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TEACHING VOCABULARY TO AT-RISK 3RD GRADE STUDENTS: PAPER-AND-PENCIL ACTIVITIES VERSUS TECHNOLOGY ACTIVITIES

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Abstract In this mixed-methods study, the classroom teacher examined six vocabulary activities to see if consistent practice of academic vocabulary over time would improve students' recall and working knowledge of the academic vocabulary being learned. Additionally, students' preferences to these activities were examined. Twenty-three third-grade students were given a pre/posttest in which they were asked to rate their knowledge of academic vocabulary words using a Likert. Students worked for a nine-week period using both three pencil and paper activities and three corresponding activities using technology. Results showed that the majority of these students more than doubled their understanding of academic vocabulary and students had a strong preference for the technology-based learning activities.

Introduction

This action research took place in a third-grade classroom. The study was developed because research has shown that vocabulary knowledge matters, as it helps with everyday communication, reading comprehension, and academic achievement (Glende, 2013). Additionally, students need regular opportunities to talk and to write using academic vocabulary in order to internalize their meanings and to use them to express their understanding of the content being learned (Echevarria, Vogt, & Short, 2004; Marzano, 2004; Shanahan, & Beck, 2007). We were curious to see if the implicit instruction and practice of academic vocabulary over time would improve students' recall and working

knowledge of academic vocabulary and to determine if students preferred paper-and-pencil activities or technology activities the most.

Purpose of Study. The U.S. Department of Education in 2013 revealed that students who performed well in vocabulary also performed well in reading comprehension. These findings confirm that vocabulary, which is one of the five pillars of reading, are fundamental for students to be successful in reading comprehension. The questions that led this study were:

- Are there paper/pencil activities that can be matched with technology programs that use the same approach to teach vocabulary?

- Can nine weeks of explicitly working with vocabulary make a difference in vocabulary growth?

- Do third grade students have a preference using paper/pencil or technologies to help with vocabulary growth?

- What activity did third grade students like the most while working with vocabulary?

Literature Review

Several theories support this project. First, this study supports the idea that vocabulary development is an essential component of literacy, as supported by the National Reading Panel Report (2000) that found vocabulary to be one of the five pillars of reading. While the ability to decode allows one to break down and recognize written text, knowledge of vocabulary unlocks the actual meaning of the text. "Vocabulary refers to the words we must know to communicate effectively, and applies to speaking, listening, reading, and writing," (Pinnell, 2008, p. 2).

Second, this study supports the idea of the Mathew Effect (Stanovich, 1986). The Mathew Effect was developed to explain the differences in literacy acquisition. Stanovich stated that reading begets reading, which we believe can be carried over to learning vocabulary words, as learning more words helps with the learning and understanding of even more words. The process of learning new words is important and there are three types of vocabulary words that must be learned. First, there is oral vocabulary. Listening and speaking vocabulary are in the category of oral vocabulary (Learning Point Associates, 2004). Oral vocabulary is the set of words we know well and feel comfortable using in our speech while listening vocabulary are the words we know and understand when others use them. Second, reading vocabulary is the set of words one recognizes and comprehends while reading. Third, writing vocabulary is a set of words that one is able to use while writing. A person is likely to have differing word lists in each of the three. For example, a young child's reading vocabulary may be more extensive than his writing vocabulary and one's oral vocabulary is the largest. An individual's vocabulary is developed over time through both indirect and explicit instruction, (Neuman & Dwyer, 2009).

Importance of Explicitly Teaching Vocabulary. Education has always encountered a small percentage of students falling into the at-risk category. Sadly, this category has had an escalation of students over the last two decades. A majority of these students are at-risk due to their lack of reading and comprehension skills (NAEP, 2011; Nagy & Townsend, 2012).

There are many components involved in the process of reading and comprehension. However, research has provided insight into the expansive differences in the vocabularies of high achieving students versus low achieving students (Careleton & Marzano, 2010; NAEP, 2011; Nagy & Townsend, 2012; Beck et al, 2013). This expanse stretches to roughly 6000 vocabulary words between students in the 25th percentile to students in the 50th percentile on standardized tests in grades four through twelve (Carleton & Marzano, 2010). According to the National Assessment of Educational Progress (NAEP) vocabulary report of 2011, in fourth grade 73% of the students who scored below the 25th percentile on vocabulary were eligible for the free or reduced school lunch program and in eighth grade 68% of these same status students scored below the 25th percentile.

"There are profound differences in vocabulary knowledge among learners from different ability or socioeconomic groups from toddlers to adults" (Beck et.al., 2013, p. 1). "Until schools are prepared to emphasize vocabulary acquisition, especially in the primary grades, less advantaged children will continue to be handicapped even if they master reading written words" (Biemiller, 2006, p. 44). Students and parents alike hear teachers say to read widely. However, Beck (2013) found that "relying on wide reading for vocabulary growth adds to the inequities in individual difference in vocabulary knowledge" (p. 8). If a reader is already struggling and lacking vocabulary schema, then wide reading is not an option. When children arrive at school for the first time, their educational schema varies greatly. Each child comes from a different environment with varying experiences that have been generated from their family culture and home life (DeVries, 2012). Some arrive with much less oral vocabulary than others. This is the reality in our culture, and schools cannot change what occurs before children arrive at their doors. However, schools do have the ability and resources to ensure that students begin and continue to acquire comprehensive vocabulary through their schooling. The further behind a student becomes, the less likely it is they can later catch up to become as successful.

Starting at approximately second grade, children increase their new vocabulary by 1,000 words per year of schooling (Biemiller, 2006). "Vocabulary knowledge is strongly related to one's reading proficiency and school achievement" (Beck, McKeown, 2013, p. 1). Children encounter a plethora of words in various forms every day. The real question is, how many of those words do they understand well enough to get the gist of the conversation and how many of those words do they understand well enough to use. The truth is there are an inadequate amount of vocabulary words that they understand orally and even fewer words that they can successfully use within a conversation (Beck et al., 2013).

Research completed by the U.S. Department of Education in 2013 revealed that students who performed proficiently on the vocabulary portion of the test also performed proficiently on the reading comprehension portion and therefore validates vocabulary as a

fundamental aspect in the active process of reading comprehension in all levels of schooling. "The new reading framework defines reading as an active, complex process that involves understanding text, developing and interpreting meaning from text, and using meaning as appropriate to type of text, purpose, and situation" (NAEP, 2013, p. 2). Researchers have found vocabulary to be one of the foundational pillars of reading comprehension (Beck et al, 2013; Nagy & Townsend, 2012; Stein, 2013).

Our background knowledge or schema plays a crucial part in our understanding of oral and textual language. If one's schema is rich enough within a concept, then that concept becomes relevant and comprehension of the components of that concept occur easily. However, if one's schema within a concept is inadequate then comprehension becomes difficult with a slower constructive retrieval process, if not impossible. "An important distinction exists between knowing a word meaning well enough to pass a multiple-choice vocabulary test and knowing it well enough to use it in text comprehension" (Beck, et. al., 1982, pg. 507). Therefore, when students face a segment of text that contains a high portion of vocabulary words that are not within their current schema or of familiarity but retrieved with difficulty, there is a discernibly negative effect on the students' comprehension. This is due to the processing interference of the text, attributed to attention that must be diverted from the construction of meaning to the action of searching for the words' meaning (Beck, McKown, & Kucan, 2008; Beck et. al., 1982).

The U.S. Department of Education (2002) mandated technology integration in all content areas for grades K–12. Therefore, teachers are now expected to integrate technology applications into the typical learning day to to create a digital learning environment in the classroom. With the integration of technology instructional planning will become more complex (Davies, 2011). Pechenkina & Aeschliman (2017) completed a study which showed students are currently using technology for educational purposes in minimal ways. Student's rarely engage with technology in educational settings unless it is presented to them as an important part of their learning. "Furthermore, students of this generation are not necessarily willing to take risks with new or unfamiliar technology unless they are convinced of its positive benefits in educational outcomes" (Pechenkina & Aeschliman, 2017).

Methodology

Instrument. The vocabulary-knowledge-rating-scale (Blochowicz, 1986) can be used before reading to evaluate students' prior knowledge of words/concepts that are found within the text. Students are given a list of words and asked to rate how well they know each term. Additionally, the list can be used after reading to evaluate students' word knowledge growth.

The vocabulary-knowledge-rating-scale uses a Likert-scale (0-3) rating to find out students' knowledge of words. The categories the students could use to describe their knowledge was 0 points = do not know the word; 1 point = have seen or heard the word; 2 points = know something about the word and/or can relate it to a situation; 3 points = know the word well, can explain it and use it correctly.

Data Collection. Data collection was done in two ways. First, the quantitative data was collected using the vocabulary-knowledge-rating-scale (Blochowicz, 1986). Second, the qualitative data was collected by interviewing the third-grade students.

Quantitative Data. The pre/posttest vocabulary list was created by using the academic vocabulary word list from Lead4ward field guide for third grade academic vocabulary. The list contained 30 words, so the total score students could receive ranged from 0-90 points.

Qualitative Data. This data was collected through both teacher observation and interviewing students about their learning of vocabulary words and their preferences for their learning, as seen below:

- Do you think you know more vocabulary words now that we have spent time practicing them?

- Out of all the activities, we did with paper and pencil; which activity was your favorite? Why?

- Out of all the activities, we did on the ipads; which activity was your favorite? Why?

- If you could choose from any of the activities we did, which one would you pick?

- Which activity do you think helped you to learn the most words and their meanings? Why?

Data Analysis. Quantitative data looked at descriptive statistics. As there were differences in mean scores from pre- to posttest, a paired-sample *t*-test was run using SPSS to determine if the differences were significant. The qualitative data simply looked at responses and tallied the results.

Study Design. This exploratory action research study was designed to use a mixed method approach as well as a pre/post design to determine student's vocabulary knowledge. The study lasted for a nine-week period for 40 minutes per day in a third-grade classroom.

Participants. The participants were 23 students who attended a third-grade classroom. There were 15 females (65%) and 8 males (35%). All but two students (87%) received free and reduced breakfast and lunch. Ethnicities of the children were varied and included: 23 (40%) African Americans students; 1 (4%) American Indian student; 2 (9%) Asian students; 4 (17%) Caucasian students; and 1 (4%) student marked other. Students involved in pull out programs included 2 (9%) English language learners (ESL) and 3 (13%) dyslexic students. *Intervention.* For a nine-week period, for 40 minutes a day, time was spent within centers using two interventions. Six activities were purposefully designed to teach the same concepts. However, twenty minutes were spent doing work and reinforcing vocabulary using a paper/pencil approach and twenty minutes were spent doing work and reinforcing vocabulary using a technology approach.

Paper/Pencil Activities. The first paper/pencil activity consisted of working with flash cards. The teacher created a word list and a definition list printed on colored paper. The students were asked to work on a memorization task with a partner to commit to memory vocabulary terms and their matching definitions.

The second paper/pencil activity consisted of working with matching. The teacher created another set of words and definitions again printed on colored paper. The students were asked to work on a matching task in which they could work individually or in pairs to match up vocabulary terms with their corresponding definitions.

The third paper/pencil activity consisted of using the graphic organizer entitled Vocabulary Diagram, which was adapted from the Frayer Model (Frayer & Klausmeier, 1969). The teacher provided copies of the graphic organizer for the students to complete. The students were asked to create a definition using their own words, provide an illustration or example, write at least one synonym, and create a sentence in which the academic vocabulary word was used correctly.

Technology Activities. The technology activities used free online application sources that would match the paper/pencil activities. The first activity was found at quizlet.com. The teacher entered the terms and definitions into the program in order to create an online folder. Then the students were asked to enter the site, select the vocabulary folder, and choose a game to play. The first activity was much like the flash card game. Here, students toggled back and forth between the term and the definition in order to practice memorization of the words and their meanings.

The second activity was created within quizlet.com. Students entered the site, and selected the matching game that would then bring up all the terms and definitions. Once the students matched the term with the correct definition, both disappear from the screen. This continued until all matches were made.

The third activity was found at popplet.com. By using Popplet, students were able to create a graphic organizer identical to that of the paper/pencil Vocabulary Diagram. The students were asked to create a definition using their own words, provide an illustration or example from clipart, write at least one synonym, and create a sentence in which the academic vocabulary word was used correctly.

Results

Quantitative Data. The quantitative data came from the vocabulary-knowledge-rating-scale. The pre/post academic word list contained 30 words in which the students were asked to rate their word knowledge by using a Likert-scale rubric of 0-3. Thus, each child could receive 0 to 90 points as a total score on both the pretest and the posttest. The total scores were figured for all 23 participants as seen in Table 1. The total scores were used to determine a mean score for both the pretest results and the posttest results. It was found that for the pretest, the students mean score were 13.78 while their posttests mean score were 38. A *t*-test showed that this difference was very significant at p=.000. These results

are shown in Table 1. Students were randomized and then given the vocabulary-knowledge-rating-scale (Blochowicz, 1986) prior to any activities being introduced. Their scores were recorded as their Pretest Results. This Likert-scale rating of 0 – 3 recorded each students' initial knowledge of the tested words by scoring their current word knowledge as 0 points if they did not know the word at all, 1 point if they had seen or heard the word before, 2 points if they knew something about the word and/or could relate it to a specific situation, and 3 points if they knew the word well and can explain it and use it correctly in a sentence. At the end of the nine-week period students were once again give the same knowledge-rating-scale and scores were recorded as the Posttest-Results. The rate of growth was then extrapolated and recorded in the Growth portion of Table 1.

Table 1: Students Pre/post Vocabulary Growth Results

Student Number	Pretest Results	Posttest Results	Growth in Words
1	11	34	23
2	20	53	33
3	7	40	33
4	39	63	24
5	16	33	17
6	3	11	8
7	33	55	22
8	29	61	32
9	18	56	38
10	8	24	16
11	10	34	24
12	26	68	42
13	4	26	22
14	6	30	24
15	4	35	31
16	1	11	10
17	1	27	26
18	4	32	28
19	17	41	24
20	7	30	23
21	19	46	27
22	23	40	17
23	11	24	13

Qualitative Data. To answer the five qualitative questions, the teacher both observed the students during center activities and also sat down individually with each child for a face-to-face interview. Question #1 asked "Do you think you know more vocabulary words now that we have spent time practicing them?". Twenty-two (96%) of the students agreed that they had learned "a lot" of new words. The teacher's observations recorded an increase in students' ability to orally communicate using the defined vocabulary words. To answer Question #2, which asked, "Out of all the activities, we did with paper and pencil; which

activity was your favorite? Why?", three students (13%) responded that they liked the matching activity the best while 20 (87%) students responded that they liked the Vocabulary Diagram activity the best. Those students who preferred the matching activity agreed they enjoyed "finding the pieces that go together". While the majority of students stated they enjoyed the drawing and coloring portion of the Vocabulary Diagram activity. Observations supported evidence that the students showed an increase in enthusiasm toward learning new words when given time to draw and color illustrations of those vocabulary terms. In response to Question #3, "Out of all the activities, we did on the ipads; which activity was your favorite? Why?", all 23 (100%) students chose the organizing map they could create on poplet.com in order to learn new words and their meanings. Many students explained that they enjoyed "drawing or looking for clip art" to match the vocabulary word. Observations indicated students were most engaged when working with the Poplet program. Fewer class interruptions and off task behaviors were observed. Question #4 asked students, "If you could choose from any of the activities we did, which one would you pick?". All 23 (100%) students picked the technology activity from popplet.com. Again, this was supported by the teacher's observation, as students were very excited when given the opportunity to interact with the technology program on a classroom iPad. Finally, Question #5 asked the students, "Which activity do you think helped you to learn the most words and their meanings? Why?". The Vocabulary Diagram pencil/paper activity was chosen by 4(17%) students, the remining 19 (83%) students chose Poplet.com and the use of technology, as they liked the program on poplet.com.

Discussion

The first research question asked if there were paper/pencil activities that could be matched with technology programs to teach vocabulary. The classroom teacher found that there were paper/pencil activities that can be matched with technology programs that use the same approach to teach vocabulary. Therefore, time was taken to research technology options that would provide a match to existing paper/pencil activities. This also allowed the teacher to meet The U.S. Department of Education (2002) mandated technology integration in all content areas for grades K–12. The first activity consisted of repeated readings of words and their definitions to increase memorization. The paper/pencil activity provided was working with flash cards and was paired with a free online application source at quizlet.com which functioned much like a flash card game. The second activity worked to enhance the memorization by using matching. The paper/pencil portion was composed of words and definitions printed on colored paper whereby students were able to match the vocabulary words with the definitions. This matching activity was paired with quizlet.com. Using this application students would match the term with the correct definition. When correctly matched both would disappear from the screen. The final activity was geared toward helping the students apply their new vocabulary words. For the paper/pencil activity students completed the graphic organizer to create a definition using their own words, provide an illustration or example, write at least one synonym, and create a sentence in which the academic vocabulary word was used correctly. To correspond with technology, the application popplet.com was utilized. In this application students completed the same paper/pencil tasks via technology.

The second research question led the researcher to examine the impact of explicitly working with vocabulary activities for nine weeks to see if this intervention could make a difference in a student's word understanding. It was found that 40 minutes a day for nine weeks had a very significant impact on these third-grade student's vocabulary growths and meaning understanding. Monitoring of students' vocabulary growth is a must. Students need clear definitions and illustrations to help them understand word meaning. This leads one to believe that if this approach in used for two-semesters or even the whole year, there should be huge gains by all children. These findings do support prior research on the importance of teaching vocabulary explicitly and long-term (Nagy, 2005; Nagy & Townsend; (2012).

The third research question asked if third grade students had a preference when working in vocabulary centers. The answer was a resounding support for technology to help with vocabulary growth over the use of paper/pencil. This makes sense as today's students have been utilizing technology to play video games, many from before the time they learned to walk. They have become accustomed to the colorful and animated screens that various programs use. Even though, the study completed by Pechenkina & Aeschliman (2017) showed students are currently using technology for educational purposes in minimal ways because they tend to only engage with technology in educational settings when it is presented to them as a required part of their learning, the students still tend to enjoy the technological activities. This could be an effect of the applications being set up and taught in detail prior to its use. Therefore, students were not forced to take any great risks with new or unfamiliar technology (Pechenkina & Aeschliman, 2017)

Implications

Looking to the future and continuing this approach in the classroom, several recommendations are given to classroom teachers. First, a smaller group of words need to be presented weekly rather than using all 30 words simultaneously. Listing the 30 words was overwhelming for some at-risk students even though they knew they would be learning them throughout the semester. Second, other options for activities need to be created and slowly introduced during center time. Finally, as the majority of the students preferred the technology vocabulary programs, more classroom iPads need to be acquired so that more technology activities can be used.

Conclusion

Vocabulary is a foundational pillar of reading comprehension (Beck et. al., 2013); Nagy & Townsend, 2012; Stein, 2013. Pinnell (2008) referred to vocabulary as the words we must understand to be able to speak, listen, read, and write. By exponentially increasing our student's levels of vocabulary we are also increasing their ability to communicate as a society through speaking, listening, reading, and writing. Vocabulary is important to the overall academic health of our students. Beck et. al. (2013) research showed the extreme variances in vocabulary knowledge among different ability or socioeconomic groups can be equalized by intense vocabulary instruction. By incorporating a steady regiment of vocabulary activities into students already existing center time activities, students' vocabulary growth rate was more than doubled within a nine-week period.

Technology is already a factor in our student's daily lives. Allowing them the choice to use existing technology programs to learn new vocabulary words increases the student's excitement in learning and thereby increases their vocabulary knowledge. The technology was not seen as daunting possibly because it was set up mostly in the form of games and previously taught before expected solo use.

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