DOES MEDIUM MATTER? INCREASING PRESCHOOLERS' VOCABULARY DURING SHARED STORYBOOK READING USING ELECTRONIC AND PRINT FORMATS

A thesis presented to the faculty of the Graduate School of Western Carolina University in partial fulfillment of the requirements for the degree of Master of Science in Communication Sciences and Disorders

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ABSTRACT

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VOCABULARY DURING SHARED STORYBOOK READING USING
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The purpose of this study was to examine whether books in a traditional print
format or an electronic format would have a greater impact on novel word learning in
preschool children from low-SES households. A multiple subject design combining an
alternating treatments design and multiple baseline design was chosen for comparing
vocabulary gains among the preschool-age participants. The alternating treatments
design was used to compare two book formats – traditional print storybook and electronic
storybook. Rich vocabulary instruction was implemented during shared storybook
reading to teach 14 words from 7 storybooks available in both formats. Seven words
were chosen to determine the amount of incidental learning that took place. Vocabulary
was measured on a weekly basis, using a decontextualized definition task. Two of the
three children learned approximately half of the words taught through rich instruction.
The third child did not demonstrate any gains in word knowledge. None of the children
learned words through incidental learning. Engagement during book readings was rated
to determine its impact on vocabulary gains, revealing that interest and participation

during electronic books were slightly higher than for print books. Factors such as

multiple exposures to novel words and rich instruction were the most influential in

facilitating vocabulary acquisition. Implications for practitioners are discussed, including

the benefits of rich vocabulary instruction and need for collaboration.

INTRODUCTION

The relationship between vocabulary and young children's literacy skills has been well established by many studies, several dating from the 1940's (Davis, 1944, 1968; Singer 1965; Thurstone, 1946; as cited in Beck & McKeown, 2007). Specifically, a larger vocabulary is strongly correlated to increased reading ability and better school achievement (Ard & Beverly, 2004; Beck, McKeown & Kucan, 2002). Studies have noted that preschool vocabulary is predictive of school success starting in the third grade, particularly for reading comprehension (Baumann & Kameenui, 1991; Becker, 1977; Sénéchal & LeFevre, 2002; Storch & Whitehurst, 2002). The ability to comprehend reading material becomes critical as students advance from the learning-to-read stage to the reading-to-learn stage in school. As the volume of reading material increases for students, they also must master larger numbers of new words (Anderson & Nagy, 1991). Ouellette (2006) argued that vocabulary also is important for word decoding. Undoubtedly, vocabulary is a critical skill for reading success, thus learning must be established early. However, some children lack the life experiences and environments that positively contribute to vocabulary gains in the early years. Becker (1977) was one of the first to observe that vocabulary deficiency was the single most important factor that limited children from low socioeconomic status (SES) households from attaining reading and academic success.

Hart and Risley (1995) produced a seminal work measuring vocabulary levels based on socioeconomic class that is often cited. The authors noted a marked gap in

vocabulary knowledge in children from low-SES households compared to peers in higher SES households. Although very young children under the age of three typically acquire a majority of new words through incidental learning (Beck & McKeown, 2007; Brabham & Villaume, 2002; Lane & Allen, 2010), the paucity of low-SES mothers' verbal interactions with their children lessens the probability that this type of learning will take place (Hart & Risley, 1995; Hoff, 2003). Additionally, the vocabulary used by low-SES mothers rarely includes those beyond the 3,000 most common words (Weizman & Snow, 2001), which indicates that incidental learning does not provide enough opportunities to learn the sophisticated words that children over the age of three from low-SES homes need for reading and school success (Beck, McKeown & Kucan, 2002; Lane & Allen, 2010). Hart and Risley (1995) stated that by the time children were 3 years old, those coming from low-SES families had cumulative vocabularies of approximately 500 words compared to over 1100 words in peers from high-income families. In order to successfully narrow the vocabulary gap, several authors advocate beginning vocabulary instruction before children begin formal schooling, such as in preschool (Beck & McKeown, 2007; Hart & Risley, 1995; Lane & Allen, 2010; Pollard-Durodola et al., 2011; Sinatra, 2008; and Wasik, 2010). This early instruction is especially relevant and critical for those children coming from low-SES households (Coyne, Simmons, Kameenui & Stoolmiller, 2004).

In order to mediate the effects of poverty on vocabulary, the early instruction for children from low-SES households should include an explicit method of teaching vocabulary (Cabell, Justice, Konold & McGinty, 2011; Loftus, Coyne, McCoach, Zipoli & Pullen, 2010; Pollard-Durodola et al., 2011; Wasik, 2010). One model that is

recommended for teaching vocabulary is termed *rich instruction*. The term rich

instruction was first coined by Beck and McKeown (2007) to describe a method of

teaching vocabulary in which new words were given definitions in child-friendly

language, multiple examples of word use were demonstrated in multiple contexts, and

children were given opportunities to use these new words to further enhance their lexical

processing. In their study, the authors found that children explicit instruction in

vocabulary resulted in significant gains in word knowledge in young children.

Identifying which vocabulary words to teach was explained in an earlier work by Beck,

McKeown and Kucan (2002). The authors developed a three tier system that classified

words based on the level of use by adult speakers. Tier I words are basic words such as

cake, *run*, and *mad*. These words do not usually present a need for clarification or

definition for preschoolers. The third tier consists of words that are advanced, but their

usage is infrequent and are "limited to a specific domain" (p.8), such as *telescope*, *zenith*,

or *parabola*. Tier II words are also considered advanced as they are used by mature

speakers, but they also occur frequently and throughout different contexts. These are

words such as "*coincidence*, *absurd*, and *fortunate*" (p.8).

Researchers have found that explicit instruction in vocabulary can easily be

embedded into a common activity used with young children – shared storybook reading.

In fact, shared book reading alone has been found to result in gains in expressive

language. For instance, Whitehurst and colleagues (1988) developed an approach they

termed *dialogic reading* in which adults ask children open-ended questions about a story

or ask them to describe the pictures in a book; the children's responses are then

expanded. Their study trained middle- to high-SES mothers in this technique and

measured grammatical complexity in their two-year old children after using dialogic reading for two weeks. The results of this study and others using dialogic reading (Arnold, Lonigan, Whitehurst & Epstein, 1994; Lonigan & Whitehurst, 1998; Hargrave & Sénéchal, 2000) showed significant gains in preschoolers' expressive language ability. The importance of shared storybook reading was underscored by Stevenson and Fredman (1990), who stated that the frequency with which preschool children were read to was predictive of reading, spelling and IQ scores in thirteen-year-olds.

Other researchers have added the additional component of rich vocabulary instruction into shared storybook reading. For example, Wasik and Bond (2001) called their method *interactive book reading*, in which they used props and extension activities in order to provide additional contexts for encountering new words. Their study trained teachers of low-SES preschoolers to use additional activities beyond book reading to provide multiple exposures to novel vocabulary in other meaningful contexts. The results showed that the use of props and extension activities increased children's vocabulary more than book reading alone. Several researchers have concluded that shared storybook reading between an adult and child provides the mechanism in which children can be exposed to and taught new, sophisticated vocabulary words (Beauchat, Blamey & Walpole, 2009; Justice & Kaderavek, 2002; Mol & Bus, 2011; and Sinatra, 2008). What is important to understand about shared storybook reading is that it is the teacher's, parent's, or other adult's intentional approach to interaction, as well as children's active participation in shared book reading that facilitates their vocabulary learning (Brabham & Villaume, 2002; Lane & Allen, 2010; Sinatra, 2008; Wasik, 2010).

Walsh and Blewitt (2006) demonstrated the importance of adult interaction during shared book reading in facilitating vocabulary acquisition. These researchers asked three-year-old preschoolers both vocabulary-eliciting questions (questions that required children to produce the novel word) and non-eliciting questions (those that used the novel word within the question) during shared book reading sessions. The children demonstrated receptive/expressive vocabulary gains regardless of questioning style when compared to a control group, leading the authors to conclude that it was the interactive engagement that facilitated new word learning. A follow-up study by Walsh and Rose (2013) that utilized the same questioning styles with preschoolers in a Head Start program demonstrated similar results, with non-eliciting questions promoting slightly greater receptive vocabulary gains. In a similar study that looked at questioning style, Blewitt, Rump, Shealy and Cook (2009) looked at the cognitive load of questions on children's vocabulary gains. This study examined word learning in two conditions - one in which either low or high demand questions were asked during shared book reading and one in which the cognitive load of questions was increased over time. These authors found that children made greater gains in vocabulary when questions shifted from less to more demanding over time, demonstrating the benefits of scaffolded instruction.

What can be gleaned from these studies is that there are several important components of *rich instruction* that positively impact children's word learning. These include the use of books containing the sophisticated language demonstrated by adults, selecting words that can be defined in a child-friendly manner, talking about the words and their definitions within book reading, and providing multiple opportunities to encounter the new word in different contexts. Ard and Beverly (2004) looked at whether

typically developing preschoolers learned nonsense words when adults used comments, questions, or both to refer to unnamed referents in a story. Large effect sizes were demonstrated for all reading conditions compared to the control group, although comments were seen as more beneficial to new word learning. Justice, Meier and Walpole (2005) used a rich instruction approach to teach new vocabulary words during shared storybook reading to at-risk kindergartners. The new vocabulary words were defined and then used in a different sentence to clarify their meaning. The authors also looked at whether words were learned through incidental exposure over repeated readings. While the children did not exhibit notable gains for incidental words, significant gains were made for words in the rich instruction condition when compared to a control group. Pollard-Durodola and colleagues (2011) designed a curriculum of instruction using a thematic concept in shared storybook reading. The authors used rich instruction components with both storybooks and informational texts to teach new vocabulary centered around a theme such as water in its various states (e.g., rain and snow). Vocabulary was introduced and explored in both genres, teachers and students engaged in concept discussion before, during, and after reading, and scaffolding was used in the instructional design. The preschoolers in this study were considered at risk for vocabulary delay, yet made significant gains on researcher-developed vocabulary measures. As one can observe, there is a great deal of research that supports the use of shared storybook reading to increase vocabulary (Ard & Beverly, 2004; Hargrave & Sénéchal, 2000; Justice, Meier & Walpole, 2005; Pollard-Durodola et al., 2011; Walsh & Blewitt, 2006; Walsh & Rose, 2013; Wasik & Bond, 2001).

In regards to the types of books chosen for shared storybook reading, trade storybooks are the sources most often used in research studies and advocated by researchers for teaching advanced vocabulary to preschoolers (Beauchat, Blamey & Walpole, 2009; Hargrave & Sénéchal, 2000; McGee & Schickedanz, 2007; Whitehurst & Lonigan, 1998). These books are readily available in libraries and bookstores, are filled with the types of story characters, plots, and illustrations that are of interest to young children and many contain the type of advanced vocabulary designated as Tier II.

Until recently, children's storybooks were only available in print. Today, many children's storybooks have become available in electronic format, designed for use with desktop computers, tablet computers and smart phones. As demand for technology increases its affordability for the average consumer, more and more children are becoming familiar and comfortable with digital media, at increasingly younger ages (Anand & Krosnick, 2005; Davidson, 2009). Prensky (2001) first used the term "digital natives" to describe children who have grown up in a world dominated by technology. The earliest childrens books available in an electronic format were those in which the software was embedded within the pages of a special stand-alone book that required an attached stylus to activate the features and books on CD-ROM that ran on stationary computers. These formats were available commercially and through subscription programs. As advances in technology have increased portability, electronic books have also evolved to where a tangible mode of delivery is no longer necessary and these books can be downloaded to any type of computer.

Many studies using electronic books have focused on whether these books facilitate learning new vocabulary. Higgins and Cocks (1999) studied whether the

animation features of a CD-ROM book solely facilitated vocabulary acquisition in third-grade children. While the authors report positive results (an average gain from 1.27 pretest to 4.73 posttest in words learned out of a possible 6), they also postulated that greater gains could have been made with adult interaction. Higgins and Hess (1999) used the same CD-ROM book to examine vocabulary acquisition when the children used either an animation feature of the electronic book or were provided adult instruction if they could not ascertain a word's meaning from the animation. This study also showed gains in vocabulary, with greater gains in the adult interaction condition. Recent studies by Israeli and Dutch researchers examined the effectiveness of CD-ROM electronic books on measures of vocabulary as well as other emergent literacy skills. The Israeli studies made use of researcher-developed electronic books based on print versions, which also included a dictionary feature. These studies utilized the electronic book to read the story and the children used the dictionary feature to define unfamiliar words, but rich instruction was not provided either in this condition or when an adult read the print version of the same book (Korat, 2010; Korat & Shamir, 2012; Shamir, Korat & Fellah, 2010; Shamir, Korat & Shlafer, 2011). These studies all reported greater gains in vocabulary in the electronic book conditions. In Korat and Shamir (2007), the researchers provided children in the print book condition definitions for new words, although not in the electronic condition. This study reported similar gains for both electronic and print groups in vocabulary. Segers, Takke and Verhoeven (2004) examined the difference in vocabulary acquisition when kindergarten children listened to a story either read by an electronic book or by their teacher, but without the use of rich instruction in either condition. This study also showed similar gains for the electronic

and print groups. However, it is interesting to note that the study included non-native speakers. For these children, greater gains in vocabulary were made when books were read to them by their teacher. The nonverbal cues, adaptations, and occasional explanations provided by teachers when they saw these children struggling with meaning acted as additional supports for learning. In a similar study, Silverman and Hines (2009) looked at the effects of multimedia-enhanced instruction on vocabulary acquisition in English-language learners (ELL). These multimedia presentations incorporated many of the features found in electronic books (e.g., animation, text, and voice-overs). The researchers used rich instruction and found that ELL children made greater gains in the multimedia-enhanced instructional condition. They concluded that the multimedia-enhanced instruction served as additional scaffolding for these students.

Although positive effects for learning new vocabulary with electronic books was seen in all of the studies using electronic books discussed thus far, there exists no study to date that compares electronic and print books when rich vocabulary instruction is included in both conditions. This is significant given the importance of rich instruction by an adult suggested by researchers on print books. Segal-Drori, Korat, Shamir and Klein (2009) investigated whether electronic books and printed books read with and without adult interaction impacted children's phonological awareness, print awareness, and word reading abilities. Their study showed that the adult interaction was the key factor in the gains shown in post-test measures of these abilities. Wood, Pillinger and Jackson (2010) studied the different types of interactions children had on their own with electronic books or with adults using the print versions. Children who had adult support not only engaged those adults in dialogue about the books, but developed changes in their

reading strategies. Those children read at a more proficient reading level. These findings echo the point emphasized earlier in the discussion of rich instruction that the key to greater gains in learning are the result of adults' intentional interaction and instruction.

Several studies have examined the role that electronic books may play in the lives of those children who come from low-SES households (Korat & Shamir, 2007; Pearman & Chang, 2010; Shamir, 2009; Van Dijken, Bus & de Jong, 2011; Verhallen & Bus, 2010). These studies looked at the different features of electronic books and their impact on literacy skills. One feature that electronic books provide is that of choosing to have the story read. This can be of benefit to caregivers in lower SES households who, for reasons such as lack of time, fatigue or their own level of literacy, may not frequently read to their children (Pearman & Chang, 2010; Van Dijken, Bus & de Jong, 2011). Additionally, the availability of electronic books from local public libraries allows families to download many titles without having to purchase the book. However, Van Dijken, Bus and de Jong (2011) also inform us that while low-SES households may have access to electronic books, they may not necessarily seek them out.

There are currently few studies that include information about children's vocabulary development and newer forms of technology for electronic books such as dedicated e-readers (such as the Amazon Kindle, the Barnes and Noble Nook, and the Sony e-Reader) and tablet computers (such as the Apple iPad and the Samsung Galaxy). Most studies using electronic books with children feature older forms of electronic books such as CD-ROM or those available on internet websites (Jones & Brown, 2011; Korat, 2010; Korat & Shamir, 2012; Moody, Justice & Cabell, 2010; Pearman & Chang, 2010; Segal-Drori, Korat, Shamir & Klein, 2010; Shamir, 2009; Shamir, Korat & Fellah, 2012;

Shamir, Korat & Shlafer, 2011; Verhallen & Bus, 2010). The books in these studies were run on desktop computers using a mouse for navigation. What makes the newer technology stand out is the portability of the devices. Books can be downloaded for a fee or available free of charge from most libraries. The smaller size and lighter weight, and the ability to have many books stored on these devices increases the opportunities and accessibility of books to young children.

A recent study by Scholastic (2013) showed that not only do children enjoy digital reading, but that half of the children stated they would read more if they had access to books on a portable electronic device. Maynard (2010) looked at several of these newer portable devices to determine which children preferred, and found the preference to be the one with the largest screen size. Some electronic books have interactive features such as hotspots that when touched cause character movement or sound effects. Other books may highlight text as it is read by a narrator, so that children associate the visual form of a word with its auditory component, providing a type of "digital scaffold" (Zucker, Moody & McKenna, 2009; p.51). These types of features may be easier to use with the larger screen sizes of proprietary e-readers and tablet computers. They also create a more engaging experience with books, and could potentially encourage children to reach for books more often.

Few studies, however, have examined the impact of technology on preschool children. Most studies have focused on school-age children, perhaps because in many places, multi-media use is only available once children enter elementary school. Preschoolers are still mainly exposed to paper-based literacy materials. However, as traditional print mediums such as newspapers, magazines and books are quickly

disappearing and digital mediums become more pervasive, researchers must examine whether the engaging medium of technology is as effective as the traditional storybook in facilitating young children's learning when both conditions contain an interactive adult intentionally teaching these youngsters.

Purpose of This Study

Given the importance of rich instruction and the increasing presence of digital media and portable devices, the present study examines the intersection of these variables upon low-SES preschooler's learning of novel words during shared book reading. Of interest to this investigation is the effect that the newer forms of technology have on the acquisition and retention of vocabulary in these "digital natives" (Prensky, 2001, p.2). There are several research questions that this study aimed to address.

- First, would novel word learning in low-SES preschool children be better facilitated as a function of storybook medium when provided with rich instruction?

- Second, would retention of new vocabulary words be based on the medium in which they were explicitly taught?

- Lastly, would vocabulary growth occur as a function of engagement with a particular medium?

METHOD

Participants

The researcher contacted a local preschool in the Webster district of Jackson County, North Carolina, for inclusion in the study. The director and two preschool classroom teachers were informed of the purpose of the study as well as the inclusion criteria, which included children:

- Between the ages of four and five years

- At risk for or exhibiting a language impairment, based on teacher perception, and

- With hearing and vision within normal limits

The teachers were asked to identify potential participants based on their knowledge of children in their classrooms and their families. Five children were selected by the teachers for inclusion in the study. Letters describing the study were sent home by the teachers, resulting in four families agreeing to participate in the study.

Three of these four children were from low-SES households and used subsidy vouchers for the preschool program. SES, based on annual salary, was determined using 2013 federal poverty guidelines. Written permission to access school records for demographic purposes was obtained from each participating family; school records provided information on children's birthdates, vision screening results, and family monthly income. An assessment battery was completed to gain information on the children's general receptive and expressive vocabulary and overall language, as well as cognitive ability. These measures were not used as determining criteria for inclusion, but

rather to better describe each child's abilities. Teacher referral was the only method used

for determining inclusion. The assessments included the following:

- *Preschool Language Scales, Fifth Edition* (PLS-5; Zimmerman, Steiner, & Pond,

  2011)

- *Peabody Picture Vocabulary Test, Fourth Edition* (PPVT-4; Dunn & Dunn, 2007)

- *Expressive Vocabulary Test, Second Edition* (EVT-2; Williams, 2007)

- *Developmental Assessment of Young Children, Second Edition* (DAYC; Voress &

  Maddox, 1998), cognitive subtest

- Hearing screening

Hearing screenings were conducted by the researcher on all the children as their school

records did not include this information. The screenings revealed hearing within

functional limits for all the children. Table 1 displays demographic data for the preschool

children in the study. Child 3 was released from the study in early February due to four

absences during the baseline period, leaving only three participants who completed the

study.

Table 1

Demographic Data for Study Participants

Child	Age	Race	Gender	SES	PLS-5	PPVT-4	EVT-2	DAYC
Child 1	5.1	White	M	Low	96	113	104	85
Child 2	4.4	White	F	Low	118	119	104	84
Child 3	4.7	White	F	Mid	118	124	116	82
Child 4	4.1	Hispanic	F	Low	81	85	90	85

Note. Reported standard score values for all assessment instruments are based on a mean of 100 and a standard deviation of 15. PLS-5 = Preschool Language Scale, 5th Edition; PPVT-4 = Peabody Picture Vocabulary Test, 4th Edition; EVT-2 = Expressive Vocabulary Test, 2nd Edition; DAYC = Developmental Assessment of Young Children, 2nd Edition (cognitive subtest only).

Materials and Setting

The books chosen for this study were those that were marketed for the preschool age group and available in both electronic and traditional print formats. An iPad tablet computer was chosen over proprietary e-readers primarily due to its ease of use, larger size (5-3/4 in. by 7-3/4 in. screen) and ability to render electronic books in color. Seven books were chosen based on whether there was a complete story that was told and whether multiple instances of Tier II vocabulary words (Beck, McKeown & Kucan, 2002) were used throughout the text. These books were as follows:

- *How Rocket Learned to Read* (Hills, 2010)

- *Tacky the Penguin* (Lester, 1988)

- *Elmer's Special Day* (McKee, 2009)

- *Elmer and Rose* (McKee, 2010)

- *The Bremen Town Musicians* (Plume, 1980)

- *Curious George* (Rey, 1998 version)

- *Jumanji* (Van Allsburg, 1981)

In *The Bremen Town Musicians*, the text in the traditional print format (from the original Brothers Grimm; retold by Plume, 1980) was replaced with the text in the electronic book format because of discrepancies between the two texts. The discrepancies may be due to different translations of the original version. The electronic book was not available from the same publisher as the traditional print format.

From the books listed above, a total of 14 target words (2 per book) were chosen for rich instruction purposes. The words were chosen based on four factors, including their use by mature speakers, their use as nouns, verbs, or adjectives, their having four syllables or less, and their likelihood of not being familiar to the children. In most instances, the books satisfied all of these criteria. However in some books, Tier II target words were substituted for their Tier I counterparts within the text. For example, in *Curious George* (Rey, 1998 version), the word *reside* was used instead of the word *live*. Target words that had a homophone or that had multiple meanings were included to teach. The meaning of the word as it was used in the text was explicitly taught. Additionally, seven words (one from each book) were chosen to examine incidental learning. These words were not included in the rich instruction procedures; instead, children were exposed to the words only during the storybook text. These words were included in the weekly vocabulary assessment. The words chosen from each book are shown in Table 2.

Table 2

Vocabulary Words by Book

Book	Tier II Word 1	Tier II Word 2	Incidental Word
The Bremen Town Musicians	Journey (n)	Feast (n)	Continue (v)
How Rocket Learned to Read	Student (n)	Appeared (v)	Declared(v)
Tacky the Penguin	Greet (v)	Companions (n)	Odd (a)
Elmer's Special Day	Racket (n)	Ordinary (a)	Decorate (v)
Elmer and Rose	Herd (n)	Unique (a)	Blush (v)
Curious George	Reside (v)	Obedient (a)	Curious (a)
Jumanji	Guests (n)	Instructions (n)	Adventure (n)

Note. (n) = noun, (v) = verb, (a) = adjective.

Although the exact number of times a word and its definition must be heard and produced by children in order to learn a word has not been established, the present study aimed for a minimum number of 10 exposures per word per book reading. Stickers were presented to the children after each weekly vocabulary measure, as well as at the end of each reading session. All reading and testing sessions took place in a quiet room within the school.

Experimental Design

A single subject design combining an alternating treatments design and a multiple baseline design was chosen for comparing vocabulary gains among the preschool-age participants. The alternating treatments design was used to compare two book formats – traditional print storybook and electronic storybook. Additionally, although all children

were read the same books, counterbalancing was achieved by alternating the storybook medium and the order in which books were presented for each child. For example, Child 1 was first read *Elmer's Special Day* (McKee, 2009) in print format, followed by *Tacky the Penguin* (Lester, 1988) in electronic format, then *Elmer and Rose* (McKee, 2010) in print format, and so forth; Child 2 was first read *Elmer and Rose* (McKee, 2010) in electronic format, followed by *How Rocket Learned to Read* (Hills, 2010) in print format, and so forth; Child 4 was first read *The Bremen Town Musicians* (Plume, 1980) in print format, followed by *Elmer's Special Day* (McKee, 2009) in electronic format, and so on until all books were read.

The multiple baseline design was represented across subjects as well as across books. This allowed the researcher to examine, in general, the effects of the rich vocabulary instruction during book reading and to determine if changes in children's word knowledge were associated with the instruction. The multiple baseline design included a baseline phase to measure children's vocabulary knowledge, using a comprehensive pretest of vocabulary words that would be taught or could be incidentally learned through the instruction during the storybook reading. Initiating intervention for each weekly book in a staggered fashion enabled one to observe the effects of rich instruction on each set of words.

A variation (Crawford, 2006) of a visual task analysis (Haring & Kennedy, 1988) was used to examine the effects of intervention. Task analysis grids allowed the researcher to examine the children's performance on the weekly vocabulary assessments and display vocabulary knowledge gained. For each book, there are a series of 3x1 grids, with three words represented by three columns and performance on the decontextualized

vocabulary task represented by one row. In addition, the multiple baseline design is depicted using a filled vertical bar corresponding to the initiation of intervention.

Experimental Conditions and Procedures

Baseline. Children were tested by the researcher at baseline for prior knowledge of all 21 words before the readings began. Using a researcher-developed measure, the children were asked open-ended questions in the form of "What does *(target word)* mean?" or "Tell me everything you know about what a *(target word)* is" as a measure of decontextualized knowledge of all 21 vocabulary words.   Prompts such as "Tell me more about that" or "What's another word for _____?" were used when the participant gave a partial or incomplete response. This vocabulary measure was based on four stages of vocabulary knowledge categorized by Dale (1965): in Stage 1, children express no knowledge of a word; in Stage 2, children have heard the word before, but do not know what it means; in Stage 3, children only recognize a word if it is used in context; in Stage 4, children can express full knowledge of a word without the benefit of context. Knowledge at the Stage 4, or decontextualized, level implies a deep understanding of the word since there is no reliance on contextual information, such as pictures, in conveying the meaning.

Intervention. After the baseline assessment was completed, the researcher read one book each week during one-on-one sessions between the researcher and each child. Each book was read twice in one week. Given that children learn vocabulary best when provided rich instruction during interactions with an adult, the researcher incorporated a variety of components into each book reading. Each targeted word was emphasized

during the reading with a definition, presented in multiple contexts and reviewed after the story was finished.   Additionally, word-related comments and questions were utilized. Each target word, including those taught using rich instruction and incidental, appeared in the text at least three times. Children were then given at least 10 exposures (not including the end review) for each target word using the script components developed by Crawford (2006) as shown in Table 3.

Children were encouraged to interact with the books in both print and electronic formats. Children were placed in charge of turning pages in the print books and turning pages and touching the hotspots in the interactive electronic books. When read the electronic books, children were instructed not to look for hotspots on a page until after that page was read.

Table 3

Script Components. (Crawford, 2006).

Script Component	Example
1. Name and point to picture representing word.	This is Sheila Rae's *sibling* (while pointing to the sister).
2. Ask child to point to picture representing target word.	Point to Sheila Rae's *sibling*.
3. Ask child to say target word.	Say *sibling*.
4. Provide an explanation of the target word.	*Sibling* is another word for a brother or sister.
5. Make a comment with target word.	You have *siblings*.
6. Ask a question with the target word.	Who are your *siblings*?
7. Use the cloze procedure to elicit word from child.	Yes, Lance and Stephanie are your _____.
8. Ask child to explain meaning of word.	What is a *sibling*?
9. Verify meaning of the word.	Yes, a *sibling* is a brother or sister.
10. Provide definition and ask child for target word.	What is another name for a brother or sister?
11. End review.	Let's look at this picture one more time. This is Sheila Rae's _____. What is a *sibling*? Yes, that's right, a *sibling* is a brother or sister.

Dependent Measures and Data Collection

Vocabulary knowledge related to the target words was measured each week

through the researcher-developed assessment, a decontextualized definition task. This

task served as a pretest for words not introduced in books yet, a posttest for words targeted during the current week, and a maintenance test of words previously taught. Additionally, each child's level of engagement during the storybooks was measured.

  Vocabulary. As previously discussed, children's knowledge of words was assessed through a decontextualized definition task. Child responses were scored using a protocol developed by Justice, Meier, and Walpole (2005) as shown in Table 4. A response indicating partial knowledge of a word was given a score of 1 and complete knowledge of the word was given a score of 2. An incorrect response was given a score of 0.

Table 4

Word Knowledge Scoring (Adapted from Justice, Meier & Walpole, 2005).

Point	Criterion	Examples
0	*No Knowledge*	
	• No response	
	• Response of 'I don't know' or shrug of shoulders	
	• Inappropriate definition	• *When you're playing outside* (for the target word *danger*)
	• Definition of homophone	• *You brush the hair on your head* (for the target word *hare*)
1	*Incomplete Knowledge*	
	• Vague, imprecise, or partial definition	• *Like a tree* (for the target word *branch*)
	• Example of word in context (but does not define meaning)	• *If you put something in your mouth, you will get sick.* (for the target word *danger*)
	• A description with *1* example or attribute of the word or item/person/object within word category	• *A fly* (for the target word *insect*) • *Cake* (for the target word *dessert*)
2	*Complete Knowledge*	
	• Complete and precise definition	• *That's like a party.* (for the target word *celebration*)
	• Unambiguous synonym alone or used in context which defines meaning	• *Clifford the big red dog.* (for the target word *canine*)
	• A description with *more than 1* example or attribute of the word or item/person/object within word category	• *Cookies, cake, pie* (for the target word *dessert*) • *Fly, insect, ladybug* (for the target word *insect*)

During the assessment, for words that had multiple meanings (i.e., homophones),

if the child knew only the homophone or another meaning, this was considered an

incorrect response. If the homophone was given, children were then given a prompt in the form of "What else could *(target word)* mean?" to determine if they could give the definition as used in the text. For example, one of the words chosen for rich instruction was *herd*. If the child responded with a definition for the word *heard*, the prompt for a different meaning would be given. Because the desired definition was for the target word as it was used in the storybook, a full knowledge score (two points) was awarded only when that definition was given. Any other definition, even if a correctly defined homophone, was awarded zero points for no knowledge after prompting. For subsequent vocabulary testing after reading, children also were required to give the definition provided for the target word as it was used in the text in order to receive a score higher than zero (no knowledge). If the child responded with the homophone or other meaning, he/she would again be prompted with "What else could *(target word)* mean?" If the child responded only with the homophone or other meaning, zero points were given for no knowledge of the word.

The 21 vocabulary words were tested after the reading on the second day in the week for each book following a short play break. One week after all participants had finished all storybook readings, the researcher administered the vocabulary assessment once more to determine if the learned vocabulary words were retained.

Each reading session was videotaped, allowing the researcher to view each session independently and tabulate factors that may have impacted vocabulary learning, such as number of times a target word was produced or defined by the reader and by the child. These tabulations generated data for each child, each story, and each book format.

This data was cross-referenced to the number of words learned per book in the weekly

measure and overall in the maintenance measure for analysis.

   Engagement. The reading sessions also were examined and separately scored for

evidence of participant engagement (Moody, Justice & Cabell, 2010; Ponitz, Rimm-

Kaufman, Grimm & Curby, 2009). Previous research has revealed that young children

need to be actively engaged in the learning process to get the most out of their

experiences (Jones & Brown, 2011; Justice & Kaderavek, 2002; Ponnitz & Rimm-

Kaufman, 2011; Ponitz, Rimm-Kaufman, Grimm & Curby, 2009; Underwood &

Underwood, 1998). Fritjers et al., (2000) correlated preschooler's reading engagement

with both short- and long-term outcomes in reading and Justice, Chow, Capellini,

Flanigan and Colton (2003) demonstrated that it predicted gains within emergent literacy

interventions. Engagement behaviors such as attention are not only important for literacy

gains, but are needed for success within the confines of the structured settings of the

elementary school system (McClelland, Morrison & Holmes, 2000).

   Many researchers, however, are in disagreement as to the behaviors that define

engagement. In a study by Moody, Justice and Cabell (2010), engagement was measured

based on persistence, enthusiasm and compliance using a 7-point scale. Ponitz, Rimm-

Kaufman, Grimm and Curby (2009) looked at attention and completion of tasks,

following directions, persistence with difficult tasks, and self-control for their measures.

These were also rated using a 7-point scale. Moschovaki, Meadows and Pellegrini

(2007) based their measurements on children's comments and paralinguistic cues.

Regardless of the measure used, all of these studies relied on the subjective impressions

of observers. In contrast, Jones and Brown (2011) looked at engagement as a

combination of reader enjoyment and reading comprehension. Ponitz and Rimm-Kaufman (2011) looked only at attention and execution of tasks as determiners of engagement. The authors did not use a rating scale in their study, instead focusing on the level of involvement (active, passive, not involved). The amount of time spent in each condition was used as a unit measure.

Engagement in the present study was defined as level of interest and level of participation and both were measured by looking at three specific behaviors in each area during the book readings (Ponitz & Rimm-Kaufman, 2011). A 5-point Likert scale was used to rate each behavior in each area. Table 5 lists the behaviors examined for each area; Table 6 displays the Likert scale used to rate each behavior. Additionally, the overall level of engagement for each child during each book reading was rated using a separate 7-point Likert scale, shown in Table 7.

Table 5

Engagement Areas and Associated Behaviors

Level of Interest	Level of Participation
• Makes comments	• Turns pages
• Asks questions	• Answers questions
• Sits and listens	• Follows directions

Table 6.

Rating Scale for Level of Interest and Participation

Rating	Definition
1	Never
2	Rarely
3	Sometimes
4	Frequently
5	Most of the time

Table 7.

Rating Scale for Overall Level of Engagement

Rating	Definition
1	Very low level of engagement
2	Quite low
3	Slightly low
4	Neither low nor high
5	Slightly high
6	Quite high
7	Very high level of engagement

Each reading session was videotaped, allowing the researcher to view each session independently and rate each child's level of engagement. This method generated data on engagement for each child, each story, and each book format.

The scores for each behavior were then averaged to provide a total score for each area (Ponitz, Rimm-Kaufman, Grimm & Curby, 2009) for each child and each book in each format. This allowed the researcher to examine the children's behaviors individually and as a whole during reading and compare them to the vocabulary scores to determine if engagement was a factor in vocabulary learning.

Inter-Rater Reliability

All reading sessions and vocabulary assessment sessions were videotaped and an independent rater was used throughout the data collection process. The rater was a graduate student in Communication Sciences and Disorders. Two training sessions, each lasting approximately 2 hours, were conducted, which included instruction on how to score the vocabulary measure based on child responses, as well as how to rate the behaviors associated with engagement using the Likert scales. Inter-rater reliability was calculated on 30% of all data; vocabulary assessments and reading sessions were randomly chosen. Inter-rater agreement was calculated by dividing the number of agreements by the agreements plus disagreements.

Vocabulary. The rater scored responses to each stimulus on the vocabulary measure using the word knowledge scores described in Table 4 (Justice, Meier & Walpole, 2005). In addition to the training the rater received on using this scoring system, the rater was advised that in the event that a child changed his or her answer, the changed or final answer was to be used for scoring. Inter-rater agreement for the vocabulary measures was 92%.

Engagement. The rater rated each behavior associated with engagement using the 5- and 7-point Likert scales previously discussed. Inter-rater agreement for the engagement measures was 59%. The low level of inter-rater agreement is indicative of the subjectivity in measuring levels of engagement despite training in how to use the scales and how behaviors were defined. In Moschovaki, Meadows, and Pellegrini (2007), the authors implied that a definitive coding system for measuring behaviors does not exist. Such a measure would be difficult to develop given the individuality of human behavior and perception. Additionally, each study must determine its own data set which necessitates the development of unique measures. In a study by Ponitz, Rimm-Kaufman, Grimm and Curby (2009), the authors remarked that engagement has "notorious definitional variability" (p.104) which makes its study and measurement difficult.

Teacher Interview

The children's standard scores on the assessment battery seemed to conflict with the teachers' perception of language impairment, and a determination was made to interview the teachers to ascertain why they had chosen these particular children for inclusion. The interviews were conducted at the end of all data collection for the study.

RESULTS

Vocabulary learning data for each child are displayed in Appendices A through D, providing information regarding performance on the weekly vocabulary measures. The data in Appendices A through C are presented in the form of a task analysis grid. The columns to the far left of the grid represent each target word by book (each set of columns represents a book). The first column indicates the first target word chosen for rich instruction, the second column indicates the second word chosen for rich instruction, and the third column is reserved for the word chosen for incidental learning. The columns that follow (within the grid) correlate with the columns representing each target word and indicate the level of word knowledge, based on the decontextualized vocabulary measure. A white square indicates no knowledge of the word (a score of 0 on the vocabulary measure), a grey square indicates partial knowledge of a word (a score of 1 on the vocabulary measure), and a black square indicates full decontextualized knowledge of the word (a score of 2 on the vocabulary measure).

The boxes to the left of the staggered line represent the baseline data from the vocabulary measure, whereas the boxes to the immediate right of the line represent data during implementation of the intervention. The boxes that follow represent maintenance data across time (as stated previously, the comprehensive vocabulary measure was administered to each child every week). Experimental effects would ideally be indicated if grid boxes are unfilled during the baseline phase and filled immediately following the implementation of the intervention, as well as across time.

The alternating treatments design is denoted through the indication of a (P) or (E) across the vertical axis. A (P) indicates the book was read in print format, whereas an (E) indicates that an electronic book format was utilized. This allowed the researcher to determine whether book format affected vocabulary learning.

Whereas Appendices A through C provide detailed data for each child, Appendix D represents the multiple baseline design across participants and provides information on the total number of words learned regardless of level of knowledge or whether the word was learned incidentally or through rich instruction. The total number of words that the children could possibly learn was 21 (14 taught through rich instruction, and 7 learned incidentally). The total number of words is shown on the vertical axis, while the number of weeks spent in baseline, intervention, and final maintenance is shown on the horizontal axis.

Appendices A through C reveal that the children began the study with little to no knowledge of target words. Therefore, most grid boxes are unfilled, indicating incorrect responses on the vocabulary measure. Immediately after implementation of the rich vocabulary instruction during shared storybook reading, gains were observed through the weekly vocabulary assessment for two children, as indicated by the filled grid boxes to the immediate right of the staggered line. Maintenance testing, as indicated in the grid boxes that follow, revealed modest retention of word knowledge for Child 1 and Child 2, for words taught through rich instruction. Data for Child 4 revealed no vocabulary gains as a result of rich instruction. None of the words left to incidental learning were learned by any children during intervention; Child 1 exhibited partial knowledge of *decorate* and *continue* and Child 2 exhibited partial knowledge of *feast* during baseline.

Vocabulary Learning by Participant

  Child 1. Vocabulary analysis results for Child 1 are shown in Appendix A. Child 1 exhibited full knowledge of the word *racket* and partial knowledge of the words *decorate* and *continue* during a portion of the baseline phase. He maintained the same level of knowledge for *racket* and *decorate* throughout data collection. While the word *continue* was partially known in Week 7, he exhibited no knowledge in Weeks 8 through 10, then partial knowledge again in the maintenance measure. When the words *herd* (from Book 3, print), *guest* and *instructions* (both from Book 7, print) were learned, Child 1 maintained a level of decontextualized knowledge throughout data collection. Child 1 learned the words *companion* (from Book 2 electronic), *feast* (from Book 5, print) and *student* (from Book 4, electronic) after the weekly testing in which the books with those words were read, but failed to maintain this level of knowledge. Interestingly, while this child did not show knowledge of the word *unique* (from Book 3, print) immediately following implementation of the intervention, that word was known at the decontextualized level during the final maintenance measure. Another interesting observation is made with the words *appeared* (from Book 4, electronic) and *continue* (from Book 5, print). Child 1 was inconsistent with his response to these words during testing, demonstrating partial knowledge during some of the measures, and no knowledge during others.

  The maintenance test conducted one week after the end of all the readings showed that Child 1 had full knowledge of 6 of the 14 words taught through rich instruction. All of these words were taught through print storybooks. Of these words, 5 were nouns (*journey, racket, herd, guest, instructions*), and one was an adjective (*unique*). There

were only two incidental words that Child 1 had partial knowledge of, but these words were partially known during baseline and were not learned as a result of the readings.

   Child 2. Vocabulary analysis results for Child 2 are shown in Appendix B. Child 2 exhibited partial knowledge of the words *feast* and *decorate* during a portion of the baseline phase. She was inconsistent in her response to these words during testing, demonstrating partial knowledge during some of the measures, and no knowledge during others. When the words *student* (from Book 2, print), *greet*, and *companion* (both from Book 7, electronic) were taught through rich instruction, Child 2 displayed full knowledge immediately following implementation of intervention and maintained a decontextualized level of knowledge throughout data collection. Child 2 also learned the words *herd, unique* (both from Book 1, electronic), *appeared* (from Book 2, print)*, journey* and *feast* (both from Book 3, electronic) immediately following the intervention, but some variability was observed throughout the maintenance testing. In the case of *herd*, Child 2 vacillated between knowing this word either partially or fully. The word *student* was not known in the second week after the word was explicitly taught, but Child 2 responded with decontextualized knowledge of this word for the remainder of data collection. For the words *guest, instructions, racket,* and *ordinary*, Child 2 exhibited full knowledge immediately following intervention and during the final week of maintenance testing, but not on the measures between those times.

   The maintenance test conducted one week after the end of all the readings revealed that Child 2 learned 7 of the 14 words explicitly taught. Of these 7 words, 4 were taught through electronic storybooks and 3 were taught through print storybooks. Of these words learned, 5 were nouns (*student, companion, racket, guest, instructions*),

while 1 was a verb (*greet*) and 1 was an adjective (*ordinary*). She did not learn any words incidentally as a result of the readings. The word *feast* was the only word that was partially known during baseline as well as the maintenance test. She responded with no knowledge of the word *decorate*, even though she partially knew this word during baseline.

 Child 4. Vocabulary analysis results for Child 4 are shown in Appendix C. Child 4 did not exhibit knowledge of any words during the baseline phase. Child 4 did not exhibit knowledge of any words after implementation of intervention or during the maintenance phase.

Vocabulary Learning Across Participants

 The data in Appendix D reveals that for Child 1 and Child 2, rich vocabulary instruction increased their overall knowledge of target words, while this method was not effective with Child 4. While details about specific words learned, the level of knowledge for each word, and the type of books in which the target words appeared are depicted in the other appendices, an overall trend of vocabulary learning can be seen in this particular appendix. Of a possible 21 words that the children could learn, Child 1 and Child 2 each learned 10 words, while Child 4 did not exhibit novel word learning.

 As mentioned previously, Child 1 knew three words during baseline that were also known during the final maintenance measure. This yielded seven new words learned that were taught through rich instruction, as no new words were learned incidentally. Child 2 began the study knowing only two words at baseline, but only one of those words

was known during the final maintenance measure. This yielded nine new words learned

through rich instruction, as no new words were learned incidentally.

Level of Engagement by Participant

Data for level of interest and level of participation as indicators of engagement

were based on a 5-point Likert scale and tabulated for each reading. In addition, an

overall level of engagement score was based on a 7-point Likert scale and was used as a

separate measure of overall impression of engagement. The results of these subjective

measures were analyzed by computing totals and averages for level of engagement and

level of participation. Each child's scores were individually calculated, and total scores

for the children as a group were derived from the totals/averages of individuals.

Child 1. Data for Child 1 is shown in Figure 1. Child 1 displayed an average

level of interest of 3.4 out of 5 for all books read. The average level of participation was

greater at 4.62 for all books. While the number of words learned was lowest in Book 6, it

was also the book with the lowest engagement score. Interestingly, this electronic book

had no interactive features.

Figure 1. Child 1 Engagement and Vocabulary Measures by Book

Child 1

	Book 1 (P)	Book 2 (E)	Book 3 (P)	Book 4 (E)	Book 5 (P)	Book 6 (E)	Book 7 (P)	All Books
■ Interest	3.3	3.5	3.3	3.65	3.3	3.15	3.65	3.4
■ Participation	4.3	5	4.8	5	4.3	5	3.98	4.62
■ No. Words Learned	1	1	1	1	2	0	2	6
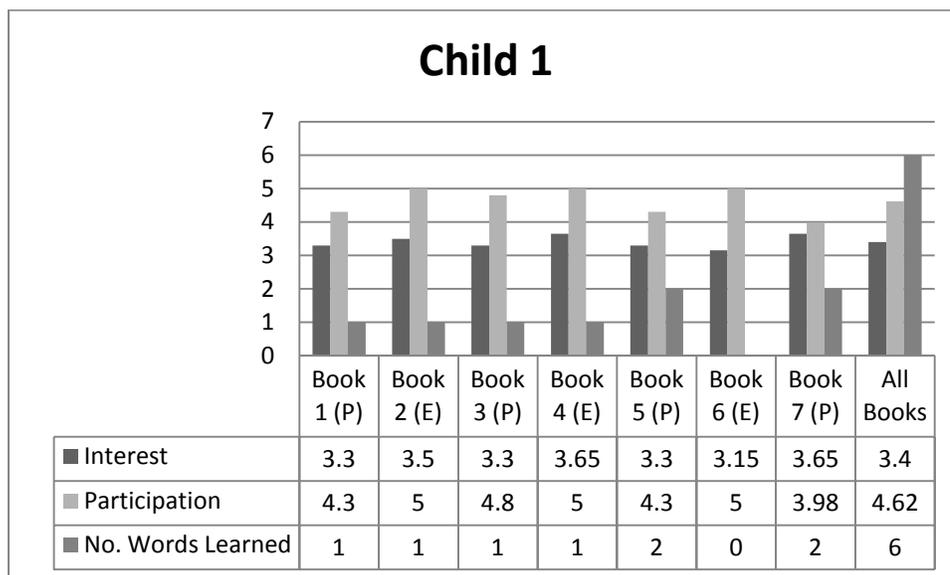
Figure 1. Weekly averages of level of interest and level of participation for Child 1 for each book. The number of new words learned per book and overall are included.

Child 2. Data for Child 2 is displayed in Figure 2. Child 2 displayed an average level of interest of 3.03 out of 5. The average level of participation was higher at 4.6 for all books. For Child 2, the levels of interest and participation had no bearing on whether new vocabulary words were learned. Several of the books in which interest scores were very low (Book 2, Book 5, Book 6, and Book 7) show the same number of words learned as in books rated higher in interest.

Figure 2. Child 2 Engagement and Vocabulary Measures by Book

	Book 1 (E)	Book 2 (P)	Book 3 (E)	Book 4 (P)	Book 5 (E)	Book 6 (P)	Book 7 (E)	All Books
■ Interest	3.17	2.8	3.65	3.45	2.8	2.6	2.8	3.03
■ Participation	4.65	4.5	5	4.3	4.3	4.5	5	4.6
■ No. Words Learned	1	2	2	0	2	2	2	7
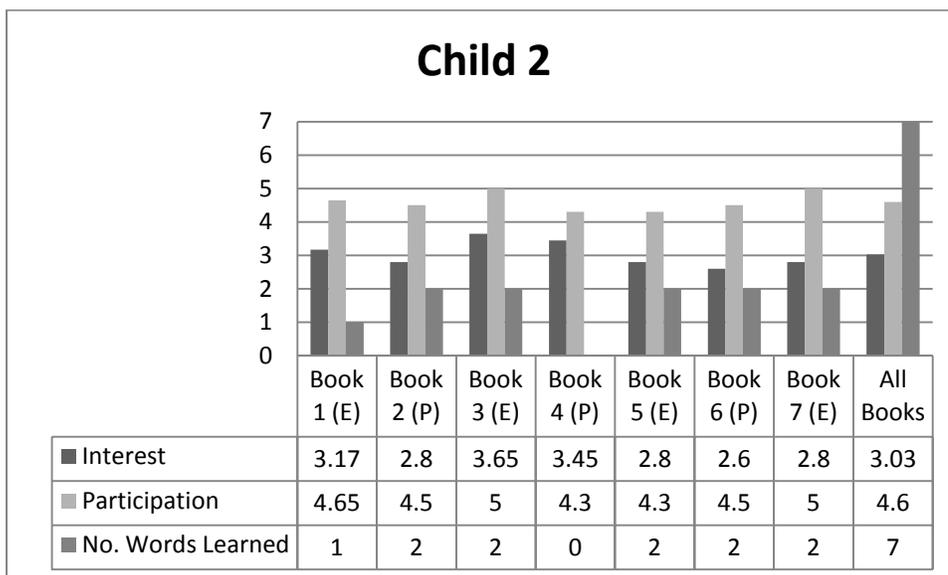
Figure 2. Weekly averages of level of interest and level of participation for Child 2 for each book. The number of new words learned per book and overall are included.

Child 4. Data for Child 4 is displayed in Figure 3. Child 4 displayed an average level of interest of 2.85. Child 4's average level of participation was 3.02 for all books. Child 4 displayed the lowest levels of engagement and participation of all the children.

Figure 3. Child 4 Engagement and Vocabulary Measures by Book

Child 4

	Book 1 (P)	Book 2 (E)	Book 3 (P)	Book 4 (E)	Book 5 (P)	Book 6 (E)	Book 7 (P)	All Books
■ Interest	2.45	2.8	3.3	3.5	2.95	3.45	1	2.85
▨ Participation	3	3.15	3.8	4	2.6	3.15	1	3.02
■ No. Words Learned	0	0	0	0	0	0	0	0
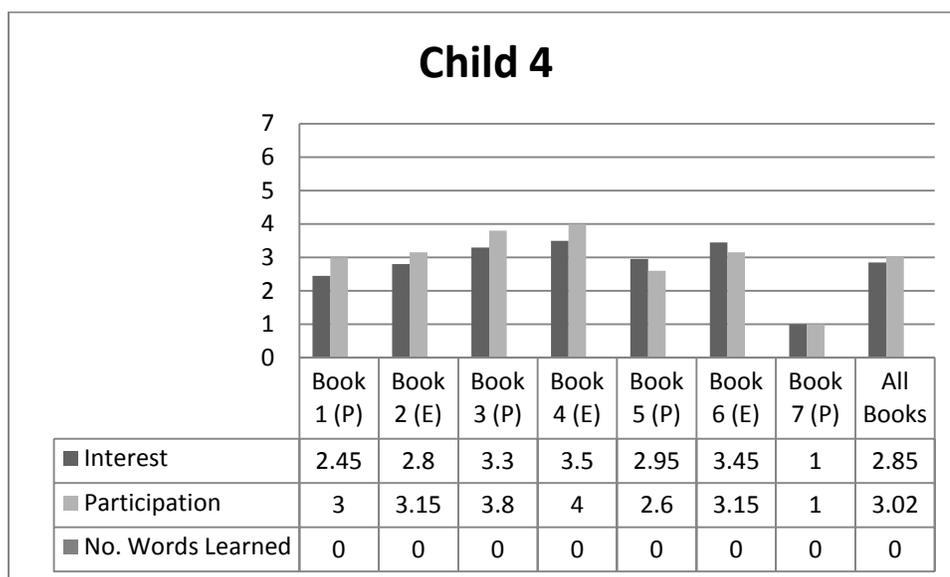
Figure 3. Weekly averages of level of interest and level of participation for Child 4 for each book. The number of new words learned per book and overall are included.

Engagement Measures for Electronic Versus Print Format

Interest. Data for the children's average level of interest is shown in Figure 4. Child 1's level of interest for the electronic books was 3.43 and 3.38 for print books. Child 2's level of interest was 3.1 for electronic books and 2.95 for print books. Child 4's level of interest was 3.25 for electronic books and 2.55 for print books.

As a group, the children displayed slightly greater interest in the electronic books. The average score for interest in the print condition was 2.96. The average score for interest in the electronic condition was 3.26.

Figure 4. Level of Interest by Medium

Interest

	Child 1	Child 2	Child 4	Group
■ Print Books	3.38	2.95	2.55	2.96
■ E-Books	3.43	3.1	3.25	3.26

Figure 4. Average levels of interest by child for electronic and print formats. Averages for the children as a group are included.

Participation. Data for the children's average level of participation is shown in Figure 5. Child 1's level of participation in the electronic book condition was a 5 and the print condition was 4.34. Child 2's level of participation in the electronic book condition was 4.73 and 4.43 for the print book condition. Child 4's level of participation in the electronic book condition was 3.43 and 2.72 for the print book condition.

The average level of participation for the electronic books was higher than for the print books when looking at the children as a group. The children displayed an average level of participation score of 4.38 out of 5 in the electronic condition as compared to 3.83 for the print condition.

Figure 5. Level of Participation By Medium

	Child 1	Child 2	Child 4	Group
Print Books	4.34	4.43	2.72	3.83
E-Books	5	4.73	3.43	4.38
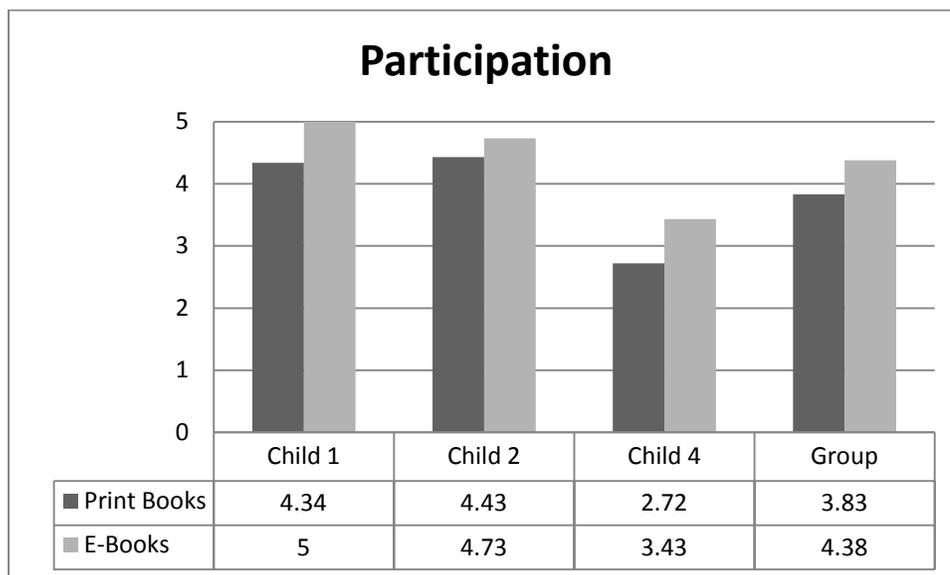
Figure 5. Average levels of participation by child for electronic and print formats. Averages for the children as a group are included.

Overall Engagement. Data for overall impression of the children's level of engagement is shown in Figure 6. The overall impression of Child 1's level of engagement was 5.42 out of 7, with electronic books at 5.6 and print books at 5.25. Overall impression of Child 2's level of engagement was 5.35 out of 7, with 5.37 for the electronic books and 5.33 for print books. Overall impression of Child 4's level of engagement was 4.28 out of 7, with 4.83 for the electronic books and 3.87 for the print books.

The overall impression of level of engagement was rated higher for the electronic books as compared to the print books for the children as a group. The electronic books yielded an average score of 5.26, while the print books yielded an average score of 4.81.
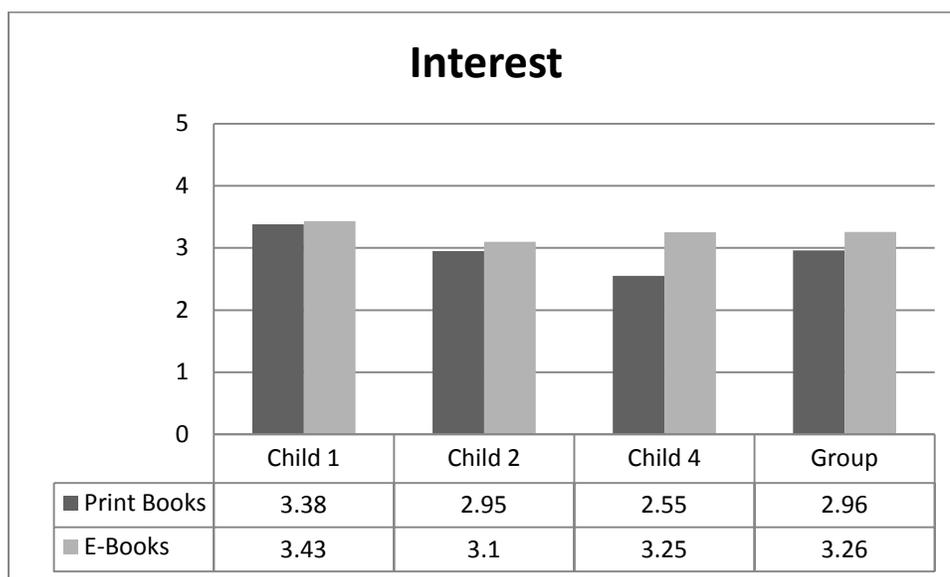
Figure 6. Overall Impression of Engagement
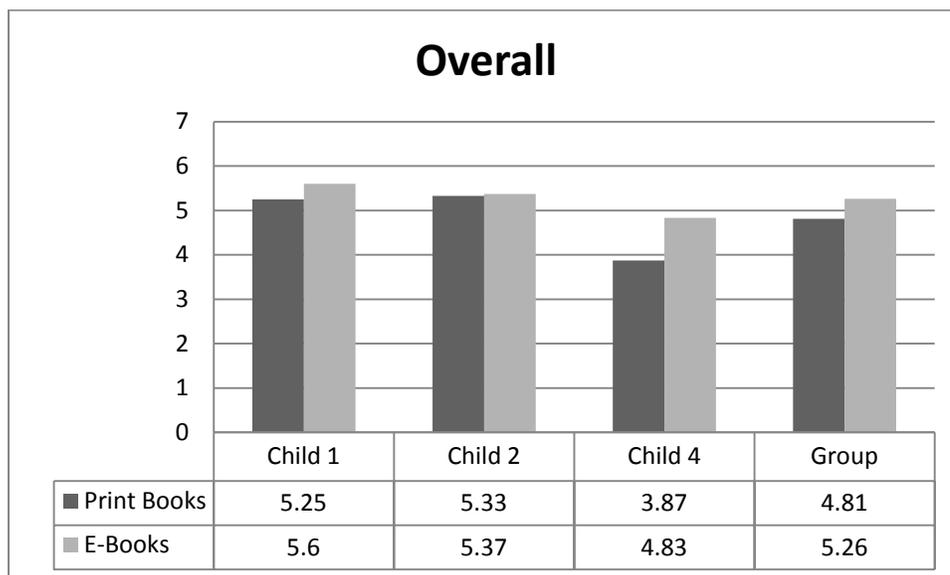
Figure 6. Average levels of overall engagement by child for electronic and print formats. Averages for the children as a group are included.

Teacher Responses

Noting a discrepancy between the children's standard scores on the assessment battery (displayed in Table 5 in the Methods section) and teacher perception of language impairment led the researcher to conduct teacher interviews to determine their rationale for choosing these particular children for inclusion in the study.

Child 1's scores on all assessments were all within one standard deviation of the mean, indicating abilities in the average range. Child 2's scores showed above average ability in receptive/expressive language as measured by the *PLS-5* and the *PPVT-4*. Her score on the *EVT-2* indicates performance in the average range. However, this child's score on the *DAYC,* a teacher-interview based measure, fell slightly below one standard deviation from the mean. The researcher's direct observation of the child as well as

evaluation of scores on the *PLS-5* and *PPVT-2*, determined that this score alone did not

warrant exclusion of Child 2 from the study. Child 3 scored in the above average range

(greater than one standard deviation above the mean) on all assessment instruments

except the *DAYC*, in which she scored more than one standard deviation below the mean.

Again, this score was evaluated along with the scores she obtained on the other

assessment instruments and the determination was made to include Child 3 in the study.

Child 4's scores indicated performance in the average range except for

receptive/expressive language ability measured by the *PLS-5*. While this score was

greater than one standard deviation below the mean, this child's bilingualism was felt to

be an influential factor. In evaluating this score along with the scores Child 4 obtained in

the other measures, the researcher determined this child to be at risk for a language

impairment and was included in the study.

When asked what behaviors she felt indicated a possible language impairment,

Teacher A reported that children would demonstrate behaviors such as an inability to

process new information and an inability to attend. She felt that the two children she

chose (Child 2 and Child 3) both demonstrated language processing issues. Both children

reportedly took a long time to process information and formulate responses to open-

ended and wh- questions. When asked why she had chosen these particular children from

her classroom to include in the study, Teacher A reported that her choice was based on

the families who were the most likely to participate in the study.

When asked the same question about language impairment behaviors, Teacher B

described language disorders as an inability to understand what has been said and an

inability to correctly articulate phonemes. When asked about her choice of participants in

the study, she reported that she chose Child 1 because he already had good vocabulary knowledge and wanted to see how much more he could learn. Child 4 was chosen because Teacher B felt she could benefit from individualized vocabulary instruction and from engaging in an activity that could possibly improve her inability to attend to tasks.

DISCUSSION

The present study examined whether books in a traditional print format or an electronic format would have a greater impact on novel word learning in children from low-SES households when rich instruction was provided in both mediums. The findings revealed gains in vocabulary knowledge at the decontextualized level as a result of intervention for two out of the three children in the study. Gains were observed through both print and electronic books, although this appeared to vary with each of the two children.

The Effects of Medium on Word Learning

The children's variability in words learned at the decontextualized level and the mediums in which those words were learned do not allow any definitive conclusions to be drawn or generalizations to be made about the effectiveness of any one medium on novel vocabulary learning for all children. Instead, learning was highly individualized. Child 1 learned target vocabulary words only from books in the print condition. Child 2 learned target vocabulary from both types of books. Child 4 did not learn novel vocabulary words as a function of either medium. While all the children showed slightly more interest in and participation with the electronic storybooks, this did not appear to facilitate learning of novel vocabulary at the decontextualized level across all children. The three children in this study all exhibited individual preferences in the medium through which they acquired and retained novel vocabulary.

The children's amount of exposure to books in general and to electronic books in particular was unknown. The novelty of the electronic books may have been a potential factor in learning new words at a decontextualized level in both the weekly and maintenance measures. Pearman and Chang (2010) make a case for the interactive features of electronic storybooks being a distraction for many children. The authors caution that although some interactive features (such as dictionaries and word pronunciations) can help struggling readers, other incidental features (such as animations) may reduce focus.

There are currently no standards in electronic book features. The electronic books used in the present study all differed in the amount of interactivity programmed into the book. As more children's storybooks become available in this medium, future researchers may be able to locate more books with similar features for better comparisons. Additionally, researchers should determine children's level of exposure to electronic storybooks prior to use in a study to eliminate the aspect of novelty and to encourage task focus.

The Effects of Medium on Retention of Novel Vocabulary

Weekly vocabulary measures revealed that Child 1 and Child 2 each learned at least one word at the decontextualized level from both mediums, with the exception of the words chosen for rich instruction in the book *Curious George* (Rey, 1998 version). However, all of the words retained by Child 1 in the maintenance measure were from books in the print condition; Child 2 retained three words from books in the print condition and four words in the electronic condition. In total, these two children did not

retain decontextualized knowledge of five words previously learned from books in the electronic condition, and only two words previously learned from books in the print condition. This examination of the data points to greater retention of novel vocabulary words learned at the decontextualized level in the traditional print books. However, the previous discussion as to the level of previous exposure to electronic storybooks and their novel use may be an influential factor in these outcomes as well. It would be interesting to note if any differences in novel vocabulary learning would be seen in children who are familiar with electronic storybooks when given the same conditions in a replication of the present study.

The Effects of Engagement on Word Learning

Children also need to be actively engaged in the learning process in order to fully integrate a target word into their lexicon (Walsh, 2008). This was accomplished in this study in various ways, such as by having the children provide the definition for the target word, answering cloze-type questions and repeating the word.

Engagement with a medium (electronic versus print) was initially proposed as a possible influential factor in vocabulary learning. While the novelty and interactive features of the electronic books may have played a role in the children exhibiting higher engagement scores for the electronic books, it did not necessarily influence their vocabulary learning. Results based on engagement are therefore inconclusive.

Engagement is an elusive characteristic to measure. In reviewing the literature, it was evident that researchers do not agree on how best to measure engagement. Jones and Brown (2011) administered surveys to students. Moody, Justice and Cabell (2010) used

a 7-point Likert scale with three dimensions of behavior that was used as a model for the present study's measure of engagement. Moschovaki, Meadows and Pellegrini (2007) remarked that they were unaware of an existing coding system for engagement behaviors. Their study simply marked the demonstration of specific affective behaviors. Ponitz and Rimm-Kaufmann (2011) measured the amount of time spent on task. Ponitz, Rimm-Kaufmann, Grimm and Curby (2009) noted that engagement has "notorious definitional variability" (p.104). Their study also used a 7-point Likert scale to measure five specific behaviors they felt were indicative of engagement and also informed the creation of the interest and participation scales for the present study. In reviewing these studies, the distinction between what constituted an engagement and a participation behavior was unclear. This proved to be a difficult distinction to make in the present study as well.

Engagement also is a subjective measure that is difficult to quantify. There is variability not only in rater perception, but also in the way children choose to exhibit engagement. In the Moody, Justice and Cabell (2010) study, one measure of enthusiasm was that children show excitement during the reading activity. The definition of what constitutes this behavior was not given, which makes it difficult to understand exactly how this was demonstrated by the children. Additionally, some children may also not be as overt as others. These children may be engaged with an activity, but not manifest it in ways in which we expect. This individuality poses questions as to the reliability of any measure of engagement.

Rater subjectivity as well as variability in the children's behavior can perhaps explain why inter-rater agreement on the engagement scales was low in the present study. One rater had young children in the home, while the other did not. The rater with young

children's frame of reference was that of shared storybook reading in a middle-SES home environment with typically-developing children. The other rater's experiences were solely with low-SES children in preschool environments. Despite the extensive training that took place on rating engagement behaviors, the raters' perceptions of what constituted engagement could not be aligned. More research needs to be conducted to determine the best parameters by which to rate engagement and participation of young children in activities such as shared storybook reading.

The Effects of Rich Vocabulary Instruction on Word Learning

In the present study, rich vocabulary instruction was the most influential and consistent factor affecting the children's learning of new vocabulary words, given the variability of the medium in which children acquired those novel words. Child 1 and Child 2 each learned approximately half of the words taught through rich instruction and retained that knowledge across time, through the final maintenance measure. The deep level of understanding the children had for the target vocabulary as a result of the rich vocabulary instruction was evident in that the children were able to define or describe words taught, whereas they were not able to define any of the words chosen for incidental learning, apart from the words with which they were already familiar. Incidental learning has been shown to be inefficient in learning the type of vocabulary that results in academic success (Beck, McKeown & Kucan, 2002; Lane & Allen, 2010).

Rich vocabulary instruction has been shown by researchers to be an effective method of facilitating vocabulary gains in children. While researchers may use different terminology for their particular methods, the basic components of rich vocabulary

instruction are included in their models, such as using child-friendly definitions when a novel word is encountered, using the novel word in multiple contexts, providing multiple opportunities in which to use the word, and repeated exposures to the novel word (Ard & Beverly, 2004; Beauchat, Blamey & Walpole, 2009; Beck & McKeown, 2007; Blewitt, Rump, Shealy & Cook, 2009; Justice, Meier & Walpole, 2005; Loftus, Coyne, McCoach, Zipoli & Pullen, 2010; McGee & Schickedanz, 2007; Pollard-Durodola et al., 2011; Walsh & Blewitt, 2006; Walsh & Rose, 2013; Wasik, 2010; Wasik & Bond, 2001; Wasik, Bond & Hindman, 2006; Weizman & Snow, 2001; Whitehurst et al., 1994) .

Children need multiple exposures to a word in order to learn the word at a level that instills a deep understanding of its meaning (Beck & McKeown, 2007; Cabell, Justice, Konold & McGinty, 2011; Loftus, Coyne, McCoach, Zipoli & Pullen, 2010; Pollard-Durodola et al., 2011; Wasik, 2010). It can be argued, however, that multiple exposures may not be enough (Justice, Meier & Walpole, 2005); if it were, multiple exposures alone would result in incidental vocabulary gains. This has been demonstrated in the present as well as other studies (Hargrave & Sénéchal, 2000; Justice, Meier & Walpole, 2005; Loftus, Coyne, McCoach, Zipoli & Pullen, 2010; Sinatra, 2008; Walsh, 2008; Walsh & Blewitt, 2006; Walsh & Rose, 2013; Wasik, Bond & Hindman, 2006; Whitehurst et al., 1994). Although providing multiple exposures to a word is an important component of rich vocabulary instruction, the other components may have greater impact. Comments and questions posed by an adult provide new information and allow the child to be an active participant in the discussions that facilitate deep levels of vocabulary knowledge (Ard & Beverly, 2004; Blewitt, Rump, Shealy & Cook, 2009; Hargrave & Sénéchal, 2000; Whitehurst et al., 1994). Defining unknown words and

modeling their use also has been shown to contribute to vocabulary growth (Justice, Meier & Walpole, 2005; Lane & Allen, 2010; Walsh & Blewitt, 2006; Walsh & Rose, 2013). Using the components of interactive discussion as well as word definition, Loftus, Coyne, McCoach, Zipoli and Pullen (2010) discovered that children made more significant gains on expressive measures of vocabulary than on receptive measures. Providing multiple contexts in which to encounter words such as through informational and storybook texts (Pollard-Durodola et al., 2011) or through extension activities using props (Wasik, 2010; Wasik & Bond, 2001; Wasik, Bond & Hindman, 2006) help children make connections between words and the concepts they represent to more fully integrate this knowledge. Child 4, however, did not acquire any novel vocabulary as a result of rich instruction. This may be due in part to the type of vocabulary words taught. Child 4 was the youngest child in the study, having just turned 4 years of age when the study began, and she was the only bilingual child. These factors may have required additional support, such as more readings, for this child to fully integrate the vocabulary into her lexicon. Additionally, she may have needed instruction in the basic Tier I words instead of the Tier II words chosen to be taught. Researchers have also suggested that bilingual children, especially those from low-SES households, may take up to seven to ten years to develop proficiency in context-reduced language (Cummins, Chow & Schecter, 2006; Eschevarria, Short & Powers, 2006; Torres-Guzman, 2002). Therefore, young children who are English-language learners would benefit from instruction within the confines of context until they develop the proficiencies needed for decontextualized knowledge.

Other Factors Affecting Learning

Observations made during the study identified some factors that may have negatively impacted the children's learning of new vocabulary. Based on the researcher's field notes, these may be subjective impressions but are important to consider when examining influences on the data obtained. One factor was the time of day during which reading sessions took place. The children were seen from 8 a.m. until 9 a.m., once they arrived at school and before any instructional activities took place. This was problematic for two reasons. First, the children sometimes exhibited signs of fatigue when first arriving at school. Whether this was caused by too little sleep or a late wake-up time was not known by the researcher, but the lethargy and inattentiveness could have influenced their ability to absorb and retain new knowledge. Another factor at times was the well-being of the child. There were several instances of the children coming to school with illnesses that resulted in the same type of negative behaviors. The third factor was that of hunger. The children in this study were all from low-SES households and eligible for subsidies, including meals at school. This meant that they ate breakfast at school, but breakfast was not served until 9 a.m. This may have been the first meal of the day for these children, so that they arrived at school hungry as well as fatigued. While these issues are not typically the focus of studies that examine the effect of low SES on vocabulary, they remain important factors that should be addressed when determining possible causes of children's ability to learn. Low-SES children may come to school with less vocabulary knowledge, but hunger, illness and fatigue also may be keeping them from making significant gains.

In looking at the results for Child 4, other additional issues may have played a role in her ability to learn. Child 4 had many behaviors that may have impacted her focus on the vocabulary learning task, such as a lack of attention, restlessness,, and an overall unwillingness to cooperate, despite prompting, removal of distracters (such as toys), and verbal praise when attentive behavior was demonstrated.

Additionally, the reinforcement of stickers at the end of every session may have negatively influenced the children's motivational level. The children were awarded stickers at the end of each reading as well as at the end of each administration of the vocabulary measure. The stickers were awarded for participation in that day's activity, whether or not they exhibited knowledge of the target vocabulary word. It may have been more beneficial to reward positive behaviors such as good listening skills or remaining seated. A different approach, such as asking parents and teachers to identify the children's best reinforcers for learning, could perhaps have been more effective in motivating the children.

Teacher Knowledge of Language Impairments

While not relevant to or impacting the results of the present study, the issue of whether preschool teachers are aware of how language impairments can manifest in young children is important. Based on an interview with the two teachers who agreed to take part in the study, the researcher found that they were unclear as to the behaviors that might indicate a language impairment. The teachers in this study had difficulty answering this question when it was presented and their responses indicated a low level of knowledge about language impairments. With the exception of Child 4, the children

selected for participation in the study by the teachers exhibited receptive and expressive language skills in the average to above-average range based on the assessments conducted by the researcher. While it would be unwise to generalize that low levels of knowledge about language impairments is the case for all teachers, it would be beneficial for speech-language pathologists working within school systems that include preschools to provide educational opportunities for teachers to help them identify red flags for language impairments in young children. Teachers and speech-language pathologists can and should work together not only for identification purposes, but also in providing intervention for children who are either at risk for or have language impairments. Together, their combined and varied approaches may facilitate greater gains in language development and more effectively close the vocabulary gap experienced by many low-SES children, ensuring their future academic success.

A low-SES background, however, is only one risk factor for language impairment. Other risk factors such as number of children's books in the home and mother's level of education also can be used to identify children who may need intervention (Hart & Risley, 1995; Bradley & Corwyn, 2002). However, children's abilities in interacting with and processing information in their environments does not necessarily correlate with household SES or other risk factors. An individualized approach that centers on the child's abilities may be best in identifying potential study participants. The use of language screening or evaluation instruments can be used to help confirm suspected language impairments in those children who teachers perceive to be at risk before choosing possible participants. Relying on teacher perceptions alone may not be enough to ensure that the intended population of a study are identified.

Limitations

      Some limitations to the present study were noted in previous sections. However, some additional limitations warrant discussion. One limitation is the small sample size, which does not allow the results to be generalized to low-SES preschool children as a whole. Similar studies in the future would benefit from a larger sample in which to analyze data.

      Another limitation is the way in which the children's vocabulary was measured. Vocabulary knowledge can be measured in different ways that allow researchers to examine the type of gains made. The present study focused on measuring the children's level of decontextualized knowledge related to the novel words, as this level relates to a full and deep understanding of words. However, as Dale (1965) described, there are varying levels of word knowledge. Even words learned at the contextual level serve to instill a level of knowledge that can be increased with subsequent exposure or that can lead to greater understanding of the concepts represented by the novel word. Thus, the vocabulary measure could have included stimuli that examined the varying levels, such as an expressive naming task, or an identification/receptive task. These additional measures may have revealed evidence of gains in vocabulary at different levels of knowledge. Regardless of the type of vocabulary measure used, it should be noted that the gains observed also could have been related to other unknown factors, such as exposure to the target words through other contexts such as interactions with adults in the home or in the classroom.

Clinical Implications

The question of which medium is more effective in engaging preschool children to facilitate novel word learning has no definitive answer based on the results of the present study. The children who participated in this study showed individual preferences and learning styles. Electronic storybooks as well as traditional print storybooks may be used in shared storybook reading with young children. Both mediums may be used to provide children with the multisensory experiences that facilitate vocabulary learning. The advantage to beginning exposure to electronic storybooks in preschool is that their use becomes less of a novelty when they are confronted with electronic texts in their future classrooms and they will be better versed in interactive feature use. Additionally, these interactive features may provide a digital scaffold in which struggling readers or those at risk for or exhibiting language impairments can use to facilitate novel vocabulary word learning and reading comprehension.

Vocabulary in particular is often cited as the most influential of the emergent literacy skills in later school performance and achievement (Beck, McKeown & Kucan, 2002; Becker, 1977; Hart & Risley, 1995). Rich instruction has been shown by numerous researchers to be an effective method to facilitate novel word learning in children of school age (Beck & McKeown, 2007; Beck, McKeown & Kucan, 2002). The basic components of rich instruction – child-friendly definitions, encounters with novel words in multiple contexts, multiple opportunities to use the novel word, and repeated exposures – are easily embedded in shared storybook reading with preschool children either at home or in the classroom. Additional components, such as extension activities, also can be incorporated, allowing the instructor or adult flexibility as well as creativity.

For children at risk for language impairments, early intervention is critical to their future academic success. Vocabulary instruction should begin during the preschool years as a preventative model of intervention, instead of waiting until the school-age years. The results of the present study provide support for the implementation of rich vocabulary instruction with preschool-age children. Therefore, it is important for speech-language pathologists and teachers to work as a team in both the identification and intervention processes. The knowledge and skills of these professionals are ideally suited to collaboration in the classroom and the clinic to make both their efforts more effective and efficient.

Finally, for some children, opportunities for vocabulary learning may not present themselves as readily as they do for others (Hargrave & Sénéchal, 2000; Hart & Risley, 1995; Justice, Meier & Walpole, 2005; Lane & Allen, 2010; Sinatra, 2008). As speech-language pathologists and educators, it is incumbent upon us to provide those children with the supports they need to advance their language skills. This is especially true for culturally and linguistically diverse populations. These children may require instruction in more basic vocabulary, additional supports in learning vocabulary, or both until their level of proficiency more closely matches those of their native-language peers.

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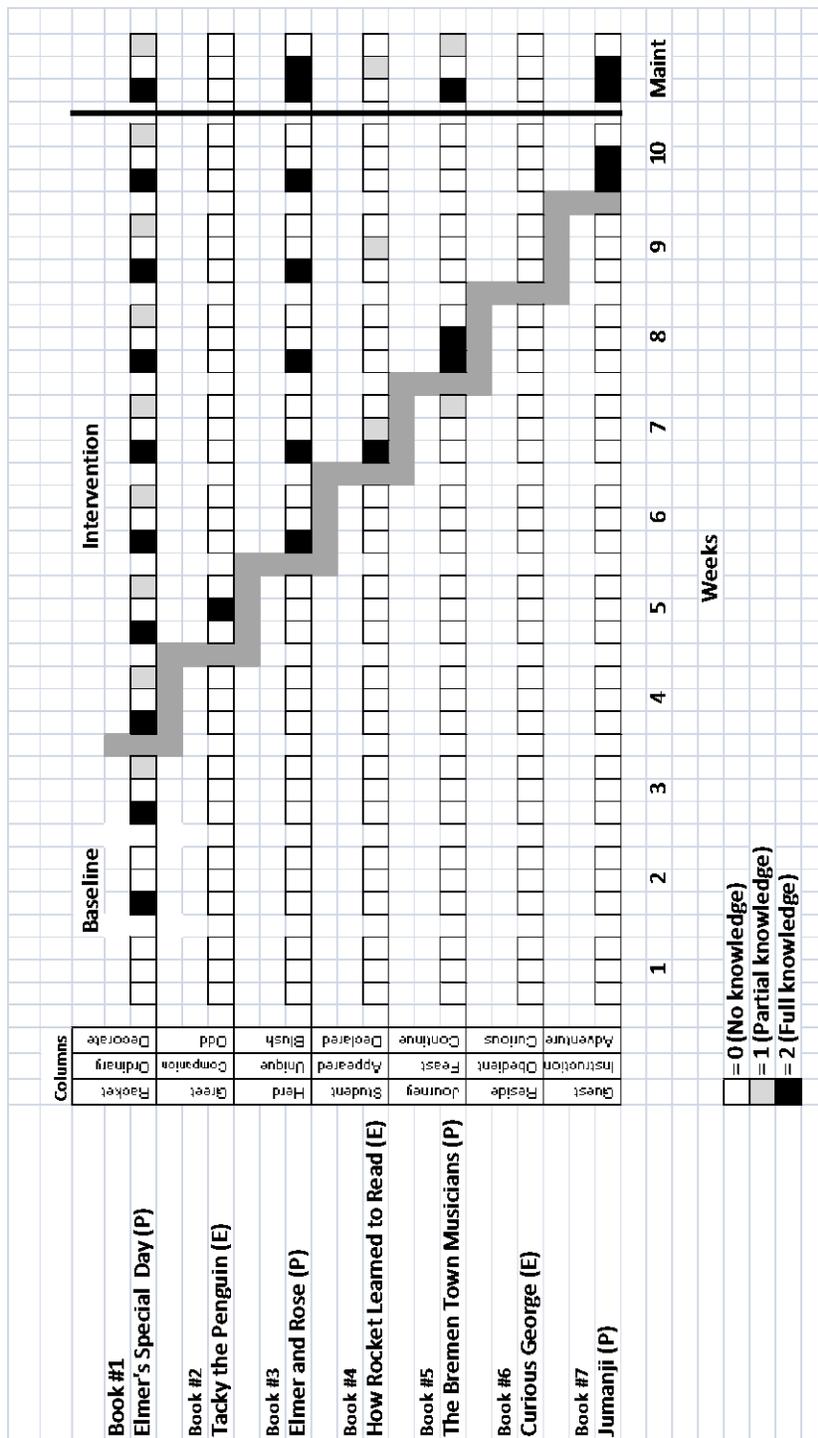
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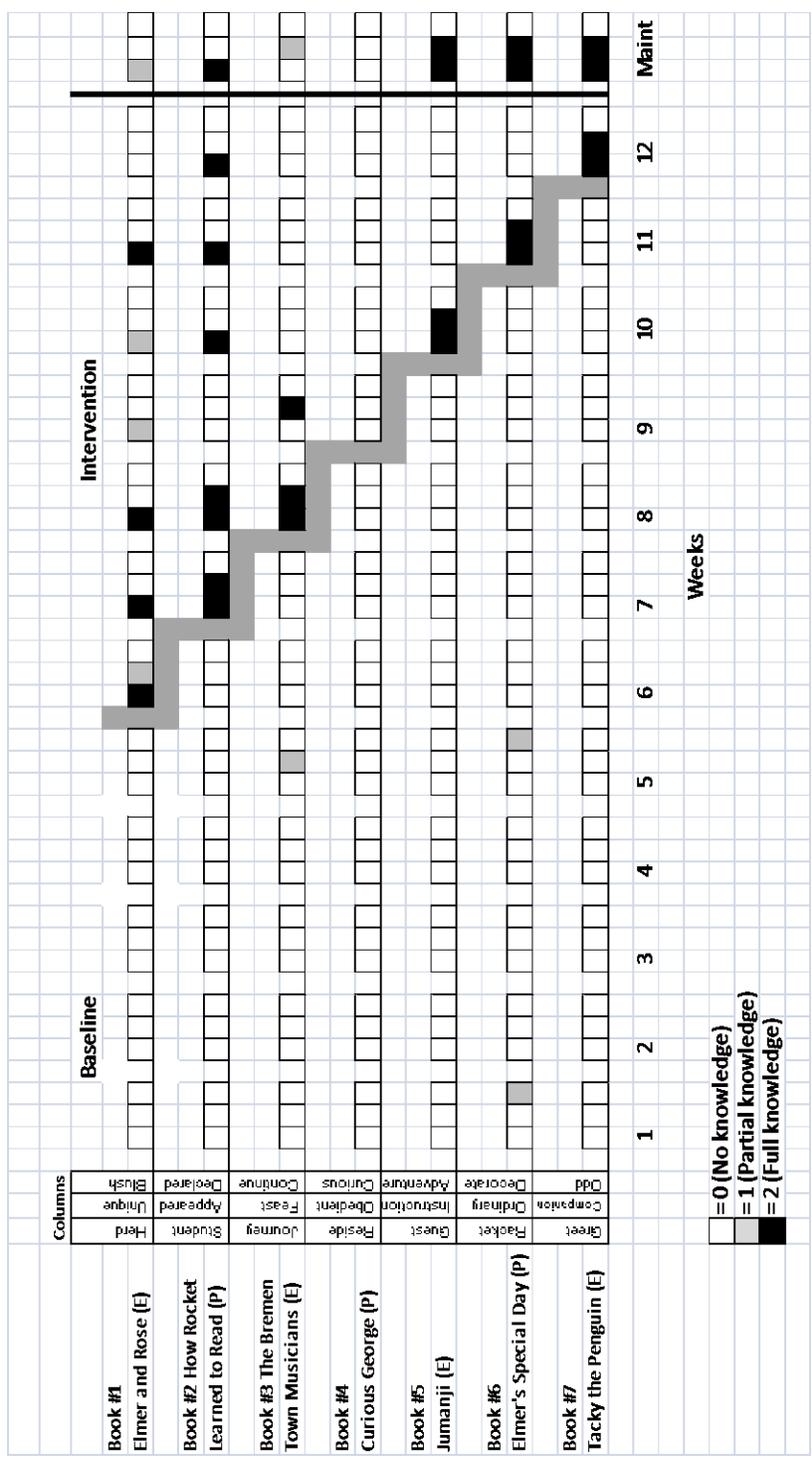
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APPENDIX A: CHILD 1 VOCABULARY ANALYSIS

Intervention

Baseline

Maint

Weeks

1 2 3 4 5 6 7 8 9 10

Columns

Decorate	Ordinary	Racket
Odd	Companion	Greet
Blush	Unique	Herd
Declared	Appeared	Student
Continue	Feast	Journey
Curious	Obedient	Reside
Adventure	Instruction	Guest

Book #1
Elmer's Special Day (P)

Book #2
Tacky the Penguin (E)

Book #3
Elmer and Rose (P)

Book #4
How Rocket Learned to Read (E)

Book #5
The Bremen Town Musicians (P)

Book #6
Curious George (E)

Book #7
Jumanji (P)

□ = 0 (No knowledge)
▨ = 1 (Partial knowledge)
■ = 2 (Full knowledge)

APPENDIX B: CHILD 2 VOCABULARY ANALYSIS

Baseline   **Intervention**   **Maint**

Weeks 1 2 3 4 5 6 7 8 9 10 11 12

Columns

Book #1 Elmer and Rose (E): Herd, Unique, Blush

Book #2 How Rocket Learned to Read (P): Student, Appeared, Declared

Book #3 The Bremen Town Musicians (E): Journey, Feast, Continue

Book #4 Curious George (P): Reside, Obedient, Curious

Book #5 Jumanji (E): Guest, Instruction, Adventure

Book #6 Elmer's Special Day (P): Racket, Ordinary, Decorate

Book #7 Tacky the Penguin (E): Greet, Companion, Odd

= 0 (No knowledge)
= 1 (Partial knowledge)
= 2 (Full knowledge)

APPENDIX C: CHILD 4 VOCABULARY ANALYSIS
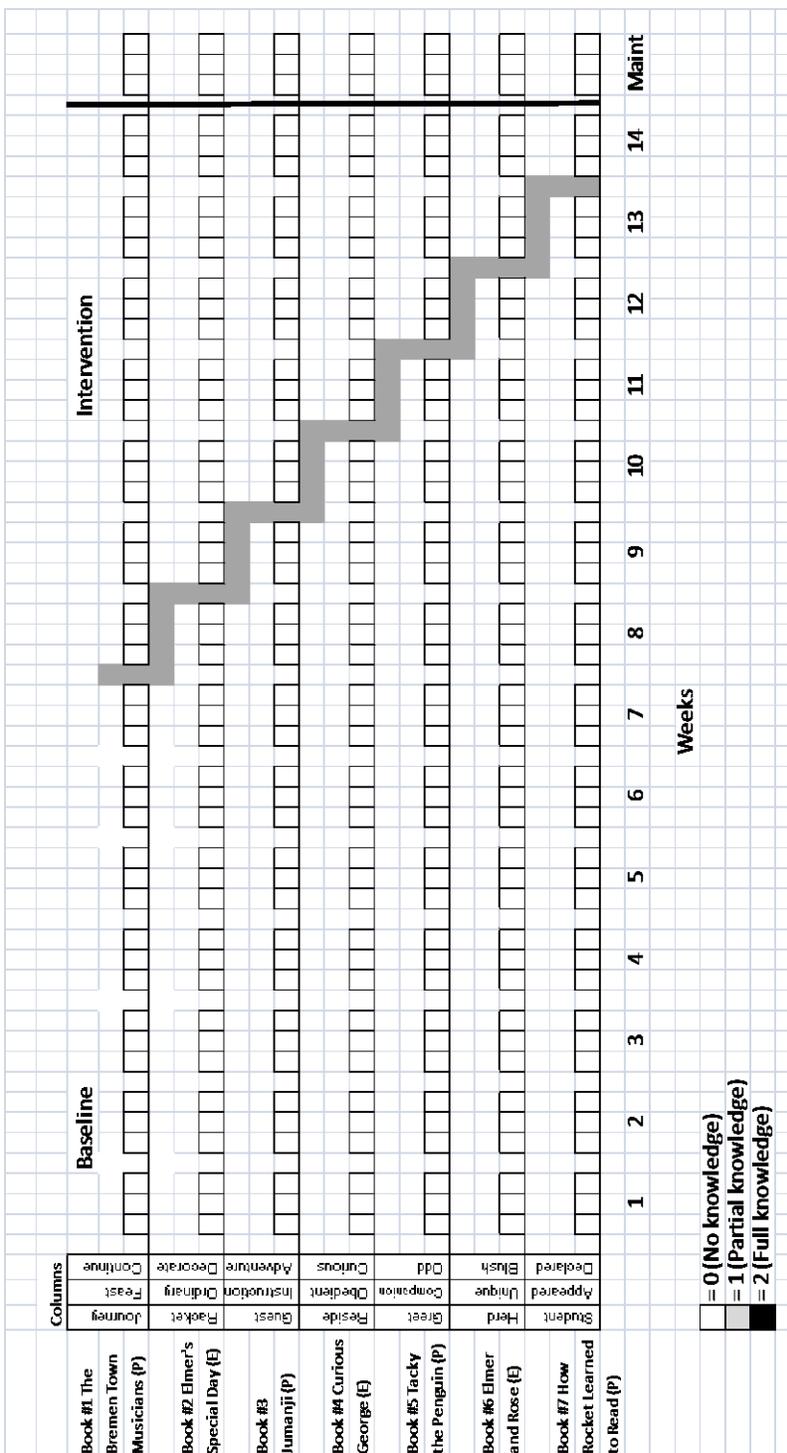
APPENDIX D: TOTAL NUMBER OF WORDS LEARNED BY CHILD