

**The More You Read the More You Know: The Impact of Oral Vocabulary on  
Early Literacy Skills**

BY

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## Abstract

Past literature demonstrates that children's storybooks play a key role in vocabulary acquisition. In addition, there is evidence to support an association between vocabulary and general reading level. The present study explored whether adding elaborative semantic teaching to storybook readings increased vocabulary learning and whether storybook exposure helps children learn to read the words to which they are being exposed. This study directly evaluated oral vocabulary learning and initial learning to read of novel words embedded within storybook contexts. Fifty-nine kindergarten students listened to two storybooks, in which ten nonwords were embedded in each. The nonwords were presented in two conditions: dialogic reading with semantic elaboration and dialogic reading without extra semantic focus. After a delay, students were tested on their ability to recognize, identify, understand, and read the nonwords that were presented in the storybook, relative to control nonwords. Posttests included receptive and expressive measures of vocabulary breadth and depth, as well as a novel learn-to-read task involving the embedded target nonwords. The results highlight the impact of storybook reading on word learning, particularly when presented with semantics. Participants demonstrated a greater degree of knowledge for the nonwords that were presented with additional semantics. In contrast, semantics provided no benefit in the learn-to-read task. Yet children demonstrated superior performance on the learn to read task for the nonwords from both conditions that were embedded in the storybooks compared to control nonwords that were not in the storybooks.

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## **Dedication**

I would like to dedicate my thesis to my grandpa, Jagdesh Chandra. Thank you for teaching me the importance of education and for being an incredible role model. I have always strived to be like you, following the footsteps you carved out for me as the first member of your family to earn a Bachelor of Science degree. You inspire me and I love you.

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## **The More You Read the More you Know: The Impact of Oral Vocabulary on Early Literacy Skills**

Learning language is a major aspect of development, beginning in infancy and continuing throughout one's lifetime. Between the ages of two and five, children are very receptive to learning language; their vocabulary enlarges without deliberate effort, simply by exposure to new words in daily conversation (Carey & Bartlett, 1978).

Through a mutually shared learning mechanism, children then begin learning to read the words to which they are exposed (Apel, 2010). There has been an interest in determining how children best acquire both spoken and written vocabulary during these years. Much of this attention has focused on storybook exposure and there is robust evidence of language learning from storybooks, as shared storybook reading presents contextual language in spoken and written forms (Sénéchal & Cornell, 1993). There is a clear relationship between storybook exposure and an increased oral vocabulary.

There is also accumulating research on the link between vocabulary and reading. The current literature suggests that children with a larger vocabulary learn to read words more easily, but there is conflicting evidence on why and how this occurs. Research has not yet established whether vocabulary links to word reading on a word specific basis, or whether it is a system-based phenomenon. In other words, it is unclear whether it is the exposure to specific words in oral language that helps children learn to read those same words or whether a larger, more efficiently organized vocabulary system provides an advantage when it comes to learning to read. Additionally, research has yet to uncover whether storybook exposure results in an advantage in learning to read the specific words within the book. The aim of this study is to establish whether the link

between vocabulary and learning to read is word-specific or system-based by evaluating how the use of storybooks impacts children's ability to read new words.

### **Using Storybooks to Teach Vocabulary**

According to Sénéchal and Cornell (1993), shared storybook reading is a popular pastime that helps children acquire language. Reading storybooks provides exposure to new terms and stimulates discussion between the adult reader and the child, which promotes the child's recall of the new words (Sénéchal & Cornell, 1993). Storybooks are effective in teaching vocabulary, as they provide specific context for the novel word.

Snow and Goldfield (1983) suggest that the illustrations in storybooks help provide context and assist in teaching the meaning of new words. Illustrations provide a visual representation that can be stored in a child's memory. Snow and Goldfield (1983) found that children learn through discussions about the illustrations and are more likely to acquire what the reader says about an illustration if it is repeated. In general, storybooks use repetitive language, and this may assist in vocabulary (word) learning.

Sénéchal and Cornell (1993) studied whether children could learn new vocabulary from a single reading of a storybook and whether certain conversational devices used during joint book reading could teach vocabulary. The researchers tested the acquisition of 10 rare words that they embedded within the story, which were not typically known to children of their age. Participants were four and five-year-old children, who were randomly assigned to one of four conditions. The conditions represented a continuum of decreasing amounts of engagement with the story, varying from answering questions throughout the reading to simply hearing the story. All participants heard the story one time and were then post-tested for learning of the new

words. Post-testing occurred immediately following the reading and again after a one-week delay. In order to measure receptive and expressive vocabulary, participants were shown cards with pictures of the rare words, to which they had to respond to questions. Receptive vocabulary refers to understanding a word, whereas expressive vocabulary refers to properly using a word in a sentence. Sénéchal and Cornell (1993) reported that receptive vocabulary learning was robust, but there was no significant difference under varying conditions. They also concluded that a single reading of a storybook was not sufficient to enhance the expressive vocabulary of either the four or five-year-old participants.

Sénéchal (1997) also examined reading style by examining the effects of storybook repetition and the use of questions on toddlers' word acquisition. Participants included three and four-year-old children, divided into three groups: single-reading, repeated-reading, and questioning. All participants heard the same story, which was embedded with 10 rare words, unlikely to be known by toddlers. Children in the repeated-reading condition heard the story three times. This condition improved children's expressive and receptive vocabulary, meaning they could understand and produce these novel words better than children in the control group, who only heard the story once. Children in the question condition also listened to the story three times and were asked to label target items with the novel words as the story was read. The children were not only exposed to the words, but also had to demonstrate their understanding of the novel words as the story progressed. The study determined that the use of questions facilitated expressive vocabulary more than receptive vocabulary (Sénéchal, 1997). This demonstrates that different reading styles used by adults have differential effects on

preschoolers' receptive and expressive vocabulary, however both experimental groups showed an increase in word learning compared to the control group (Sénéchal, 1997). This shows that repeated exposures and additional questions both stimulate vocabulary growth in preschoolers.

Walsh and Blewitt (2006) studied the types of questions asked during dialogic storybook reading and how this impacts word learning. They read three original storybooks to three-year-old children, containing six rare words, which were each heard twice. The researchers asked the participants questions to measure production and comprehension of the novel words. Questions about the book that included the target word were considered non-eliciting questions, whereas eliciting questions required the child to recall the word in the response. In regard to word acquisition, no significant difference between the two types of questions on the acquisition of these words was found; yet asking questions in general was found to result in improved word learning. This suggests that the type of question is not as important to word learning as the children's active engagement in discussions about novel words (Walsh and Blewitt, 2006). These findings were consistent with the idea that dialogic reading style has positive effects on children's vocabulary.

Flack et al. (2018) also support the idea of learning vocabulary through discussions. Their meta-analysis shows that a dialogic reading style influences the number of new words learned by children during shared storybook reading. Dialogic reading techniques include pointing at pictures or words, providing definitions, and asking children questions throughout the story (Flack et al. 2018). Flack et al. (2018) report that children learn 1.22 more words when dialogic reading styles are implemented

in contrast to nondialogic reading.

Flack et al. (2018) also found that style is a more significant moderator than the identity of the reader; pre-existing relationships between the child and the adult who reads the story does not influence word comprehension or learning. When the same conditions were implemented, and the storybooks were read in a dialogic fashion, children learned an equivalent number of words from storybooks read by familiar adults as they did by researchers they had just met (Flack et al. 2018).

Sénéchal and LeFevre (2002) completed a five-year longitudinal study to examine the process of learning to read, beginning from children's introduction to language and continuing until they can read fluently. The purpose of this study was to focus on how parental involvement influences the development of reading skills. Parental involvement was measured in two ways: children's exposure to storybooks and parents' reports concerning how frequently they taught their children about reading and writing words. The results demonstrated that these two measures were uncorrelated and that each measure predicted different skills. Formal literacy interactions, such as lessons on letters and sounds, led to increased knowledge of reading and writing. In contrast, informal storybook reading was associated with the development of children's receptive language, that is the ability to understand and comprehend spoken language. However, both of these parental interactions were seen as predictors of children's reading ability in the third grade. This study supports the notion that storybook exposure can predict future reading ability, albeit only over a longer period of time. Sénéchal & LeFevre (2002) provide evidence that storybooks impact reading level five years later, although it is not clear if such a link is only evident years later or if storybook exposure has any

immediate impact on learning to read.

Researching storybook exposure in children is valuable, but the methodology has inherent limitations. There is a large variation in vocabulary knowledge and literacy level in children that must be accounted for in the analysis of the results. In order to remove this limitation and accurately test children's learning of vocabulary, researchers must ensure that the target words in the study are unknown to all participants. Researchers have removed this bias by replacing real words in storybooks with nonwords (also known as pseudo-words). This ensures that no participants have an advantage due to previous exposure to the target word. Participants are tested on their retention of these newly taught items and scores can be compared accurately. The use of nonwords is a well-tested and established methodology used by many researchers to test word acquisition. Flack et al. (2018) examined the use of nonwords in contrast with real novel words in their meta-analysis and determined that both types of words can be acquired at a similar rate, as long as the real words are novel to all participants.

The initial literacy level of the participants contributes to word learning from storybook exposure. Individual differences can affect one's ability to learn novel words. The Matthew effect describes how advantage begets further advantage, with ever increasing disparity between the successful and the unsuccessful. This concept can be applied to the widening gap between good and poor readers over time (Penno et al., 2002). Children who begin with a larger lexicon and greater ability to learn words will experience the most improvement after an intervention. Penno et al. (2002) studied this effect and attempted to remove this bias. Children were divided into groups based on different ages and varying amounts of additional vocabulary knowledge. All participants

listened to two stories read to them on three occasions, each one week apart. Each story contained 10 target words. For one storybook, children listened to the reading and were given explanations of target word meanings, while children were not given explanations for the words in the other story. A posttest multiple choice vocabulary test measured word acquisition after each reading. The study demonstrated that children with higher initial abilities made greater gains across all conditions. Penno et al. (2002) found that children can learn vocabulary from listening to stories, but this is enhanced by repeated story presentations and the addition of explanations of difficult vocabulary. Increasing explanations and exposure to the vocabulary items could not overcome the Matthew effect.

### **The Link Between Vocabulary and Word Reading**

Recent research has observed the role of vocabulary on word reading level. A lexicon is the complete set of words known or understood by an individual. According to White et al. (1990), a larger lexicon is predictive of improved decoding performance in children of ages six to 10. Their study looked at children from three dissimilar elementary schools, each from different economic backgrounds. Pretests demonstrated that mainstream students had larger lexicons than students from disadvantaged backgrounds. In the results, they observed a gap in decoding performance between mainstream and disadvantaged students, which was largest for infrequent words. Overall, the results demonstrated that knowing more words correlates with word reading abilities (White et al., 1990). More recently, Suggate et al. (2014) found evidence to support the vocabulary-reading link using kindergarten children in New Zealand and Germany. They found an even greater correlation in English-speakers than German-

speakers.

To date, the basis for the relationship between vocabulary and word learning has not been determined. It is postulated that it could be a general phenomenon, meaning that knowing more words leads to a more efficient lexicon and greater ability in learning to read words. Other research suggests that learning to read words is item-specific, meaning that children can read words more easily if that specific word is in their oral lexicon. There is conflicting evidence to support both sides of this argument.

### ***Word Learning as an Item-Specific Phenomenon***

It can be argued that word reading is learned on an individual word basis. Children with larger vocabularies are at an advantage because the presence of those words in their vocabulary help them learn to read those same words.

Ehri (2005) describes the gradual process in which children learn to read words. At first, children begin by learning the initial and final parts of a word. If this word is in their lexicon, they are often able to correctly identify the word without having to decode it fully. As their alphabetic knowledge grows, they will gradually learn to decode the other letters by name and sound, which will strengthen the connection between orthography and phonology. With reinforcement, children can eventually store full words in their memory. Children often first learn to spell and recognize their names and other short words. They read these familiar words by accessing them in memory, thus they are called sight words. This skill is called visual word recognition. It is with decoding practice and repeated exposure that words can eventually be stored and eventually read automatically by sight (Ehri, 2005).

Share (1995) proposed the self-teaching hypothesis of reading development. This

theory explains that a child's ability to learn to read words depends upon a child's ability to phonologically decode new letter strings. With repetition, this decoding leads to the establishment of lexical representations that are then accessed for more rapid, fluent reading and writing. Importantly, Share proposes that this learning mechanism, which he termed "self-teaching", is supported by semantics. According to the self-teaching hypothesis, orthographic knowledge develops primarily as a result of the self-teaching opportunities provided by successful decoding (Share, 1995). That is, reading a word correctly reinforces the ability to read that word.

As children get older and their reading level advances, they must read irregular words, which do not follow regular phonetic rules. In English words, the relationship between print and pronunciation is not always consistent, such as yacht or chorus. Greater vocabulary knowledge assists in decoding, especially for irregular words and homophones, so having a specific word in one's oral lexicon is advantageous (Share, 1995). In encountering a new word that may not be fully regular in its spelling, the reader can partially decode it and then use the meaning of the sentence to help activate the correct pronunciation if that word is in their oral lexicon. In other words, meaning and oral vocabulary knowledge help resolve decoding ambiguity (Share, 1995).

The self-teaching hypothesis is linked to the triangle model developed by Siedenberg and McClelland (1989). This model proposes an interaction between three elements necessary for visual-word processing and pronunciation: phonology, orthography and semantics. According to this theory, these three elements are linked. In terms of word identification, this model suggests letter-by-letter recognition. As a child reads each individual word, they must decode using these three skills. Over time, this

strengthens the connection between the three elements, resulting in a more fluent reader (Siedenberg and McClelland, 1989).

Nation (2008) addressed context, reporting that it was beneficial to specific word reading. Context can be provided by presenting the target word in a sentence, paragraph or book. This is relevant to irregular words, which cannot be entirely decoded on the basis of letter-sound correspondences alone and provides evidence that accurate decoding is only possible if the item is already present in an individual's lexicon (Nation, 2008). According to Nation (2008), episodic knowledge aids in word acquisition, such that a mental representation of a word facilitates word reading for that same word. Every exposure creates a new episodic trace; more experience will add richness to the memory systems that serve lexical processing. Consequently, learning to read words is easier if the child is already familiar with said words.

Nation and Cocksey (2009) also studied the relationship between children's ability to read words aloud and their knowledge of the same words. They studied seven-year-olds, who read two 32-item lists of words aloud. One list was comprised of regular words and the other list included irregular words. Nation and Cocksey (2009) first measured the participants' familiarity with the phonological form of the word using an auditory lexical decision test. Next, the participants were instructed to read the word aloud. Finally, their semantic knowledge of the word was measured by a definitions task. Nation and Cocksey (2009) reported that children's knowledge about words in the oral domain is associated with their ability to read those same words aloud, even more so when the words contain irregularities between orthography and phonology. They explicitly state that knowledge of a specific word is not needed to read regular words,

which can be sounded out through decoding.

Ricketts et al. (2016) found contradicting evidence while investigating the link between semantic knowledge and word reading in emergent readers. They demonstrated a close relationship between semantic knowledge and reading words that are both regular and irregular in spelling. A sample of six and seven-year-olds were exposed to 40 words in the context of four tasks: two assessing reading (reading in isolation and reading in context) and two assessing lexical knowledge (auditory lexical decision and definitions). Of the 40 words, 20 were regular and 20 were irregular. Ricketts et al. (2016) found that lexical knowledge correlated with reading ability for all words. This demonstrates that semantic knowledge may aid in word reading regardless of regularity (Ricketts et al., 2016). This provides novel evidence that semantics contribute separately to reading performance. This contradicts the findings of Nation and Cocksey (2009); noteworthy, the study by Ricketts et al. (2016) more directly and thoroughly assessed word knowledge (relative to Nation and Cocksey) and used advanced statistical modeling, adding to the confidence of their findings.

### ***Word Learning as a General Phenomenon***

As research advances, there is accumulating evidence that describes the link between word learning and learning to read as a more general phenomenon. As the number of words in the oral lexicon increases, the system must become more efficient in terms of organization and retrieval. This efficiency may be pertinent and advantageous in learning to read (Ouellette & Beers, 2009; Ouellette & Shaw, 2015).

In the past, it has been suggested that oral vocabulary is a proxy for intelligence and thus better reading could also be a reflection of the link between general intelligence

and reading. This notion is challenged, however, as more recent studies demonstrate that vocabulary can be purposefully trained in order to improve reading. Ouellette (2006) suggests that those with larger vocabularies have more efficient and better organized lexicons, which support reading.

Ouellette's (2006) research further evaluates the role of vocabulary on reading by specifying a distinction between vocabulary breadth and depth. Breadth is defined as the number of items in an individual's lexicon, and depth is how well an individual can define and understand this word. When a child acquires a word, they do not necessarily gain a rich understanding of the word. Both vocabulary breadth and vocabulary depth appear to be related to word reading ability (Ouellette, 2006). Results from a study using grade four students revealed that receptive vocabulary breadth was a predictor of decoding ability, whereas expressive vocabulary breadth was a predictor of more rapid visual word recognition. Both vocabulary breadth and depth predicted irregular word reading beyond verbal intelligence quotient (IQ) and decoding. This demonstrates that increased exposure and a greater understanding of words aids with word reading for both decoding and recognizing words by sight. This study cannot determine whether these relations are present at a word specific level, however, as the same words were not used in all assessments and tasks (Ouellette, 2006).

Ouellette and Beers (2009) examined the relationship between vocabulary and reading in two cohorts of students. Their results supported the notion that language skills impact reading differently at different ages and literacy levels. The researchers found that vocabulary predicted irregular word recognition in students in both grade one and grade six, but they found that this was due to different skills. Vocabulary depth was a

significant predictor in grade one and vocabulary breadth in grade six. Ouellette and Beers (2009) suggest that younger children can more rapidly store new vocabulary words without a full and deep meaning of each word, but having such meaning stored is advantageous; in later grades it appears to be the mere size of the oral lexicon that is advantageous. Again, it is unclear whether this could be explained on a word-specific basis, as only general measures of vocabulary and reading were used in the study.

### **Gaps in the Current Literature**

Word acquisition is an essential process in learning language and becoming a skilled reader. Past literature demonstrates that children's storybooks play a key role in acquiring language. It is well understood that storybook exposure results in vocabulary learning, and that this learning can be maximized with dialogic techniques (Flack et al. 2018). In addition, there is a growing literature that shows an association between vocabulary and general reading level. To date, investigators have not decisively established whether an enhanced vocabulary leads to improved word reading on an individual word basis, allowing a child to read the specific words in their lexicon, or whether this is a more system-based phenomenon. Further, it has not been explored whether storybook exposure helps children learn to read the words to which they are being exposed. To address these gaps in the literature, the present study combines these two areas by exposing kindergarten children to novel words in storybooks. This study directly assesses gains made in oral vocabulary breadth and depth for these specific words, as well as the children's performance in learning to read these same taught words.

Apel (2010) conducted the only other known study to explicitly examine

learning to read words through storybook exposure. In this study, 41 kindergarten students were pretested, indicating that all of the participants demonstrated strong initial reading ability for their age. This was determined using standardized tests, which allowed scores to be compared to known normal standards. Apel (2010) then inserted 12 nonwords into 12 stories. The stories were read to all participants in a classroom setting. Each story consisted of four sentences and was displayed on a PowerPoint slideshow with a recorded audio. Every story contained one nonword. Following each story, participants performed four tasks: two written word learning tasks and two spoken word learning tasks. These tasks required participants to say and spell the nonwords, identify the words by images and identify the words by their written forms. Results indicated that children acquired specific phonological and orthographic knowledge of novel words through storybook reading. This provides evidence that emergent readers employ a mutually shared learning mechanism when learning new spoken words and their written forms.

The results of Apel (2010) need to be interpreted with caution, due to the methodology employed. Firstly, this study lacked generalizability. It would have been more generalizable had Apel (2010) used participants with a larger variety of reading abilities. All of the participants were identified as strong readers for their age, which lacks ecological validity. Secondly, the format of the “storybooks” was flawed, as they consisted of only four sentences and were presented on a PowerPoint slideshow with a recorded audio. This is an inaccurate representation of true storybooks, which makes the study difficult to apply to the real world. Additionally, this type of storybook exposure does not align with the current literature, which has established the importance of the

interactive, dialogic nature of storybook reading. Furthermore, there was only one novel word per story, and posttesting happened immediately, before the next story, thus assessing immediate recall of only one item. The taught items were also grouped into conditions of only three words each for analysis. Together, these aspects of the experimental design constrained the distribution of the data, bringing the validity of the study design into question. The word learning tasks themselves were also flawed, as the spelling test used a stringent correct/incorrect scoring system criterion. This was not an appropriate way to mark kindergarteners' writing abilities, as data on first graders' spelling demonstrates that children only spell 20% of nonwords perfectly while using phonological encoding (Apel, 2010). This inadequate study design skewed the data collected in Apel's (2010) study, as children could have received higher scores if a less than perfect spelling was accepted. Finally, this design did not allow for a direct examination of whether the storybook exposure helped in later learning to read these items.

### **Present Study**

The present study has been devised to overcome the uncertainty in the literature by directly evaluating both oral vocabulary learning and initial learning to read of novel words embedded within storybook contexts. There were two conditions examined: dialogic reading with semantic elaboration, which is linked to vocabulary depth, and dialogic reading without extra semantic focus. After a delay, students were tested on their ability to read the nonwords that were presented in the storybook and words presented in isolation. Posttests included receptive and expressive measures of vocabulary breadth and depth, as well as a novel learn-to-read task involving the

embedded target words. Given the work of Sénéchal (1997) and Ricketts et al. (2016), it is hypothesised that the students will learn the nonwords that were embedded in the storybooks, and further that participants will demonstrate a greater degree of knowledge for the nonwords that were presented with additional semantic activities. It is uncertain whether this extra semantic teaching will facilitate learning to read those same new words. There is accumulating research supporting word-specific links between vocabulary and reading, which suggests that participants may show an advantage in learning to read the nonwords from the storybooks relative to a set of control nonwords that were not included in the stories.

## **Method**

### **Participants**

Fifty-nine kindergarten students were recruited from a local elementary school to participate in the current study. Parental consent forms were completed for all participants. Over the course of the study, complete data was obtained for 52 of the students. One student was deemed to be an outlier on the pretested literacy areas ( $>2.5$  SD above mean) and was at ceiling on all post-test measure; this participant was excluded from the analyses. The final sample reported includes 51 students from 4 different classrooms, consisting of 32 males and 19 females. Participants' ages ranged from 60 to 73 months, with a mean of 66.87 months ( $SD = 3.44$ ). English was spoken in all homes, with 13 homes reporting a second language spoken. Parental education ranged from less than high school ( $n=1$ ) to post-secondary education ( $n=25$ ).

### **Materials**

Assessment began with seven standardized tests, which each participant

completed individually.

***Pretest***

Two subsets of the Comprehensive Test of Phonological Processing (CTOPP; Wagner et al., 1999) were administered to assess phonological awareness. In the Sound Matching subtest, children were shown pictures and were asked to identify those that have the same initial sound or the same final sound. Twenty items were tested, and testing ended following four errors over seven items. This test has excellent internal reliability ( $\alpha = .83$ ). In the Elision subtest of the CTOPP, the administrator read a word and asked participants to repeat the word. The child was asked to say the word again while leaving out a certain sound. An example is saying “cup” without the sound /k/. There were 20 items tested and testing stopped after three consecutive errors. Test-retest reliability for this subtest is  $r = .88$ .

The Word Classes test for children ages five to 10 was completed from the Clinical Evaluation of Language Fundamentals-Fifth Edition (CELF-5; Wiig et al., 2013). This test was used to evaluate the students’ ability to understand relationships between words, based on semantic class features, function, or place or time of occurrence. This test included 12 picture items; the first eight items included three pictures and the other items included four pictures. Participants were asked to determine which two pictures were associated. All students completed all 12 items and were scored on how many items they answered correctly. Following this, students completed 27 more items, which each presented four words orally (without pictures). Students were asked to determine which two words were best associated.

The Peabody Picture Vocabulary Test (PPVT- 4 (A); Dunn & Dunn, 2007) was

used to measure the participant's receptive vocabulary. The participants were shown four pictures and were asked to point to the picture that matched the words spoken by the examiner. Testing followed the test specific basal and ceiling rules: testing ended after eight errors had been made in a set of 12. The reported internal consistency reliability for this test is excellent ( $\alpha = .91$ ).

Two subtests of the Woodcock Reading Mastery Task (WRMT; Woodcock, 1998) were administered to measure reading ability. The Letter Identification subset asked participants to identify alphabet characters in several fonts, including cursive writing. Testing ended following six consecutive errors. There were 51 words in total.

In the Word Identification subset, participants were asked to read aloud regular and irregular words in isolation from lists of increasing difficulty. The listed words had to be decoded and pronounced in a manner consistent with the articulation guidelines in order to be counted as correct. Testing was halted following six consecutive errors. There were 106 words in total. This subtest has high internal consistency,  $\alpha=.91$ .

### ***Intervention***

In this study, children were exposed to 20 nonwords embedded in two storybooks (10 in each). The first book was entitled *Just in Passing*. This wordless book was created by Susan Bonners and published by Lothrop, Lee and Shepard Books in 1989. A script was written for this book by Dr. Gene Ouellette in 2019 and the book was retitled *The Yawn*. The second book that was used in this study was entitled *The Howling Dog*. This book was written by Tracey Campbell Pearson and published by Farrar et al. in 1991. An alternative script was written for this book by Dr. Gene Ouellette in 2019.

Each nonword was given a clear referent within the story, using a sentence. An

example included “Mrs. Taylor always has a DALE in her hair, which is a large ball of hair that hangs in the back.” The nonword always had a clear referent in the pictures in the book. Ten nonwords were presented in each of the two storybooks and were the same for each participant.

Note that nonwords were devised and organized into six equivalent lists of five words, with similar letter lengths and vowel patterns across lists. Word List 1 and Word List 2 were inserted throughout the first book; Word List 3 and Word List 4 were inserted throughout the second book. Word List 5 and Word List 6 were used for a posttest no-treatment comparison. In the end, each participant was exposed to 10 words in both conditions (5 per book): storybook exposure and storybook exposure with semantic elaboration. See Appendix for all word lists.

### **Procedure**

Participants were exposed to two different conditions of a within-participant design. The conditions included storybook exposure and storybook exposure with semantic elaboration. All participants experienced both conditions with both storybooks, and the word lists within each book were counterbalanced across conditions.

Students participated in the shared storybook intervention over three consecutive days, for storybook 1 (The Yawn), in groups of four or five students. Sessions lasted approximately 25 minutes and took place in a classroom during regular school time. The sessions were administered by one of two retired teachers hired for this study.

On the first day, the administrator read one storybook, telling students that the book contained some special words. After the initial reading, the administrator talked about the 10 nonwords and showed the children where the nonwords occurred in the

storybook. The administrator read each nonword and had the students repeat the words aloud. Administrators discussed the nonwords and participants were asked a phonological question about each word's pronunciation, such as "Did I say PRISP or CRISP?" For the five target words in the condition with additional semantic elaboration, participants partook in additional semantic activities. Administrators contextualized each target word by using the nonwords in a sentence. Participants were asked to define the nonwords, to use it in their own sentence, to identify it in a picture and to answer a forced choice category question such as, "Is a DUSS a piece of furniture or a piece of an airplane?" Across conditions, the number of times children heard and said each word was equal.

On the second and third day, students listened to the book again and were instructed to raise their hands when they heard one of the special words. As the 10 nonwords were encountered, the administrator asked questions regarding the pronunciation, as per the day before. For the five target words in the semantic condition, the same semantic enrichment tasks were completed as the first day, but this occurred individually for each word and was embedded within the course of the storybook reading.

On the day immediately following the last intervention session, participants completed posttesting individually. Sessions lasted approximately 20 to 30 minutes. The purpose of conducting posttesting was to assess word learning, to determine whether additional semantic depth influences word learning, and to directly assess performance on a learn-to-read task for the newly taught items. In the posttest, participants completed a series of tasks using 15 cards with a nonword written on each. The cards included the

10 nonwords from the book, in addition to five nonwords not included in the books (i.e., Word list 5 and 6, which were used for comparison.

The posttest tasks evaluated participants' word learning (depth and breadth) and their ability to read the nonwords. Index cards of the printed nonwords were shown in random order and participants were asked to read the word. If read correctly, the administrator replied, "That's correct, it says \_\_\_\_." If the participant read the word incorrectly, the administrator elongated the correct pronunciation and then repeated it normally. The participant was asked to identify whether the word was seen in the book (recognition), to define it, and to answer a forced choice comparison question, such as "Is a SOT something to drink from or something to cook on?" All answers were coded as correct or incorrect, except for the definition task, which was scored out of two, based on the amount of detail provided.

Next, the students' performance in learning to read these new words was tested using a learn-to-read task. In this task, the administrator held up each card again, asking the students to read the word. Since the participants were in kindergarten, they were between the ages of five and six, and were thus expected to have a low reading level. As a result, it was important to not only assess a single trial reading, but also their performance on a learn-to-read task. If read correctly, the administrator replied, "That's correct, it says \_\_\_\_." If the participant read the word incorrectly, the administrator elongated the correct pronunciation and then repeated it normally. This task was repeated four times and was recorded as correct or incorrect.

To further assess vocabulary learning, participants completed a receptive vocabulary activity and an expressive vocabulary activity for the 10 nonwords from the

storybook. In the receptive vocabulary activity, participants were shown a set of three pictures from the book and were asked to point to the one that matched the nonword spoken by the examiner. This was repeated for all 10 nonwords, using 10 different picture sets. Responses were recorded as correct or incorrect. In the expressive vocabulary activity, participants were asked to name a specific item in a picture set. This was repeated for all 10 nonwords. Responses were recorded as correct or incorrect.

Once this procedure (intervention and post-testing) was completed by all participants, the entire protocol was repeated with the second storybook (and comparison word list 6 in the post-tests).

Following data collection, the data was prepared for analyses. Responses were combined across the two books, creating totals for each measure for words within each condition (with semantic enrichment, without semantic enrichment, and control), for each participant. Given that there was a total of 10 nonwords per condition, the maximum score for each measure was 10, except for definitions, which had a maximum score of 20 (i.e., 10 items each scored out of 2). These computed variables were used in all analyses.

## **Results**

The descriptive statistics and correlation coefficients among pretest items are reported in Table 1. The PPVT-4 (A) was not significantly correlated with the CTOPP Sound Match test or with the CTOPP Elision test. All other items were intercorrelated. As expected, there are strong-to-moderate relations among alphabet knowledge, phonological awareness, vocabulary, and word comprehension. The means for all measures reflect performance at the participants' age-expected levels.

**Table 1***Descriptive Statistics and Intercorrelations Among Pretest Variables (N = 51)*

	1	2	3	4	5	6
1. CTOPP Sound Match	-	-	-	-	-	-
2. CTOPP Elision	.574**	-	-	-	-	-
3. WRMT Letter ID	.461**	.497**	-	-	-	-
4. WRMT Word ID	.549**	.488**	.572**	-	-	-
5. CELF-5 Word Classes	.549**	.328*	.548**	.363**	-	-
6. PPVT-4 (A)	.121	.215	.404**	.292*	.365**	-
Mean	7.16	4.08	25.00	2.59	12.41	111.02
SD	4.41	2.30	8.84	2.39	3.62	16.16
Range	18	8	34	12	16	54

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

*Word Learning:* An initial test examined whether participants could correctly determine which nonwords were encountered in the storybooks. Three one sample t-tests were used to test whether participants correctly responded to the question “Was \_\_\_\_\_ in our book?” at a level greater than expected by chance. The results indicated that participants’ average recognition score for the storybook nonwords presented with semantic enrichment ( $M = 9.33$ ,  $SD = 0.93$ ) was significantly higher than chance,  $t(50) = 33.24$ ,  $p < .001$ . For storybook nonwords presented without additional semantics, scores

( $M = 8.80$ ,  $SD = 1.20$ ) were also significantly higher than chance,  $t(50) = 22.63$ ,  $p < .001$ , as was the recognition that control nonwords were not in the story, ( $M = 8.80$ ,  $SD = 1.30$ ),  $t(50) = 20.95$ ,  $p < .001$ .

To investigate whether word learning was impacted by additional semantic elaboration, participants' scores on recognition, comparison, definition, expressive vocabulary, and receptive vocabulary tasks were compared between conditions.

Participants' mean scores are presented in Table 2.

**Table 2**

*Means and Standard Deviations for Word Learning Tasks (N = 51)*

	With Semantic Enrichment	Without Semantic Enrichment	Control
Recognition	9.33 (0.93)	8.80 (1.20)	8.80 (1.30)
Comparison	9.00 (1.25)	8.49 (1.32)	
Definitions	8.04 (3.12)	6.67 (2.94)	
Expressive Vocabulary	3.78 (1.89)	3.22 (2.04)	
Receptive Vocabulary	8.80 (1.72)	8.41 (2.12)	

To compare performance across conditions on whether participants could correctly identify whether nonwords were encountered in the storybooks, a repeated measures test was completed for performance on the recognition question. With a significant test of sphericity ( $p = .005$ ), there was a main effect for condition,  $F(2,49) = 6.42$ ,  $p = .003$ ,  $\eta^2 = .208$ , which is a medium-large effect size. To isolate this main effect, pairwise comparisons were run between all conditions. There was no significant difference between the condition without semantic enrichment compared to the control

condition ( $p = 1.0$ ); the condition with semantic enrichment was significantly higher than both the condition without semantic enrichment ( $p = .002$ ) and the control condition ( $p = .023$ ).

To determine whether additional semantic enrichment impacted the participants' depth of word knowledge, separate repeated measures tests were conducted on the various vocabulary tasks administered: comparison, definition, expressive vocabulary and receptive vocabulary. For the comparison question, there was a main effect of condition, showing a benefit of semantic enrichment,  $F(1,50) = 5.78, p = .020, \eta^2 = .104$ , reflecting a medium effect size.

For the definition task, there was a main effect of condition, showing a benefit of semantic enrichment,  $F(1,50) = 18.20, p < .001, \eta^2 = .267$ , reflecting a large effect size. For the expressive vocabulary task, there was a main effect of condition, showing a benefit of semantic enrichment,  $F(1,50) = 7.08, p = .010, \eta^2 = .124$ , reflecting a medium effect size.

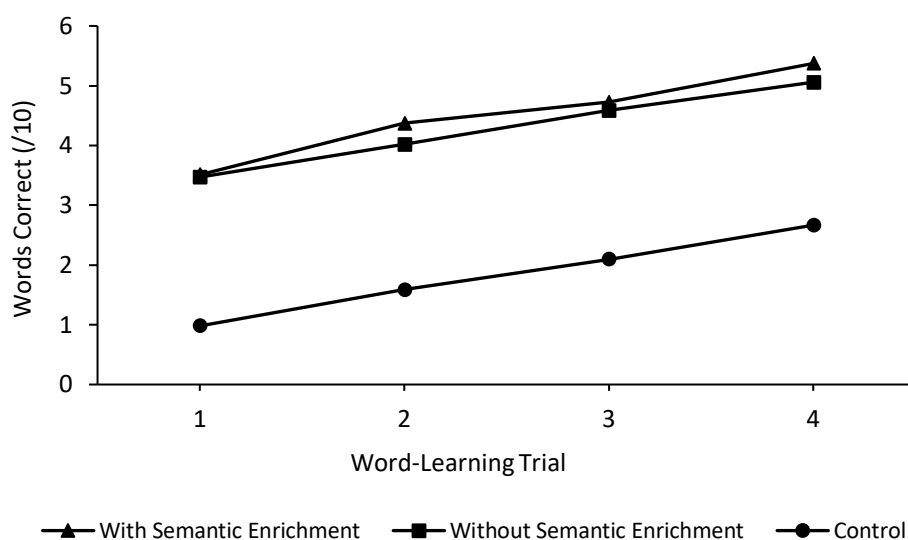
For the receptive vocabulary task, there was no effect of condition,  $F(1,50) = 3.11, p = .084$ .

*Learn-to-Read Task:* Performance on the learn-to-read task is shown for the words in the three conditions (with semantic enrichment, without semantic enrichment, control), see Figure 1. Repeated measures analyses were conducted across word-learning trials to test whether storybook exposure benefited learning to read these same nonwords. Test of sphericity was significant,  $p < .001$ . There was a main effect for trial,  $F(3,48) = 31.40, p < .001, \eta^2 = .662$ , which is a very large effect size. There was also a main effect for condition,  $F(2,49) = 51.15, p < .001, \eta^2 = .676$ , which is a very large

effect size. The trial by condition interaction was not significant,  $F(6,45) < 1.0, p = .876$ . Pairwise comparisons showed significant differences between each trial, all  $p$ 's  $< .001$ . Pairwise comparisons on total scores over the series of trials confirmed the observed superior performance on nonwords from both conditions that were in the storybooks compared to the nonwords in the control condition,  $p$ 's  $< .001$ . There was no significant difference between conditions with semantic enrichment and without semantics enrichment,  $p = .204$ .

**Figure 1**

*Mean Number of Words Read on Each Trial of the Learn-to-Read Task*



## Discussion

The findings of the present study highlight the impact of storybook exposure and semantic elaboration on the acquisition of vocabulary and early literacy skills. Although the children learned nonwords presented in the storybook under both conditions, word learning was improved when the nonwords were presented with semantic enrichment. The learn-to-read task demonstrated that storybook exposure directly influenced

learning to read, as participants showed superior reading for the nonwords that were presented in the storybook relative to control nonwords that were not part of the storybooks. There was no additional benefit of semantic elaboration evident in the learn to read task; previous exposure to nonwords benefitted learning to read, but additional semantics did not aid with learning to read.

*Word Learning:* As hypothesized, the children learned nonwords that were embedded in the storybooks. The participants correctly identified which nonwords were presented in the story, regardless of the condition; they recognized that control nonwords were not in the story at a level greater than expected by chance. This demonstrated that children of this age understood the task and could correctly recognize the words that had been embedded in the stories. The results demonstrated that nonwords presented with additional semantic activities were better learned than words presented without semantics.

Moreover, the present results supported the hypothesis that students would demonstrate a greater degree of knowledge for the nonwords that were presented with additional semantic activities. Various vocabulary tasks were used to determine whether additional semantic enrichment impacted the participants' depth of word knowledge: comparison, definition, expressive vocabulary and receptive vocabulary. For the comparison task, the definition task, and the expressive vocabulary task, there was a main effect of condition, showing a benefit of semantic enrichment. The present results are thus evidence that word learning is improved with the use of semantic enriching activities. In particular, word learning is improved by vocabulary depth, as proposed by Ouellette (2006). Words are learned incrementally, the greater the exposure to new

words, the deeper the knowledge of that word. Children gradually develop a more refined understanding of the words in their vocabulary the more they are exposed to them. As mentioned, Sénéchal (1997) demonstrated that children's expressive and receptive vocabulary improved with repeated exposure. Using storybooks, Sénéchal (1997) found that children who heard the story more frequently could understand and produce the novel words better than children in the control group, who only heard the story once. Further, Nation (2008), found that repeated exposure increased the understanding of the meaning of a word because of episodic knowledge. Each exposure creates a new episodic trace, thus more experience will add richness to the memory systems that serve lexical processing. Given that vocabulary depth can be learned to various degrees, it reasons that direct semantic elaboration would benefit children in this area.

On the contrary, there was no effect of condition for the receptive vocabulary task. When participants were shown a set of three pictures from the book, they performed very well at correctly identifying the picture that matched the nonword spoken by the examiner, regardless of semantic enrichment. The lack of effect of condition may be attributed to the nature of the task. Picture identification is a measure of receptive vocabulary; given that the picture is present, it acts as a cue to recall, making the task less demanding. This cue acts as a stimulus to the participants' memory, enabling them to retrieve the words more easily. Scores were high in both conditions ( $M = 8.80$  and  $M = 8.41$ ), suggesting that additional semantic information is not necessary for this type of identification exercise. This finding is in line with Sénéchal and Cornell (1993), who compared receptive and expressive vocabulary learning from storybooks in

four and five-year-old children. The participants were randomly assigned to one of four conditions, which varied in the level of engagement with the story, ranging from answering many questions throughout the reading to a simple reading of the story. They found that receptive vocabulary learning was robust, even after only one exposure, and that there was no significant difference under these varying conditions. This demonstrates that semantic knowledge does not significantly aid with receptive vocabulary tasks for participants of this age. Yet it can be noted that the present study's results for the receptive vocabulary task are approaching significance in the expected direction, with a higher mean for nonwords presented in the semantic enrichment condition, as hypothesized.

For the expressive vocabulary task, participants scored much lower than they did on all other word learning tasks. This is not surprising, as Sénéchal and Cornell (1993) found that four and five-year-old participants had more difficulty completing expressive vocabulary tasks compared with tasks of receptive vocabulary. The participants in their study scored higher in measures of receptive vocabulary than that of expressive vocabulary. In other words, recalling a label given the picture is far more difficult than choosing the correct picture given the label. The development of receptive vocabulary is the basis for the development of expressive vocabulary, as the understanding of a word precedes its production.

*Learn-to-Read Task:* Performance on the learn-to-read task shows that participants were better at reading words that were embedded in the storybooks. The present study is the first to show a direct relation between storybook exposure, vocabulary learning, and learning to read. Children demonstrated superior performance

on nonwords from both conditions that were in the books compared to the nonwords in the control condition, but there was no significant difference between conditions with semantic enrichment and without semantic enrichment. This demonstrates that semantic elaboration did not benefit learning to read, but previous exposure to the words was beneficial. If the word was present in the children's lexicons, they performed better on the learn-to-read task.

As previously noted, Apel (2010) conducted the only other known study to explicitly examine learning to read words through storybook exposure. In this study, kindergarten children listened to 12 storybooks, containing one nonword each, in a classroom setting. Each story consisted of four sentences and was displayed on a slideshow with an audio recording of the story. Following each storybook, participants performed four tasks: two written word learning tasks and two spoken word learning tasks. These tasks required participants to say and spell the nonwords, identify the words by images and identify the words by their written forms. The results indicated that children acquired specific phonological and orthographic knowledge of novel words through storybook reading. This suggested that emergent readers employ a mutually shared learning mechanism when learning new spoken words and their written forms.

These findings extend those of Apel (2010) by demonstrating a direct link between storybook exposure and learning to read. As mentioned previously, the findings of Apel must be interpreted with caution, as the methodology employed in that study did not measure the process of learning to read, as was examined in the present study. In Apel's study, posttesting happened immediately after each story, thus assessing immediate recall of only one item at a time, resembling more of a memory task than a

measure of learning to read. The current study used a more direct methodology, building on past storybook exposure literature, while adding a learn-to-read task, thus allowing for more confident conclusions regarding the vocabulary-reading connection in development.

The present study contradicts the findings of Nation and Cocksey (2009), who explicitly stated that knowledge of a specific word is not needed to read regular words, which can be sounded out through decoding. Nation and Cocksey studied seven-year-olds participants, who read two 32-item lists of words, of which some were spelled regularly, and some were spelled irregularly. They studied the children's phonological knowledge, semantic knowledge, and ability to read each word. Nation and Cocksey reported that children's knowledge about words in the oral domain is associated with their ability to read those same words aloud, even more so when the words contain irregularities between orthography and phonology. Interestingly, the current study found there was an advantage for storybook nonwords that were decodable, meaning some degree of vocabulary knowledge does matter even for decodable words. Yet, in the present study, added semantic depth did not add any additional immediate benefit for learning to read.

The current study supports the theories presented by Share (1995) and Ehri (2005) on previous exposure to words. Ehri (2005) suggested that words in a child's lexicon can be read without having to be fully decoded. They describe the gradual process by which children learn to read words, often beginning by learning the initial and final parts of a word. As a result, if the word is already in the child's lexicon, they do not have to decode it fully in order to activate the stored lexical representation. As

their lexical knowledge increases, children will gradually learn to decode the other letters by name and sound, which will strengthen the connection between orthography and phonology. In the current study, children improved with each trial on the learn-to-read task. Each trial repeatedly exposed the participants to the nonwords, making the words more defined in their lexicon. As a result, their performance increased with each trial.

Similarly, Share's self-teaching hypothesis of reading development suggests that vocabulary knowledge assists in decoding, and thus having a specific word in one's oral lexicon is advantageous (Share, 1995). This theory explains that a child's ability to learn to read words depends upon a child's ability to phonologically decode new letter strings. With repetition, this decoding leads to the establishment of lexical representations that are then accessed for more rapid, fluent reading and writing. That is, reading a word correctly reinforces the ability to read that word, as seen in the present study. This supports the notion that that learning to read words is item-specific, meaning that children can read words more easily if that specific word is in their oral lexicon.

Moreover, Share (1995) proposed that the self-teaching hypothesis was supported by semantics. As children begin reading at a higher level, they must read irregularly spelled words, which do not follow phonetic rules. Share (1995) reported that a greater semantic knowledge assists in decoding, especially for irregular words and homophones when the word is already present in the child's oral lexicon. When a child encounters an irregular word, the reader can partially decode it and then use the meaning of the sentence to help activate the correct pronunciation if that word is in their lexicon. The current study found that semantic elaborations did not add additional benefit in the

learn-to-read task. The posttest learn-to-read task presented the nonwords in isolation. The findings of Share (1995) may suggest that presenting the words within a context could have aided in learning to read the words in the semantic condition.

This finding adds to the growing literature on breadth and depth, as discussed by Ouellette (2006). As mentioned previously, breadth is defined as the number of items in an individual's lexicon; when a child acquires a word, they do not necessarily gain a rich understanding of the word. Depth refers to how well an individual can define and understand a word. Results from the study by Ouellette (2006) examined students in grade four and revealed that vocabulary breadth was a predictor of decoding ability and of more rapid visual word recognition. The present study supports this notion, as vocabulary breadth aided in the learn-to-read task; participants were better at learning to read the nonwords that were already present in their lexicons.

The present study found that semantic elaborations did not add additional benefit, which contradicts the findings of Ricketts et al. (2016). Ricketts et al. (2016) studied the link between semantic knowledge and word reading in emergent readers, using a sample of six and seven-year-olds. The participants were exposed to words, some of which were spelled regularly and some of which were irregular. They completed four tasks: two assessing reading (reading in isolation and reading in context) and two assessing lexical knowledge (auditory lexical decision and definitions). The results showed that lexical knowledge correlated with reading ability for all words. The children demonstrated a close relationship between semantic knowledge and reading words that are both regular and irregular in spelling. This suggested that semantics contribute separately to reading performance and thus the nonwords presented with

semantics should have supported word learning in the present study. Perhaps this was not found, as the nonwords presented in the current study were regularly spelled following conventional phonetic rules. The participants in the present study were also younger and just beginning to learn to read.

### **Limitations and Future Directions**

The next step for this research could be to replicate this study across students in higher grade levels. From a developmental perspective, this would prove useful in tracing the developmental trajectory of the reported relations. Previous work in this area reported a greater role of vocabulary depth and a lesser involvement of vocabulary breadth in grade six students, compared to grade one (Ouellette & Beers, 2010). It would be interesting to evaluate if semantics would have more impact on older students in completing a reading task. Further, older students are stronger readers, so it could be of interest to see the effects of semantics on reading, as opposed to learning to read.

One potential limitation to this study was the types of nonwords embedded in the storybooks. The novel nonwords were all nouns, as other forms of words, such as verbs or adjectives, can be more challenging to acquire during initial word learning. Future researchers should examine word learning and reading across word types to determine whether similar findings are obtained. This present study was also limited to the decodable word forms used. Future research could use varying word patterns, such as longer or irregular words. Past research has demonstrated a difference between regular and irregular words (Nation and Cocksey, 2009; Ricketts et al., 2016), suggesting that regularity of spelling may impact word learning and learning to read.

Another avenue for future research could be to examine the effects of semantics

on spelling. The present study is limited to reading, as participants' spelling was not measured. Developmental spelling has been directly linked to learning to read, but the link between spelling and vocabulary are not well explored. Future studies should incorporate spelling to see if it differs from learning to read.

### **Summary and Conclusion**

To conclude, the present study was undertaken to directly evaluate oral vocabulary learning and initial learning to read of novel words embedded within storybook contexts. The results highlight the impact of storybook reading on word learning, particularly when presented with semantic elaboration. Participants demonstrated a greater degree of knowledge for the nonwords that were presented with additional semantic activities. The increase in vocabulary depth served to increase the comprehension of the nonwords. Contrarily, semantic elaboration provided no additional benefit in the learn-to-read task; children demonstrated superior performance on nonwords that were embedded within the storybooks regardless of semantic elaboration. This demonstrates previous exposure (breadth) and some degree of vocabulary depth benefited learning to read those same words. If the word was present in the child's lexicon, they performed better on the learn-to-read task. The present study offers direct evidence of the role of vocabulary in learning to read, on a word-by-word basis.

The findings of this study offer guidance to parents and educators. It presents the notion that communicating with and reading to children facilitates both word learning and learning to read. To further aid word acquisition, semantic enrichment is recommended: specifically, repeated exposure to new words in storybooks and the use

of a dialogic reading style with discussion about the content of the story improves literacy skills. Oral and written language ability has long-term implications. Literacy is a prerequisite for all education and is a necessary skill for success in society today. In conclusion, it is crucial that children receive the necessary exposure to language early in order to reach their full literacy potential.

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## Appendix

### Word List 1

RELL  
FID  
VEAK  
LURT  
UT

### Word List 2

DUSS  
SOT  
ZEET  
VERN  
IP

### Word List 3

HESS  
BAZ  
LOAT  
PRAIF  
IM

### Word List 4

LERB  
DELTH  
YAIT  
RENSE  
WOTE

### Word List 5

FERD  
CRETH  
POAN  
JANSE  
DALE

### Word List 6

GIRT  
SHEAL  
ROOP  
PINSE  
JUME