Examination of the Effectiveness of Embedded Vocabulary Instruction

Vocabulary is an integral part of reading fluency and comprehension (Shapiro, 2011). Children from low-income families often have a limited vocabulary in comparison to those who come from a higher SES background. Graves, Brunetti, and Slater (1982) suggested that by first grade children from higher socioeconomic status (SES) families have nearly twice the vocabulary as children from lower SES environments. Once this gap occurs it is difficult to ameliorate because most academic curricula do not provide intensive vocabulary interventions. In addition, supplemental intervention is not always available. However, when direct vocabulary interventions for children from low SES homes are early in a child’s schooling, they are able to gain vocabulary that help diminish this inequality. Therefore early vocabulary interventions are essential to equalizing the academic playing field.

Supporting Research

Researchers have conducted multiple studies focused on different methods of implementing interactive shared book reading instruction and the corresponding vocabulary outcomes. In a school setting, Coyne, Simmons, Kame’enui, and Stoolmiller (2004) examined the effects of embedded instruction versus shared book reading on 34 students in comparison with 30 peers who did not receive the intervention. These students were chosen because they were identified as being at risk for reading difficulties based on their performance on letter naming and phonological awareness tasks. These weaknesses are typically associated with low children from low SES homes. Embedded instruction is that each time a target word is read in the book the interventionist reads the sentence as written, tells the students the definition of the target word, and then re-reads the sentence integrating the definition (Coyne, McCoach, & Kapp, 2007; Coyne, McCoach, Loftus, Zipoli, & Kapp, 2009).
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The embedded vocabulary intervention consisted of 108 half-hour sessions and 40 children’s books with three target words per book. Pre- and posttest data were collected using measures created by the researchers. The measures required the student to provide word meanings or share their own understanding of the word. The test consisted of 20 words (10 randomly selected target words and 10 randomly selected words) of the 120 potential target words and was administered over two sessions. Coyne et al. (2004) found that students who received the embedded vocabulary instruction made greater growth according to pre- and posttest data than students who were incidentally exposed to but were not explicitly taught the target words.

Coyne et al. (2009) conducted an interactive shared book reading intervention with 42 students on a singular storybook with 9 target words. All the students attended kindergarten at a public school where 65% of the student population was eligible for free or reduced-price lunch. Each student was read each story on three separate occasions. The 9 target words were taught using extended instruction (3), embedded instruction (3), and incidental exposure (3). Pretest, posttest, and delayed posttest assessments were administered 1 week prior, 1-5 days after, and 8 weeks after the intervention period. Pretest, posttest, and delayed posttest data were collected using researcher created measures which examined word recognition, receptive vocabulary, expressive vocabulary and context dependent word knowledge. Coyne et al. (2009) found that according to the measures children performed significantly on words taught using extended instruction in comparison with those taught using embedded instruction or incidental exposure on a majority of measures. Words taught with embedded instruction also showed greater gains than those in the incidental exposure condition on all measures except the delayed posttest of receptive definitions (Coyne, et al., 2009).
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Justice, Meir, and Walpole (2005) also compared the effectiveness of embedded instruction versus incidental exposure by examining intervention data from 57 kindergarten students. The students were chosen from two classes in a public school that served predominately lower SES children (more than two-thirds of the students received free or reduced lunch). The intervention consisted of 10 books each containing six target words or three per condition for a total of 60 words. The pre- and posttest measures were individually administered measures created by the researcher that prompted the student to verbally explain the meaning each word. Justice et al. (2005) found that words taught using embedded instruction resulted in meaningful gains between pre-and posttest evaluations.

The purpose of this study was to investigate the effectiveness of an embedded vocabulary intervention when implemented in a small group setting with a public school kindergarten class. The specific research questions are: (1) Does embedded vocabulary instruction improve kindergarten students receptive and expressive vocabulary? (2) Does changing the length and frequency of the intervention sessions effect the projected results?

Method

Participants

Four kindergarten students (1 male, 3 females; between 5 years 2 months and 5 years 11 months) participated in the study. The racial composition was 3 Caucasians and 1 African American student. The students ranged in from 5 years 2 months to 5 years 11 months. Prior to the intervention 2 students (Amy and David) were receiving special education services through the school. The participants were selected based on teacher recommendation because there was a paucity of preexisting information about the kindergarten students. The teacher suggested the selected students because they were struggling academically and were believed to come from
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lower SES homes. The intervention began during the eighth week of kindergarten.

Materials

Ten storybooks were selected based on those used by Justice et al. (2005) (see Figure 1). The books used in this intervention were developmentally-appropriate narrative storybooks with colorful illustrations, were not excessively long, and included texts published between 1963 and 2001. Six unfamiliar words were selected from each of the 10 storybooks used in this study. The sixty words were selected based on the study conducted by Justice et al. (2005). Justice et al. (2005) identified words based on collaborative discussions between two speech-language pathologists and two reading specialists. The words needed to meet four criteria in order to be selected. The word needed to be a tier-two word, “a medium- to high-frequency word that occurs across a variety of contexts for mature language users” (Justice, et al., 2005, p. 22). The words also needed to be unknown to kindergarten children, needed to occur without much context in the storybook, and the words could only occur once in the storybook from which it was selected.

The final word set included 28 verbs, 16 nouns, and 16 adjectives. After the words were selected they were placed in divided by part of speech (noun, verb, adjective) and randomly and equally assigned to elaborated or non-elaborate groups. These word groups were treated differently during the reading intervention.

Assessment Measures

Prior to the first intervention session each student was administered a Peabody Picture Vocabulary Test-4 (PPVT-IV; Dunn & Dunn, 2007) and a 60-question researcher-constructed measure. The PPVT-IV is an individually administered assessment that assesses a student’s receptive vocabulary abilities (SS=100, μ=15).
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The 60-question researcher constructed measure was set up like a traditional expressive vocabulary test. Each question consisted of one of the 60 target words. The researcher asked, “What does [target word] mean?” The student was then expected to respond verbally with their best attempt at an accurate definition for the target word. The students could receive up to two points per item based on the amount of knowledge conveyed by their definition (0-reflects no knowledge, 1- reflects incomplete knowledge, 2- reflects complete knowledge). Progress was monitored using a similar measure but included only the words being taught in each intervention session.

During each intervention session a pre- and posttest measure were administered. The assessments were structured identically to the 60-question research constructed but contained 12 to 18 items depending on the books read each week. These pre- and posttest measures were used to monitor students’ progress and guide intervention phase changes. It took approximately 5 to 15 minutes to administer each pre- and posttest measure.

Procedures

The initial intervention closely adhered to the procedures used by Justice et al. (2005). All students participated in 10 storybook reading sessions over a 10-week period. During each intervention session a 12-18 item pre- and posttest measure were administer. The assessments were structured identically to the 60-question research constructed measure and took approximately 5 to 15 minutes to administer. These pre- and posttest measures were used to monitor students’ progress and guide intervention phase changes. Each assessment was administered in the hallway outside the students’ kindergarten classroom.

Three books were read during each session. Therefore each of the 10 storybooks was read three times during the intervention. The intervention sessions lasted 20 to 30-minutes once per
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week. The interventionist followed a strict reading protocol to ensure fidelity across sessions and to keep participants focused on the storybook. The interventionist strayed from the prescribed texts to maintain participants’ attention, redirect participants’ attention to the story when needed, and elaborate on the words that were assigned to the elaboration condition.

The 60 target words were divided into elaboration and non-elaboration groups. The elaboration group contained 4 words and the non-elaboration group consisted of 2 words. Non-elaborated words were not explained in the context of the story or by the interventionist. Elaborated words were explicitly defined by the interventionist at the end of the sentence where the word occurred in the storybook. The interventionists provided the definition to the elaborated word and then re-read the original sentence with the definition embedded in it. The definitions were taken from a children’s dictionary and were modified to match the context of the story and the child’s developmental level. The words were highlighted in the storybook using highlighter tape and definitions were taped to the back of each book.

The first phase change, addition of a reinforcer, occurred during the fifth week of the intervention. This change was implemented because the intervention was not as effective as anticipated. The reward was used during the pre- and posttests each week to help increase motivation to respond to items in the weekly pre- and posttests. The reinforcer consisted of a jar of marbles and stickers. Each time a student provided a definition in response to a target word s/he could move a marble into the jar. If there were 10 or more marbles in the jar at the end of the pre- or posttest the child received a sticker. Marbles were given regardless of the accuracy of the students’ definition for each target word.

The second phase change occurred at week 7. It consisted of prompting the student with the title of the book from which the target word came. If during the posttest the child used the
word to define itself, said, “I don’t know” or “I can’t remember” the interventionist would say, “This word came from the book [book title]. Please tell me a definition of the word [target word] without using [target word] in the definition.” After providing a definition the student was asked the next question in the posttest. This phase change was chosen to help remind the student about the context in which s/he learned the word.

Each of the phase changes built upon the previous intervention tactics. The first phase change (reinforcer) maintained the methods of the original intervention and added the marble jar. The second phase change (prompt) continued with the initial intervention plus the marble motivator, which was added during the first phase change (reinforcer).

**Results**

The students’ initial Peabody Picture Vocabulary Test-4 (PPVT-IV) standard scores ranged from 87-107 (mean of 96.5). Based on scores from the PPVT-IV, Hannah and Amy fell within the low average range (see figure 2a and 4a) while David and Mia received average scores (see figure 3a and 5a) on the PPVT-IV. The scores received on the pretest vocabulary measure range form 0 - 5 out of 120 points (see figures 2a, 3a, 4a, 5a). These pretests were administered on the same day as the first intervention session.

**Initial Results**

During the initial phase of the vocabulary intervention (i.e., prior to adding a reinforcement and prompts), Amy and Hannah consistently earned 0 points on the posttest measures (see Figures 2a and 4a). David’s scores ranged from 0 to 2 points per posttest with an average of 0.75 points per week. Mia earned a minimum of 0 points and maximum of 2 points per week with a mean of 0.5 (see Figure 5a). The average points eared per posttest for all children combined was 0.31. Based on these data the interventionist decided to modify the
intervention to increase its effectiveness.

**Reinforcer Results**

After the reinforcer was added, posttest scores increased to an average 1.25 points per student. Amy continued to earn posttest scores of 0 points during each intervention session. Hailey increased from 0 points to 3 points during the second week (7th week overall) after the reinforcer was added (see figure 4a). This increased her average score from 0 during the initial phase of the intervention to an average of 1.5 points per week during the reinforcer phase. David’s posttest scores for the reinforcements phase were 0 and 3 points (mean of 1.5 points per posttest). These scores are higher than those he received in the initial phase (see figure 3a). Mia was absent during the 1st week of the reinforcer phase (6th week overall), but she earned 4 points during the second week of the reinforcer phase (see figure 5a).

**Prompt Results**

After the prompt was added, the average scores increased again. Amy and David earned 0.5 points on average during over the course of the prompt phase (weeks 7 -10 overall). Their scores ranged from 0 to 2 points per posttest (see figure 2a and 3a). Hannah scored an average of 3 points per week by scores 3 points per posttest (see figure 4a). Mia earned 5.25 points on average after a prompt was provided during the posttest (see figure 5a). Her scores ranged from 4 to 7 points per posttest. These data suggest that the intervention and each additional phase change either increased the effectiveness of the intervention or experimenter biasness (i.e., the likelihood that the measure accurately reflected the child’s knowledge of each target word).

**Overall Results**

Based on the scores collected 2 of the 3 students administered the PPVT-IV at the beginning and end of the intervention increased their PPVT-IV scores significantly (see figures
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2b, 3b, and 4b). At the beginning of the intervention Amy and Hanna received a Standard Score of 87 on the PPVT-IV. During the second administration Amy earned a Standard Score of 93. Hannah’s Standard Score of 98. Hannah and Mia’s 60-item researcher-constructed vocabulary measure also increased from 1 to 7 points and 3 to 15 points respectively.

Discussion

Even though the assessment scores show that 3 of the 4 students experienced positive growth the overall effectiveness of the intervention is still unknown. For instance, the changes could be due to the students increased comfort with the interventionist or their familiarity with the measures and/or vocabulary words. Conversely the students may have experienced greater improvement than was recorded by the pretest and posttest measures. This could be due to disinterest in completing the pretest and posttest measures. Each student expressed their disinterest during at least one of the posttest evaluations. For instance, both David and Mia openly said that they did not want to answer any more questions during the last administration of the research-constructed measure.

The embedded vocabulary intervention produced measurable gains comparable to those found by Justice et al. (2005). While additional modifications could be made to the procedures to increase the intervention’s effectiveness given the interventionist’s and students time constraints the intervention fit the demands of the situation. The intervention could be easily modified to fit the needs of any classroom or small group intervention setting.

Future Directions

The embedded vocabulary instruction intervention was effective in raising students vocabulary scores as reflected by their scores on the PPVT-IV and researcher-constructed vocabulary measure. The intervention could be implemented in a general education classroom
with ease and yield positive results. A teacher could easily implement the intervention, without progress monitoring, during her daily whole classroom read aloud. The modified intervention would consist of the teacher reading the same set of books for the duration of a week. During each reading the teacher would define the same set of target words that were unfamiliar and challenging to her students. S/he would introduce each word in the same way the words were introduced in the reading intervention. The general education classroom teacher could put this whole class intervention in place. It can be started at any point in the school year. This would be an informal intervention with no explicit goal.

If a teacher wanted to implement a vocabulary intervention in a small group setting with an explicit goal several changes should be made. Increasing the frequency of the sessions may be easier for the students to retain the definitions. Also, having shorter intervention sessions would allow the students to maintain focus with greater ease. By conducting intervention sessions 2-3 times per week for less than 15 minutes each would most likely yield greater results. In addition, if fewer books were read at a time (e.g., 5 books read 3 times each, 2 books read 3 times per 2 weeks) the repeated consistent exposure would reinforce the vocabulary words and their definitions.

The versatility of this intervention makes it an appropriate, feasible, and effective in a variety of settings. Such community settings could include afterschool programs, local libraries, and university tutoring programs. The use of formal and informal evidence based interventions is key to children’s academic success and ultimately the wellbeing of the community. Early vocabulary interventions are essential to promote maximum gains in children’s vocabulary and consequently reading capabilities (Shapiro, 2011).
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References


Figure 1.
Selected Books

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<tr>
<th>Book</th>
<th>Author</th>
<th>Year</th>
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<tbody>
<tr>
<td>Harry and the Terrible Whatzit</td>
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<td>Book! Book! Book!</td>
<td>Bruss</td>
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<td>Lawrence</td>
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<td>Swimmy</td>
<td>Lionni</td>
<td>1963</td>
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<td>Imagene’s Antlers</td>
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<td>1985</td>
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<td>Shy Charles</td>
<td>Wells</td>
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<td>Possum and the Peeper</td>
<td>Hunter</td>
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<td>What do you do with a Kangaroo?</td>
<td>Mayer</td>
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Figure 2a.
Amy Progress Monitoring Data

![Graph showing progress monitoring data for Amy](image)

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Figure 2b.
Amy Pre- and Post-Intervention Data

![Graph showing pre- and post-intervention data for Amy](image)

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Figure 3a.
David Progress Monitoring Data

![Graph showing progress monitoring data for David](image)

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Figure 3b.  
*David Pre- and Post-Intervention Data*

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Figure 4a.  
*Hannah Progress Monitoring Data*  
![Hannah Progress Monitoring Data](image)

Figure 4b.  
*Hannah Pre- and Post-Intervention Data*

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Figure 5a.  
*Mia Progress Monitoring Data*  
![Mia Progress Monitoring Data](image)

Figure 5b.  
*Mia Pre- and Post-Intervention Data*

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