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A Pilot Study on the Use of Nonlinguistic Concrete Materials and Drama to Aid Vocabulary Learning for Third-Grade Students

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Abstract

This article reports on the effects of the use of nonlinguistic concrete materials and dramatization on student vocabulary learning in eight third-grade classrooms. It follows a preceding study which determined that the use of nonlinguistic concrete materials and drama in K-3 classrooms for vocabulary instruction was minimal and varied across content areas. The results of the pilot study showed that the use of nonlinguistic materials significantly improved vocabulary learning for normally-progressing students (p=0.00185), but had little or no effect on students in reading intervention classrooms. The study was quasi-experimental in nature and utilized six third-grade classrooms of normally-progressing students and two third-grade reading intervention classrooms. Each set of classrooms was randomly divided between treatment and control groups. The study did not prescribe a vocabulary instructional method other than requiring that nonlinguistic concrete materials and drama were to be used in the treatment groups. The concept of augmenting vocabulary lessons with these materials was based on extending the preliterate method of learning names of objects by seeing, touching, hearing, smelling, and tasting them. Vocabulary instruction time was held constant throughout the study for both treatment and control groups.

The landmark studies on early vocabulary acquisition by Hart and Risley were the impetus for our studies on vocabulary instruction in grades K-3. Hart and Risley (1995) documented that early word exposure during the preliterate period provided a linguistic foundation that supports the acquisition of future reading skills. For preschool children, it is the home environment that sets the stage for later vocabulary growth. The early word learning begun in the home comes from incidental word exposure through conversations that occur within the earshot of the child and random utterances that occur during the day as the parent or caregiver interacts with the child. "We have to change your diaper" and "I bet you are hungry" are words spoken directly to the young child. In addition to the everyday routine use of language, parents and caregivers teach words directly to children within their natural environment. "Here is your *rabbit*" and "This is a *blue*ball" are

deliberate attempts to teach very young children word meanings. During this direct teaching, the targeted word's meaning is attached to a referent in the child's environment.

To determine whether the early practice of pairing the word with its referent continued at school in grades K-3, we conducted a descriptive study of the materials teachers in grades K-3 used when teaching vocabulary. In 2009-2010, trained graduate students observed a total of 507 vocabulary lessons in 179 classrooms in northern Mississippi to document the types of materials teachers used during vocabulary instruction. We were interested in learning how many times nonlinguistic concrete materials and drama were used to teach targeted vocabulary. We found that the use of objects and actions varied among academic content areas as well as among the Mississippi Department of Education school performance ratings. The numbers of lessons that used objects and action

as a percentage of total lessons are as follows (Holmes & Holmes, in press; MDE, 2010):

Academic Content Areas	School Performance Levels
Mathematics- 42.6%	High Performing- 34.5%
Science-15.0%	Successful- 31.2%
Language Arts- 9.1%	Academic Watch- 15%
	At Risk of Failure-11.8%

This article describes a second study we conducted with 118 third-grade students to test whether the inclusion of nonlinguistic concrete materials and drama added to regularly planned vocabulary lessons had a significant effect on vocabulary learning. It is important to note that for the purpose of both studies, we defined vocabulary knowledge as "knowing the meaning of words" and vocabulary instruction as "teaching the meaning of targeted words." Though important, spelling, phonics, and sight word recognition were not a part of either study.

Review of Vocabulary Instruction Research

The importance of vocabulary learning to school achievement cannot be overstated. Vocabulary knowledge is highly correlated with reading comprehension (Senechal, Ouelette, & Rodney, 2006; Biemiller, 2001; National Reading Panel, 2000; McKeown, Beck, Omanson, & Perfetti, 1983). Stanovich (2000) found that vocabulary levels assessed in grade one predict about 30% of the variance of grade 11 reading comprehension**.** Much of the research on direct systematic instruction of reading has focused on the teaching of phonological awareness, phonemic awareness, and phonics, all critical and predictive foundational skills for reading success. However, once these basic skills are learned, it takes vocabulary knowledge for students to comprehend the meaning of the words they have decoded (Stahl & Nagy, 2006; Nagy, 2005). The following quote by Marilyn

Adams (2010/2011) eloquently summarizes the importance of vocabulary knowledge:

What makes vocabulary valuable and important is not the words themselves so much as the understandings they afford. The reason we need to know the meanings of words is that they point to the knowledge from which we are to construct, interpret, and reflect on the meaning of text. (p. 8)

Biemiller (2004) found that there is little planned vocabulary instruction in kindergarten and first grade classrooms. Without planned direct vocabulary instruction, children depend on written contexts to learn the meaning of new sophisticated words. Unfortunately, research suggests that written context alone is inefficient and ineffective for children under 10 because texts written for the early grades focus on readability and do not contain the words that would expand vocabulary knowledge (Biemiller, 2006; Stanovich, 2000).

Vocabulary instruction should be taught through direct and indirect methods (Graves, 2008; Stahl & Nagy, 2006). Of the estimated 2,000-3,000 words students learn in a year (Stahl & Nagy, 2006; Beck &McKeown, 1991), teachers should choose 10-12 words to teach directly each week, 360-432 words for a 36 week school year (Stahl & Nagy, 2006). These are the sophisticated and academic essential words students must know well for their daily lessons. The rest of the words are learned through exposure, mostly from books and other forms of written text (Hayes & Ahrens, 1988).

Learning the meaning of words is a complex multidimensional process (Lesaux, Kieffer, Faller, & Kelley, 2010) that can move students from basic definitional knowledge to broader and deeper layers of meaning necessary for the development of conceptual knowledge. Or, it can begin with building the knowledge of concepts and culminating in definitional

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knowledge. These deductive and inductive approaches to vocabulary learning offer pathways to the understandings Adams (2010/2011) said were valuable and important for comprehension.

Nonlinguistic Materials as a Multisensory Context for Word Learning

The recognition that nonlinguistic concrete materials support cognitive processing is not new. Piaget (1976) developed his stage theory of cognitive development to explain how we learn about our world. Infants and young children begin to learn through multisensory explorations. As children progress through the next two stages, they depend on concrete materials to aid abstract thought. Roughly by age 12, they are able to engage in abstract thought with lessening dependence on concrete materials to the point where they can reason without their support.

Paivio (1986) found that interaction with nonlinguistic concrete objects supports linguistic input that leads to speaking and writing. He categorized these mental processes into two separate, yet interrelated cognitive subsystems, "verbal" and "imagery," referring to imagery as "referent images" (p. 120). In our study we refer to the use of nonverbal materials and drama as "nonlinguistic" and the verbal and written codes as well as two-dimensional imagery as "linguistic" and "imagery" vocabulary instruction. No matter what the label, wordless representations of objects, images, or events evoke separate memory processes from verbal and written linguistic presentations of information (Paivio, 1986). It is interesting to note that when either of the subsystems (linguistic or nonlinguistic) is activated, the other subsystem is more easily recalled (Paivio, 1986). Therefore, memory is strengthened when both cognitive subsystems are activated.

Younger children, who have not developed reading skills that enable them to read books with sophisticated vocabulary, must rely on mental and pictorial images to provide context clues for word meaning. Powell (1980) conducted a meta-analysis of 23 studies on the use of mental imagery to promote word recall and found that high imagery words (e.g. flower) were remembered more often than low imagery words (e.g. loyalty). Taken to a different level, Marzano (2004) advocates the use of real, rather than imagined pictures that are supplied by the teacher or generated by the students. Moving beyond two dimensional images, Stahl & Nagy (2006) support the use of drama to convey a word's meaning. They found that drama is most effectively used as a reteaching or reviewing strategy so that students have at least some background information related to the word as they try to construct meaning from the dramatic movements.

When the common method of instruction of using linguistic materials and two-dimensional images is augmented with nonlinguistic concrete materials and drama, students are exposed to more than one type of contextual encounter with words. This overcomes a danger pointed out by McKeown and Beck (2006) that teaching a word within a single context will lead to a limited view of a word's meaning. For example, to expand the students' knowledge about the word "barrel" teachers can bring a real barrel to class and let the students examine its attributes. This newly acquired information can be integrated with written and verbal explanations thus expanding their contextual knowledge of barrels. When students have access to information through their actions on a barrel, they develop an understanding that (1) not all barrels look or feel alike and (2) the word barrel, learned as a noun, can also be used as an adjectival (barrel shape)

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and verb (barrel down the road). These understandings facilitate students' ability to make meaningful inferences when they come upon this word in oral discourse or written text.

Nonlinguistic Concrete Materials and Drama in Vocabulary Lessons

In our review of the literature, we found that the concept of "multiple contexts," a bedrock principle of effective vocabulary instruction (Beck, McKeown, &Kucan, 2008; Coyne, Simmons, & Kame'enui, 2004), was predominantly linguistic. Images and drama were recommended as viable learning tools (Graves, 2009; Kamil, 2004; Marzano, 2004), but were far outnumbered in our search by linguistic-only vocabulary strategies such as graphic organizers, writing journals, interactive word walls, student-created definitions, morphemic analysis, and the use of written context to derive meaning.

Making connections between known information and new information is a critical cognitive strategy that enables students to build knowledge through the activation of existing schema. Carr & Thompson (1996) call this mental process the "power of prior knowledge" (p. 1). Through the use of concrete materials and drama, students are able to connect hands-on sensory knowledge to the more complex abstract processes of learning a referent's label, creating definitions, using words in sentences, and determining related conceptual information. Concrete materials provide opportunities for students, individually or in groups, to engage in nonlinguistic exploration, analysis, and inquiry that lead to linguistic processing through questions and conversations about the word and its attributes.

Noted researchers including Stahl & Fairbanks (2006) and Snow, Griffin, & Burns (2005)

emphasize that definitional and contextual knowledge must be present for effective word learning because both add essential dimensions of word knowledge. For deep contextual processing to occur, students must encounter words in a variety of contexts. Adding back the concrete referents to vocabulary instruction is one way to provide a contextual mix of strategies that provides opportunities for students to make connections between new and previously learned or experienced information about words.

We developed an intervention that supports the written and oral presentations of word meaning with visual and touchable materials. A nonlinguistic concrete materials-based intervention emulates at school the early word learning begun in the home. Through the use of concrete materials, teachers can build a nonlinguistic context to provide meaningful clues for vocabulary learning through relevant visual, auditory, tactile, olfactory, and gustatory/taste experiences. Students have opportunities to integrate their hands-on, and, in some cases, noses-on, and, in fewer cases, taste buds-on experiences with the linguistic experiences of reading, writing, listening, and speaking.

Third-Grade Pilot Study

The purpose of our study was to determine whether vocabulary learning and retention could be improved by expanding the term multiple contexts to include nonlinguistic concrete materials and drama. The following research questions guided this study:

Research Question 1: Does the inclusion of nonlinguistic concrete materials and drama with teacher-planned lessons promote more durable vocabulary knowledge for third-grade students

in regular education classrooms than lessons that rely solely on linguistic materials and two-dimensional images?

Research Question 2: Does the inclusion of nonlinguistic concrete materials and drama with teacher-planned lessons promote more durable vocabulary knowledge for third-grade students in reading intervention classrooms than lessons that rely solely on linguistic materials and two-dimensional images?

Research Design

The following are the three core principles that guided our study:

1. Directly teach a few words each week and teach for deep understandings.
2. Teach sophisticated rare words that have direct high utility for the students.
3. Enable students to encounter and use the words multiple times, in multiple ways, in multiple contexts that contain definitional knowledge and relevant nonlinguistic information.

The quasi-experimental study was conducted daily for five weeks in the fall of 2010. Eight third-grade classrooms were randomly separated into treatment and control groups. The treatment groups received vocabulary instruction augmented by the use of nonlinguistic concrete materials and drama; the control groups received linguistic and imagery vocabulary instruction that had been previously planned by the teachers. The type of assessment used was pretest/posttest. The pretest was administered prior to the start of the study in October and the posttest was administered seven weeks after the last instructional session. To distance the students from immediate instructional effects, the posttest was given after the students returned from Christmas break so we could determine with more certainty whether

the rate of word retention varied between students in the treatment and control groups.

Participants

A total of 146 students in regular education and intervention classrooms participated in the study. By the end of the study, data were analyzed for only the 118 students who had taken both the pretest and the posttest. Of these students, 92 were in regular classrooms and 26 were in intervention classrooms. School-wide, 57% of the students were eligible for free and reduced lunch. Seventy-eight percent of the students were white, 18% were black, and 2% were Hispanic. Eight teachers participated in the study. Of the eight teachers, six taught in self-contained classrooms with heterogeneous student populations and two taught reading intervention classes that served students with low reading achievement. The six regular education classroom teachers and the two intervention teachers were randomly assigned to either a treatment or control group by Ellenburg, one of the researchers. The size of the student population in each regular education and intervention class varied from 15-18 students resulting in n=51 for the regular education treatment groups and n=41 for the regular education control groups, and n=15 for the intervention treatment group and n=11 for the intervention control group.

Word Selection and Materials

Teachers from all eight classrooms met in September, 2010, to select 50 words to teach explicitly during the five week study. These words came from the third-grade curriculum course of study for reading, mathematics, science, and social studies curricula and were to be taught to all students in both the treatment and control groups. Specialized content area

words were selected because they appeared frequently in content area texts and lessons and were needed to understand the lesson. A few easier words were selected because of their prime importance for understanding a reading passage or for content area learning. The teachers used the following tiered system of categorizing words by level of difficulty and utility developed by Beck, McKeown, and Kucan (2002):

Tier 1- High frequency everyday words known and used by children that rarely need instruction

Tier 2- High frequency synonyms for the everyday words students already know and use

Tier 3- Low frequency, but essential specialized academic words, that refer to new or specific concepts within disciplines

It is important to note that the categorization of words among the three tiers varies according to culture and geography. For example, the students in the study live in southern Alabama and are more familiar with thunderstorms, tornadoes and hurricanes than children in southern California. Therefore, for this population of students we labeled these words as Tier 1. They are already primed for learning Tier 2 and Tier 3 words related to weather such as "precipitation," "cumulonimbus," "front," and "supercells." Furthermore, children who come from talkative families or who are exposed to a wide array of books have already been exposed to the more sophisticated Tier 2 and 3 words as a matter of course (Hayes & Ahrens, 1988; Hart &Risley, 1995) and should be challenged accordingly.

In addition to the challenge of selecting useful words at the appropriate level of difficulty, the teachers had to choose words that could be represented by concrete materials and drama.

Initially, they were concerned that there would be too few words that could be matched to their referents. However, this concern was unfounded. They found that many of the words students needed to know for content area learning and reading comprehension could be matched to these materials. Tier 3 themed content area words frequently lent themselves to multimodal student engagement (Bravo &Cervetti, 2008). The complete list of vocabulary words used in the study is shown in Table 1.

After the words were selected, teachers in the treatment group met to determine how to procure the necessary materials. Collaboratively, these teachers put together a vocabulary trunk with materials they already owned, could make, or find to share among the four treatment group classrooms. Many of the materials existed in the immediate environment and could be gathered at little or no cost. For example, for the word "spoiled" teachers provided their students with spoiled milk. For the word "bulb" teachers found different types of bulbs to show how the word "bulb" could be represented in different ways (e.g. flower and light bulb). Though a small budget was available by the researchers to the teachers to purchase materials, this was not used. Together, the teachers were able to gather all the materials on their own.

Another concern was that it would be too difficult or too costly to create a collection of materials for each of the four treatment classrooms. The teachers accommodated this need by staggering the times of their vocabulary lessons. This allowed the four groups to teach the same words each day using the same corresponding concrete materials.

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Instructional Procedures

The instructional part of the study began October 18, 2010, and ended November 19, 2010. All teachers were required to teach the same 50 words during the study. They explicitly taught 10 new words each week for five weeks. The vocabulary lessons lasted between 15-20 minutes a day, four days a week. Teachers in the treatment and control groups introduced all ten words along with their definitions on Monday. During the week they taught lessons using two different vocabulary PowerPoint programs that were required by the school and in place since August. The PowerPoint programs included pictures and videos of the words and contained games and other activities for the students and can be accessed from the following sources: Teacher Created Resources to Support Pearson Scott Foresman Reading Street
http://classroom.jc-schools.net/waltkek/Third%20Grade.html

Third-Grade Reading Street Teacher Resources
http://www.scottsboro.org/~flewis/SF%20Reading%20Street/Third%20Grade%20Reading%20Street%20Teacher%20Resources.htm

At the conclusion of each lesson, students in the treatment and control groups were given vocabulary worksheets that were to be completed during the day in learning centers. The worksheets were not graded, but were used to identify the words teachers needed to reteach or clarify during their lessons. On Friday, all students took a weekly vocabulary test.

The following describes how the vocabulary lessons differed between the treatment and control groups:

The teachers in the treatment groups augmented the PowerPoint lessons with nonlinguistic concrete materials and drama that matched the targeted vocabulary. They set aside these materials and gave the students time to explore them individually and in small groups. For example, students discussed the attributes of a real bulb made up definitions, used the word in sentences, and played games or completed activities introduced through the PowerPoint lesson. No scripting or detailed instructions on ways to use the materials were given to the four teachers.

The teachers in the control groups engaged the students in linguistic and imagery vocabulary instruction presented on the PowerPoints and did not include nonlinguistic concrete materials and drama in their lessons.

The authors met with the teachers weekly to ensure that the teachers of the treatment and control groups were following the study design.

Assessment

The same test was used as the pre and posttest for students in the treatment and control groups to determine levels of word meaning retention. The pencil and paper pre/posttest was created by the authors and the other third- grade teachers and revised to ensure that the definitions were accurate, clearly written, and that only one word from the list of four choices matched the definition. We checked the possible answers to make sure the distracters for any given word were constructed with the same part of speech, tense, or number. We followed a format recommended by the National Reading Panel (2000) where the definition was written and students had to select the word that matched the definition. We decided to use the definition as the stem with single words as the choices because the reverse procedure would have required the students to do more reading. With a 50 item pre- and post-test, we wanted to

minimize fluency and readability as variables in order to focus our assessment on word meaning.

Word Selection Analysis

Since the teachers selected the words to be taught according to their vocabulary framework and the various content units which were covered during the five week study, their decisions on word choice were final. We analyzed the 50 words they selected to determine whether there were patterns of word choices that emerged with a view toward informing word choice for future similar studies.

Our concern was that the teachers included 15 Tier 1 words among the 50 words they selected to teach. They responded that Tier 1 words were necessary since they were important to the unit of study. Furthermore, some said they didn't want the children to know zero words at the time of the pretest for esteem reasons. We deferred to their judgment on the issue, but the disadvantage of having too many Tier 1 words is that it removed a good deal of the "improvement space" or "headroom" in the study. That is, since the overwhelming majority of the students knew the meaning of the 15 Tier 1 words, they were actually being tested on only 35 words (the sum of the Tier 2 and Tier 3 words).

We divided the 50 words selected for instruction according to their parts of speech. The results are also shown in Table 1.

Table 1. Vocabulary Words by Tier and Part of Speech

Word	Tier	POS		Word	Tier	POS
WEEK 1				**WEEK 4**		
crops	2	noun		antlers	2	noun
lazy	1	Adj.		poked	1	verb
partners	2	noun		languages	2	noun
cheated	1	verb		thunderstorm	2	noun
instrument	2	noun		tornado	2	noun
calendar	1	noun		hurricane	2	noun
resources	2	noun		volcano	2	noun
community	2	noun		peninsula	3	noun
throne	2	noun		mountain	2	noun
environment	2	noun		bay	3	noun
WEEK 2				**WEEK 5**		
barrels	2	noun		blade	1	noun
pegs	2	noun		budding	2	verb
trophy	1	noun		notepad	1	noun
spoil	1	verb		fireflies	1	noun
coordinate grid	3	noun		flutter	2	verb
core	2	noun		crack	1	noun verb
crust	2	noun		patch	2	noun verb
mantle	3	noun		shivered	1	verb
map	2	noun		scattered	1	verb
rocks and minerals	3	noun		dew	2	Noun
WEEK 3				**WEEK 3 Continued**		
bulb	2	noun		Weather	1	Noun
blooming	2	verb		Collection	1	Noun
sprouting	2	verb		Celebration	2	Noun
doze	2	verb		Condense	3	Verb
showers	1	noun		Filter	2	Noun Verb

One reason for the dominant number of nouns was that the content-area textbooks typically dwelt on definitions related to the

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themed concepts of nouns rather than any other part of speech. For instance, in the science unit on the geological aspects of the earth, five vocabulary words were selected. All were nouns. In the unit on weather, four words were taught. All four were also nouns. Nouns were selected for the simple reason that they named the concepts the teachers wanted the students to know. Again, we deferred to the judgment of the teachers.

The teachers essentially followed the research-based advice of Biemiller (2001, 2004) that children younger than 10 years have difficulty inferring the meaning of new words from written context alone. Thus, the teachers selected important words from the context of the students' textbooks for intensive direct instruction and spent the first part of their vocabulary lessons on teaching the definitions and delivering instruction on those targeted words through PowerPoints. The teachers, therefore, used both contextual and isolated word methods for teaching vocabulary.

Another issue was the inclusion of inflected words in the 50 selected words. Unlike derivational morphemes that generally change the meaning and part of speech of the root words, inflectional morphemes don't change the meaning at all. Instead, they simply adapt the words to the standards of English usage and syntax by the addition of suffixes. Of the 50 words, the teachers selected 17 words in an inflected form. That is, "resources" was taught, not "resource," "blooming" was taught, not "bloom." One reason for this was that the word was simply copied without changing the form at all from the texts that the students were using in science, mathematics, or social science units.

Data Analysis and Results

The average scores on the pretests and posttests are shown in Table 2.

Table 2. Average scores by control and treatment groups on pre- and posttests		
Pretest	**Number of Participants**	**Average score**
Control Group	63	48.5
Treatment Group	70	50.6
Posttest	**Number of Participants**	**Average score**
Control Group	65	64.0
Treatment Group	69	72.2

The average scores indicate that the students knew the approximate meaning of about half the words to be taught. Of course, some margin must be assumed for correct guessing.

These raw averages shown in Table 2 simply show the approximate improvement over all students. For the detailed analysis, we eliminated pre- or posttest scores for the students who did not take both tests. To determine the improvement on a student-by-student basis, we compared scores of the same student from pretest to posttest by subtracting the score on the pretest from that on the posttest.

We separated the effects of the materials on normally progressing students in the six regular education third-grade classrooms from their effects on academically-delayed students in the two third-grade reading intervention classrooms. Thus, we analyzed the improvement

separately for the two intervention classrooms from the improvement of the other six classrooms.

The results for the normally-progressing classrooms and for the intervention classrooms are shown in Table 3.

Table 3. Average difference between pre- and posttest scores				
Normally Progressing Classrooms:				
			Number of participant	Average difference in posttest and pretest scores
Control Group			41	16.9
Treatment Group			51	24.4
Intervention Classrooms:				
			Number of participants	Average difference in posttest and pretest scores
Control Group			11	11.3
Treatment Group			15	11.9

The standard deviations for the average differences between posttest scores and pretest scores were 10.7 for the treatment group and 12.3 for the control group. A t-test was conducted to determine whether these results were statistically significant at the 0.05 level. We found that the result was significant at the p = 0.0011 level, thus enabling us to reject a null hypothesis that asserted that the use of materials had no effect on vocabulary learning by normally progressing third grade students. There remained, of course, the possibility that the treatment group was further advanced academically than the control group, either by innate intelligence or environmental factors.

In order to control for those differences, we conducted an ANCOVA, using the scores of the pretest as a marker for prior general

knowledge and the scores of the posttest as the dependent variable. However, prior to the ANCOVA, we ran a homogeneity of regression analysis to determine whether the assumptions behind the ANCOVA would be valid. The slopes of the regression lines for pretest versus posttest were determined for both the control and treatment groups. The slopes turned out to be within 6.8%, small enough to warrant the ANCOVA's use.

We found that the overall correlation between pretests and posttests for both groups combined was r = 0.665 and the portion of the within groups variability of the posttest scores attributable to covariance with pretest scores was 0.687. After subtracting variances arising from these sources from the appropriate variances (within groups and between groups), and adjusting the mean scores, we found a p-value of 0.00185, still substantially beyond our threshold for rejection.

The effect size was 0.668, in the moderate to large range.

We checked for internal consistency for each definitional question by utilizing the calculation of Cronbach's alpha. The variance of the posttests scores was 256.41 and the sum of the individual variances of each "testlet" turned out to be 39.47. Thus, Cronbach's alpha was calculated to be 0.863. Nunnally (1978) provides a rule of thumb of 0.70 in order for the data to be considered internally consistent. Thus, we concluded that our test instrument was in the proper range for internal consistency.

The results for the intervention classrooms, however, weren't so encouraging. The raw mean improvement for the control group (n = 11) was actually higher (13.1) than the treatment group (n = 15) mean improvement (12.5). One score in the treatment group was an

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outlier. The student scored 62 on the pretest, but only 40 on the posttest. If his/her score is disregarded, the raw mean increases to 15.0, but it is still far short of providing justification for rejecting the null hypothesis. The relatively small sample size and perhaps other hidden variables had a major impact on the study in intervention classrooms.

Conclusions

In this study we learned that nonlinguistic concrete materials and drama, when combined with regularly planned linguistic vocabulary lessons, had a positive learning effect for regular education students, but made no significant difference in vocabulary learning for students in the reading intervention class. The students in the regular education classrooms had large gains from pretest to posttest showing that concrete materials were associated with vocabulary learning. The low p-value gives usconfidence that this is a real improvement, not just a statistical anomaly.

Questions and Concerns

Why was there a vast difference in the improvement of vocabulary learning between the students in regular and intervention classes? It is intuitively appealing to think that multisensory materials would provide a necessary scaffolding for children unable to derive meaning from the more abstract code instruction of speech and writing. But that conclusion was not borne out by the data.

Why did we teach the same words to both groups? The words came from academic content taught to all students and they are therefore important to understand other subjects in the curriculum. Denying students in the intervention group access to sophisticated and academic words will hurt them during their

study of academic subjects. We maintained high academic standards for both groups.

The most frequently asked question concerning this research was none of the above, but rather, "How do you teach words that represent abstract concepts and, therefore, can't be represented by their concrete referents?" Our response mirrors the answer that the phonics-first researchers give when asked about non-decodable words: "You teach them as sight words." Our answer for words that can't be represented through concrete materials and drama: "You use linguistic methods." However, just as there are a large number of words that can be decoded, there are a large number of words that can be represented through nonlinguistic materials. Because teachers have time to teach directly only a fraction of the 2,000-3,000 words students learn each year, the field is wide open to select words that can be matched to concrete referents or represented through drama.

How was this augmentation of vocabulary instruction received by classroom teachers? Some teachers we talked to have been reluctant to try new methods that deviate from trusted linguistic strategies. In our conversations they said they thought the use of nonlinguistic concrete materials and drama would be too time consuming and labeled these materials as something fun to do, a "frill." However, the teachers who participated in the study planned to continue using concrete materials into their vocabulary lessons. This strategy also had the support of the principal who asked the third-grade teachers to create vocabulary trunks of materials.

Implications for Future Research

Implications for future research come from the questions that arose from the study design and learning improvement results. It is

evident that more research is needed to determine the disparity between regular education and reading intervention results. With such small numbers, 26, in the intervention classrooms, more research must be done on a larger sample size to confirm the reliability of the results.

Another variable may have been the differences in the size of the students' vocabularies. If students in the intervention classes have a smaller lexicon, they may lack the relevant schema to learn some of the more sophisticated academic words during the time of the study. On the other hand, the selection of less challenging words creates a ceiling effect that limits the measurement of learning improvement between the pre and posttest. To minimize the numbers of words students must learn, we suggest that teachers use materials to teach the meaning root words without their inflections. Because inflections typically accommodate the syntax of the language, root word knowledge should be sufficient for learning meaning. In this study, 34% of the words were inflected rather than root words. Reed (2008) found that students who use their knowledge of morphology to break words into their roots and affixes learn the meanings of two-three more new words daily than students who have not been taught this skill.

The principles of judicious word selection, multiple exposures, and varied contexts (e.g. Pearson, 2007; Hiebert & Kamil, 2007; Stahl, & Nagy, 2006; Beck, McKeown, & Kucan (2002); Blachowicz & Fisher, 2000) are hallmarks of a sound research-based vocabulary program that can be sustained and supported through the use of concrete nonlinguistic materials and drama. When teachers expand their repertoire to include materials students can see, touch, hear, and sometimes taste and smell, they provide an enriched multisensory context that provides even more opportunities for students to deepen their word knowledge, and is not a frill.

Vocabulary learning is integral to the Common Core State Standards for English Language Arts. The College and Career Readiness Anchor Standards for Language (CCR) devotes three of the six standards to vocabulary that include the analysis of meaningful word parts, the use of context clues, nuances in word meaning, and the use of academic and domain-specific words (CCR, 2011). To help all students meet these standards, it is essential to further the research on vocabulary learning.

Currently, we are replicating this study in 12 regular education sixth-grade mathematics classrooms. We are also seeking ways to repeat this study in other K-3 regular education and reading intervention classrooms to learn whether the impact of nonlinguistic concrete materials and drama on vocabulary learning varies among grade levels, achievement levels, special populations, content areas, and word choice.

Though there is no single method that works for all students, our study of pairing of nonlinguistic materials with linguistic instruction can expand contexts for word learning. The third grade teachers in our study stated that they were able to identify important curriculum content words that could be matched to available or inexpensive referents and easily include them in their regularly scheduled vocabulary lessons. Through the use of concrete materials and drama, their students had opportunities to engage in exploration, higher level thinking, and discourse in teacher-directed and student-centered lessons. Lessons that engage students with linguistic and nonlinguistic information are compatible with Paivio's (1986)

dual coding theory where he states, "Human cognition is unique in that it has become specialized for dealing simultaneously with language and with nonverbal objects and events" (p. 53).

Our pilot study of third-grade students is important because it establishes a rudimentary research base for the inclusion of nonlinguistic concrete materials and drama in vocabulary lessons. To date, we have found no other studies that focus on the teaching of vocabulary with nonlinguistic concrete materials and drama.

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