have poor literacy environments.
References


National Early Literacy Panel. (2005, December). *Findings from the National Early Literacy Panel: Providing a focus for early language and literacy development*. 76
Presented at the meeting of the National Association for the Education of Young Children, Washington, DC.


Appendix A. Rules for at-home reading.

Completing the at-home readings

This shared-reading intervention is intended to help teach your child some of the most important skills required to learn to read. You will likely find the shared-reading activities to be interesting and helpful for your child and you. We ask that you follow a short list of rules as closely as possible during the readings.

1) Please listen to the story with your child in a place that is as quiet as possible, such as in a bedroom. This will allow your child to concentrate on listening with minimal distractions.

2) Please complete the reading checklist for every reading session that you record (3 per week). This helps us make sure that children receive the intervention in the same way.

3) Any adult caregiver can read with the child, but please have the child read with only one adult at a time for the 3 recorded readings. Siblings can read the book, but this must not happen during the recorded readings. It must be only the participant child and one adult. This allows us to hear only your child's responses.

4) Encourage your child to verbally respond to the interactive activities and questions asked by the narrator. This will allow us to listen to some of your child's responses and monitor their participation.

5) You may help your child follow along with the book, if he or she needs help turning pages or staying focused on the story. However, please do not provide any additional instructions during the activities.

6) Please do not stop the story once it has started, unless there is an emergency or an important situation that requires you to stop the story.

Thank you for participating!!
Appendix B. Reading fidelity checklist.

Reading Checklist

Child’s name ______________________

Please complete this checklist each week for the three book readings. Fill in the ‘Date’ and ‘Parent Initials’ lines, then place a √ in the box under the ‘Yes’ column if the behavior has taken place. Complete #1 and #2 before reading the book, and #3 and #4 after reading the book.

<table>
<thead>
<tr>
<th>Reading day 1</th>
<th>Reading day 2</th>
<th>Reading day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date _________</td>
<td>Date _________</td>
<td>Date _________</td>
</tr>
<tr>
<td>Parent Initials: __________</td>
<td>Parent Initials: __________</td>
<td>Parent Initials: __________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Audio recorder turned off</td>
<td></td>
<td>1. Audio recorder turned off</td>
<td></td>
<td>1. Audio recorder turned off</td>
<td></td>
</tr>
</tbody>
</table>

Notes: ______________________
__________________________
__________________________

Notes: ______________________
__________________________
__________________________

Notes: ______________________
__________________________
__________________________
Appendix C. Sample embedded lesson.

Narrator: (story text) The friends were all going to a carnival today. And Pablo had a map to help them find the way. *chime* Turn the page.

Narrator: Time to help our friend Pablo again! Open the blue door. The word moose starts with /m/. mmmoose. (2) Point to the moon. Say mmmoon. (2) Tell Pablo, which word starts with /m/: bird or moon. (2) Moon. mmmoon! Let’s sing! Moon starts with /m/, moon starts with /m/, words are made of lots of sounds, moon starts with /m/.

Now, open the red door. Mug starts with /m/. mmmug. Tell Pablo which word starts with /m/: mouse or deer. (2) Mouse! Mmmouse!
Appendix D. Treatment fidelity form.

### Treatment Fidelity

**Child’s name** ________________________

**Book:** ________________________  **Read:** 1 2 3

- **Was reading completed?** Fully complete (2)  Partially complete (1)  Not complete (0)
- **Was the child present during reading?** Y / N
- **Was an adult present during reading?** Y / N

**Could any of the following be heard on the recording?**

1) **Other children present** Y / N
2) **Other adult present** Y / N
3) **Television/radio** Y / N

**Was the child:** Fully engaged (2), somewhat engaged (1), or disengaged (0)

**Percent of responses from child (from KS fidelity form):** ________________________
Appendix E. Sample responsiveness and engagement form.
Appendix F. Consumer Satisfaction Survey.

<table>
<thead>
<tr>
<th>Consumer Satisfaction Survey for At-Home Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
</tr>
<tr>
<td>Disagree</td>
</tr>
<tr>
<td>1. Book reading is an important aspect of preschool learning.</td>
</tr>
<tr>
<td>2. In general, the reading activities were appropriate for use with my child at home.</td>
</tr>
<tr>
<td>3. My child benefited from participating in the reading activities.</td>
</tr>
<tr>
<td>4. My child enjoyed the reading activities.</td>
</tr>
<tr>
<td>5. The length of the reading activities was appropriate for my child.</td>
</tr>
<tr>
<td>6. My child enjoyed listening to the same book three times.</td>
</tr>
<tr>
<td>7. I was given the necessary audio equipment to conduct the readings at home.</td>
</tr>
<tr>
<td>8. My child has talked about the reading activities after listening to the story.</td>
</tr>
<tr>
<td>9. My child needed my help to complete the activities.</td>
</tr>
<tr>
<td>10. It is possible for parents to complete the reading activities with their child at home.</td>
</tr>
<tr>
<td>11. The listening center activities fit well into my schedule and did not take too long.</td>
</tr>
<tr>
<td>12. I would recommend that people do the reading activities with their children.</td>
</tr>
</tbody>
</table>

If you could change something about the reading activities to make it better for your child, what would you change?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Did you have any problems completing the reading activities? If yes, please explain.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

What was your or your child’s favorite part of the reading activities?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Other comments:
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________