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Assessing Vocabulary of Children: Investigating the Evaluation and Instruction of Basic Concepts

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by

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Abstract

Vocabulary knowledge of preschool children is a key factor in predicting literacy success in elementary school (Hammer, Farkas, & Maczuga, 2010). However, few deliberate attempts to teach basic concept vocabulary have been studied (Bowers & Schwarz, 2013; Wilson, 2004). The purpose of this research is to determine if large group explicit instruction with interactive activities of specific basic concept vocabulary will increase preschool children's understanding of basic concept terms when measured by a standardized basic concept assessment. This research will also assess the validity of a basic concept-curriculum based measure (BC-CBM) as an efficient tool to monitor a child's understanding of basic concept vocabulary over time. There were 30 preschool children (M age=53.8 months) who participated in this experiment. Results demonstrated the standardized assessment and BC-BM raw scores improved through intervention. Further research is supported to evaluate the BC-CBM on a larger scale and control for more factors, which influence vocabulary development in children.

Keywords: basic concept, vocabulary, preschool, assessment

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Assessing Vocabulary of Children: Investigating the Evaluation and Instruction of Basic Concepts

It has been determined that the amount of vocabulary knowledge a child has upon entering elementary school influences their reading level and later academic success (Hammer, Farkas, & Maczuga, 2010; Snow, Tabors, Nicholson, & Kurland, 1995; Storch & Whitehurst, 2002). This correlation between vocabulary understanding when entering elementary school and later academic success has been observed to impact a person into adulthood (Beitchman, Jiang, Koyama, Johnson, Escobar, Atkinson, et al., 2008; Hall & Tomblin, 1978; Tomblin, Freese, & Records, 1992). Beitchman, et al. completed a 20-year longitudinal study on vocabulary growth in young children to early adulthood and found that children who exhibited language difficulties at five-years-old continued to experience receptive vocabulary deficits when they were 25 years old. Thus, the strong relationship between early vocabulary knowledge and language outcomes later in life illustrates the need for early identification and instruction in vocabulary knowledge. Although it is as yet unclear how assessment approaches and interventions may best address deficits in early vocabulary knowledge, a number of factors may influence vocabulary development including environmental factors, basic vocabulary knowledge, and vocabulary instruction.

Environmental Factors

A child's environment deeply influences their language development (Hart & Risely, 2003; Hoff, 2006; Van Kleeck, Lange, & Schwarz, 2011). Many factors shape their environment, including the education level of their mother, the quantity and diversity of words spoken to the child, and the socioeconomic status (SES) of their immediate family.

Maternal Education

Maternal education correlates with a child's acquisition of language. Children whose mothers have a high school diploma or less education demonstrate lower scores on narrative and vocabulary language assessments than children whose mothers have some post high school education (Dollaghan, Campbell, Paradise, Feldman, Janosky, Pitcairn, et al., 1999; Hoff & Tian, 2005; Huaqing, Kaiser, Milan, & Hancock, 2006; Van Kleeck, Lange, & Schwarz, 2011).

Quantity of Words Spoken

In addition to maternal education, the number of words spoken to a child also affects his/her development of vocabulary words (Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Rowe, 2008; Son & Morrison, 2010; Walker, Greenwood, Hart, & Carta, 1994). A child exposed to a greater quantity and higher quality of spoken words early in life has more opportunity to develop language, which will in turn increase their academic success in school (Dickinson, Cote, & Smith, 1993; Dodici, Draper, & Peterson, 2003; Walker et al.). They would also be more likely to have greater language outcomes later in life. It is estimated that a four-year-old child from a family of professionals would have heard an average of 45 million words, while a child from a lower SES would have only heard 13 million words (Hart & Risely, 2003). As such, quality and quantity of vocabulary knowledge has a close relationship with verbal input early in life.

Socioeconomic Status

The difference between language development of children from lower and upper SES homes begins as early as pre-kindergarten and continues into elementary school. In a study conducted by Ouellette & Casteel (1988), the Boehm Test of Basic Concepts (BTBC) (Boehm, 1986) was administered to 52 pre-kindergarteners from low, middle, and high SES homes. They

found there was a difference between the scores of children from low, middle, and high SES homes, with the students from the middle and high SES homes scoring higher on the BTBC than those in the low SES group. Biemiller and Slonim (2001) observed that second grade children from low SES demonstrated an average of 1,600 fewer vocabulary root words than second grade children from an upper SES. Walker & Greenwood (1994) performed a longitudinal study to assess the mean length of utterances (MLU) and the number of different words (NDW) spoken by toddlers at 36 months of age to determine their language use. They observed over the course of seven years the children's language, verbal ability, and academic achievement outcomes were positively related to their language ability at 36 months old. They also found a positive correlation between the children's SES and their performance on all assessments. Therefore, the available evidence suggests that early vocabulary knowledge is critical to later academic success.

Basic Concept Vocabulary

One component of vocabulary knowledge critical to later academic success is basic concept knowledge. Young children use existing vocabulary knowledge to gain understanding of additional vocabulary words. An integral component of early vocabulary development is the understanding of basic concept vocabulary words; a specific subset of vocabulary words. Basic concept words are "foundational and functionally relevant concepts", which are important for a child to learn new vocabulary (Bracken, 2006, p. 2). Wiig (2004, p. 4) defines basic concept vocabulary as "building blocks that children need to follow directions, engage in classroom routines, and provide descriptions of the world around them" and "fundamental for performing everyday tasks such as reading, writing, speaking, and math". These terms are found in state educational standards (Bracken, 2010), directions of standardized tests (Cummings & Nelson, 1980; Flanagan, Alfonso, Kaminer, & Rader, 1995; Kaufman, 1978; Shapiro, Keller, Lutz,

Santoro, & Hintze, 2006), and classroom instructions (Lane & Allen, 2010; Lin, Lorrence, & Gorrell, 2003). Basic concept vocabulary categories include: position, self/social awareness, texture, material, quantity, and time (Bracken, 2006). A child needs to understand the basic concept vocabulary words in order to "make rational judgments, either among objects, persons, or situations" (Boehm, 1971, p. 10).

While we do know preschool children from lower SES homes are further behind in the vocabulary understanding than children from middle and upper SES homes, there is a lack of understanding of specific basic concept knowledge in preschool children from a lower SES (Dollaghan, et al., 1999; Hoff, 2003; Horton-Ikard & Weismer, 2007; Mistry, Biesanz, Taylor, Burchinal, & Cox, 2004; Seifert & Schwarz, 1991). Due to the impact basic concept vocabulary understanding has on a child's success in school the acquisition of these vocabulary words needs to be addressed (Boehm, 1971; Ellis, Schaudecker, & Regimbal, 1995; Estes, Harris, Moers, & Wodrich, 1976; Piersel & McAndrews; 1982; Rosenkoetter & Barton, 2002). Vocabulary intervention programs have been found to be effective in increasing vocabulary knowledge in children from low and high SES (Bracken, 1986; Marulis & Neuman, 2010; Wilson, 2004). Yet, low SES children do not improve their vocabulary scores as much as high SES children (Juel, 1988). This disparity highlights the importance of effective instruction to strengthen the vocabulary foundation of children from lower SES homes. Therefore, there is a need to determine efficient methods of basic concept intervention and how to monitor progress of a child's understanding of basic concept knowledge.

Components of Vocabulary Instruction

One important aspect of early vocabulary knowledge is how to most effectively address deficits in basic concept knowledge. The research on basic concept vocabulary intervention is

scarce, but research investigating general vocabulary knowledge has shown there is a relationship between overall vocabulary knowledge and literacy skills in elementary school (Dickinson & McCabe, 2001; McCardle, Scarborough, & Catts, 2001). Despite this relative paucity of well-controlled studies addressing intervention, research has identified two key components of effective vocabulary instruction: explicit instruction (Beck & McKeown, 2007; Roskos, Burstein, & Sullivan, 2013; Wilson, 2004) and interactive activities (Beck & McKeown; Brabham & Lynch-Brown, 2002; Mol, Bus, & de Jong, 2009).

Explicit Instruction

Explicit group instruction of vocabulary words has been found to increase vocabulary knowledge of young children (Beck & McKeown, 2007; Roskos, et al., 2013; Wilson, 2004). Beck and McKeown provided Rich Instruction (explicit vocabulary instruction) to kindergarten and first grade children. The Rich Instruction consisted of: explaining the meaning of the target word, having the children repeat the word to create a phonological representation, give examples of the target word used in other contexts, having the children choose the correct use of the target word when given scenarios and expand on the target word, lastly having them repeat the word and meaning to reinforce the phonological representation. They found that the children who received Rich Instruction learned significantly more vocabulary words than the children receiving no supplemental instruction.

Interactive Activities

In addition to explicit instruction, interactive activities provide the children opportunities to use the target vocabulary word kinesthetically and initiate their own knowledge of the word (Beck & McKeown, 2007; Elleman, Lindo, Morphy, & Compton, 2009; Justice, McGinty, Cabell, Kilday, Knighton, & Huffman, 2010; Seifert & Schwartz, 1991). Beck and McKeown

investigated if interactive practice with target words would increase a child's understanding of that word. They used a within subjects design with kindergarten (n=36) and first grade (n=40) students. A pre-test and post-test were developed by the authors to include the vocabulary words taught, which were given to all participants. The vocabulary words taught to the students were divided into two groups: one set (6 words per week) was taught using explicit, large group instruction and the other set (3 words of the initial set) would include additional review and interactive practice. All children would be taught using both methods. The mean vocabulary gains for the words taught using the additional review were significantly greater for both classrooms (kindergarten=8.03 words, first grade=6.88 words) than the mean gains for the words only utilizing explicit, large group vocabulary instruction (kindergarten=2.97 words, first grade=3.10 words). Beck and McKeown's study indicated that an interactive review on vocabulary words taught could result in gains almost twice as large as using only explicit vocabulary instruction. The current study on basic concept vocabulary will expand on previous studies of explicit vocabulary instruction and will assess the effectiveness of large group basic concept instruction to preschool children.

Large Group Instruction

Due to the overwhelming number of young children from low SES schools that are statistically delayed in their vocabulary knowledge, large group instruction is necessary to reach these children (Neuman & Kaefer, 2013; Justice, et al., 2010). Neuman and Kaefer examined if there was a difference between small group instruction versus whole class instruction on vocabulary development of preschool children. The researchers randomly selected 108 children from twelve Head Start classrooms to receive 10-12 minutes of supplemental vocabulary instruction. This was a within subjects design where each child received large group instruction

on one set of words and small-group instruction on a different set of words. The vocabulary intervention was given daily for eight weeks, alternating small group and large group instruction every two weeks. The classroom teachers were trained to provide explicit and systematic vocabulary intervention. All children completed the Peabody Picture Vocabulary Test-3 (PPVT-3) (Dunn & Dunn, 1997) as a pretest and post-test to assess their receptive language ability. The scores on the PPVT-3 were analyzed using analysis of variance (ANOVA). The results showed a significant gain in vocabulary knowledge from pretest to post-test in both groups. There was not a significant difference between group sizes, indicating that group size did not affect word learning. Thus, large group vocabulary instruction can be effective in a preschool environment.

Justice et al. (2010) administered a pilot study to evaluate if a systematic, explicit, large group language and literacy intervention program would be more successful in facilitating preschool children's language skills than implicit classroom instruction. This study looked at gains in the child's vocabulary, in addition to narrative, print knowledge, and phonological awareness. The vocabulary instruction "Read It Again" (RIA) was implemented for the experimental group (n=66). RIA is an explicit vocabulary instruction program that utilizes storybooks. The control group (n=71) implemented the standard curriculum program. The Clinical Evaluation of Language Fundamentals Preschool—Second Edition (CELF Preschool–2) (Wiig, Semel, & Secord, 2004) was administered to all participants as a pretest and post-test in order to track language knowledge of the participants. The preschool children in the experimental group significantly improved their raw score on the CELF Preschool-2 after participating in RIA. The study by Justice et al. indicates that a small amount of explicit, large group language instruction could improve a preschool child's understanding of vocabulary words.

Basic Concept Vocabulary Instruction

Explicit large group vocabulary instruction has been found to have significant improvements on preschool and early elementary children's vocabulary knowledge (Beck & McKeown, 2007; Coyne, McCoach, & Kapp, 2007; Seifert & Schwartz, 1991). Seifert & Schwartz previously tested the effectiveness of large group instruction targeting basic concept vocabulary words on 57 children (n=28 experimental, n=29 control) utilizing direct instructions, interactive, and incidental teachings. The direct instruction phase began by providing the children with multiple examples of the target concept word. Positive and negative models of the target word were provided for the children. The models were presented for several minutes, then the children were asked to state whether an example was correct or not. The children answered in a group format and the researcher determined their understanding of the target word by their responses. The next phase was the interactive instruction phase. During this phase, the researcher would provide the child with an art project, drama, or game illustrating the target basic concept word. The final phase included incidental teaching. The classroom teachers were given a list of the weekly target words and asked to increase their use of those words in the classroom. They found that the group that received the basic concept instruction significantly improved their understanding on those specific vocabulary words. In an effort to integrate important aspects of vocabulary knowledge, the current study will include large group explicit instruction and interactive activities of basic concept vocabulary words to preschool children to evaluate the effectiveness of this approach on increasing their basic concept vocabulary knowledge.

Vocabulary Assessment

In addition to a need for effective approaches to address deficits or differences in early vocabulary knowledge, the magnitude of influence that basic concept terms have on a child's

understanding of vocabulary words shouldn't be overlooked. A valid direct assessment for monitoring a child's understanding of basic concept vocabulary terms is needed.

Standardized Assessment.

One method of assessment is via standardized tests of vocabulary knowledge. Standardized instruments are often used to assess students' level of vocabulary performance. This type of assessment is used in schools to compare a child's performance at an isolated point of time to normative data (Bogue, DeThorne, & Schaefer, 2014). Normative data is data that characterizes a defined population at specific point of time (McFadden, 1996). Standardized assessments are generally administered every one to three years to assess students' growth in skills. Testing at this interval does not provide educators with timely information of their students' understanding of curriculum due to instruction or maturation over the course of the school year (Dean, Burns, Grialou, & Varro, 2006). In order to efficiently evaluate students' understanding of curriculum an educator needs to be able to track the "slope" of their progress throughout the course of the year. This cannot be done with norm-referenced standardized assessments (Shinn, Good, Knutson, Tilly, & Collins, 1992). Assessments have been developed to track students' changes over time as an evaluation of their understanding of curriculum.

Curriculum Based Measurements

Educators have begun to recognize the value of assessments that monitor changes in students' knowledge acquisition over a short period of time. Curriculum based measures (CBMs) are a direct, quick, and repeatable assessment that can quantify students' performance throughout the school year (Deno, 1985; Fuchs & Fuchs, 1986; Hartman & Fuller, 1997; Shinn et al., 1992). CBMs utilize standardized measurement procedures to monitor an individual student's progress before and during instruction by plotting the scores on the CBM to compare progress. The

educator can then use this information to determine if the child is gaining the intended knowledge through instruction (Hartman & Fuller). CBMs have an advantage over standardized assessments, because they are concise, repeatable over a short period of time, and are able to detect changes in a student's knowledge. Studies have proven them to be reliable and valid indicators of a student's understanding of instructed material and their academic progress (Hintze, Ryan, & Stoner, 2003; Shinn, 1989; Shinn et al., 1992).

Basic Concept-Curriculum Based Measurement.

The use of a norm-referenced standardized assessment of basic concept vocabulary requires training, cost of the assessment, and 30-40 minutes to administer the assessment to an individual child (Bracken, 2006). Currently, there is not a valid basic concept-curriculum based measurement (BC-CBM) to assess basic concept knowledge. The development of a valid and reliable BC-CBM would enable educators to efficiently assess a young child's understanding of the basic concept vocabulary words, which are foundational in the child's vocabulary development. A BC-CBM is a concise assessment specifically designed to monitor progress of basic concept vocabulary knowledge over time. It can be administered and scored with a brief training session. Bowers and Schwarz (2013) evaluated the use of a BC-CBM to track progress during an intervention for basic concept vocabulary with children who are deaf or hard of hearing (n = 4; *M* age = 4.6). The researchers concluded the BC-CBM provides an indication of a child's understanding of basic concept terms; however, the study needs to be expanded to test the BC-CBM on a larger population.

Concise and effective large group instruction of basic concept vocabulary is necessary due to the large number of children from lower SES homes entering preschool with a decreased

knowledge of basic concept vocabulary terms. An efficient, reliable, and valid measurement of a child's understanding of basic concept vocabulary is needed to monitor progress over time.

For this study, a between and within subjects quasi-experimental design will be used to determine the effects of large group basic concept vocabulary intervention and to evaluate the criterion validity of the BC-CBM.

Specific Aims

Specific Aim 1

To administer large group explicit instruction with interactive activities of specific basic concept vocabulary words to preschool children from lower SES homes in order to increase their understanding of basic concept terms.

Hypothesis/Expectation 1

The large group instruction of basic concept vocabulary words will increase preschool children's understanding of basic concept terms demonstrated by their performance on a standardized assessment and a BC-CBM.

Specific Aim 2

A BC-CBM will be developed that will measure the slope of change over time of a child's understanding of basic concept terms.

Hypothesis/Expectation 2

The BC-CBM will accurately measure a child's understanding of basic concept vocabulary by following a similar slope of change over time when compared to a child's scores on a standardized basic concept assessment.

Specific Aim 3

A BC-CBM will be developed to be a dynamic assessment to monitor a child's basic concept knowledge progress in the classroom.

Hypothesis/Expectation 3

The BC-CBM will demonstrate a significant change in number of basic concept words correct from the pre- to post-intervention.

Experiment

This research was conducted to gain preliminary information on the ability of the BC-CBM to track changes over time and the effect that large group explicit instruction with interactive activities will have for children from low SES homes. This was a pretest/post-test comparison group design.

Methods

*Participants***.** The participants in this research were 53 students from two local Head Start locations recruited to participate in the investigation. Signed parental consent forms were obtained for 30 students. Weekly basic concept-curriculum based measures (BC-CBM) were given to all participating students; however, students that missed three or more trials out of eight were not included in the analysis. Of the 53 original students, 30 completed the pre- and post-Bracken Basic Concept Scale—Revised (BBCS–3:R) (Bracken, 2006), the initial and final BC-CBMs and at least five of the eight weekly BC-CBMs (mean age=53.8 months [SD=3.35]); thus, (53 that have signed consent – 30 =23) students were not included in the final cohort due to attrition, absences, did not complete pre- and post-testing, moved, non-fluent in English, and/or noncompliance during testing. Data are reported on for 14 students from the two classrooms receiving the intervention component and 16 students from the control classrooms. There was no

significant difference (p= .143) between the ages of students in the experimental group (mean age = 53.86 [SD=2.71]) and the control group (mean age=53.75 [SD=3.91]). All participants were eligible for kindergarten in the upcoming school year and were from families with reported incomes below the federal poverty level. The University's Institutional Review Board approved this research project prior to the start of all data collection (see Appendix A).

Setting. All assessments and interventions took place at Head Start facilities located in Fayetteville, AR and Springdale, AR and were administered in the classrooms or outside (during recess) at a location apart from the play area to minimalize distractions. Large group explicit instruction on basic concept terms with interactive activities was administered twice a week in two prekindergarten classrooms (experimental group). Two other prekindergarten classrooms were used as a control group and were only administered the assessment battery. Researchers reported occasional distractions during the assessments (e.g., noise level in the play area, another child attempting to join the assessment).

Materials

The following assessments were administered to all participants: the Bracken Basic Concept Scale—Revised (BBCS–3: R) (Bracken, 2006) and a basic concept-curriculum based measure (BC-CBM).

Assessments

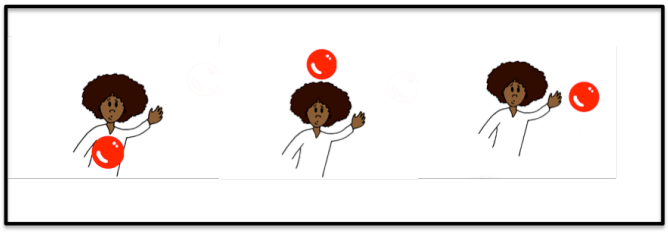
Bracken (2006) and Wiig (2004) identified functionally relevant basic concept vocabulary terms a child should know in order to understand their environment and they each developed norm-referenced standardized assessments to measure these terms. The BBCS–3: R (Bracken, 2006) was chosen as the norm-referenced standardized basic concept vocabulary assessment in which to develop and compare the results of the BC-CBM. The BBCS–3: R

includes the largest number of basic concept terms assessed on a standardized measure. The BBCS–3: R includes 308 basic concept terms (Bracken 2006), the Wiig Assessment of Basic Concepts (WABC) includes 113 basic concept terms (Wiig), and the Boehm Test of Basic Concepts-3: Preschool (BTBC-3: P) assesses only 26 basic concept terms (Boehm, 2001).

In order to create the BC-CBM, the BBCS–3: R (Bracken, 2006) was administered to a different set of preschool children (n=28) the previous year. The individual responses on the BBCS-3: R (Bracken, 2006) were analyzed and the 50 terms not understood by the majority of the participants were selected. The BBCS–3: R includes 10 subtests (e.g., direction, size, quantity), and an equal percentage of words from each subtest were selected for the BC-CBM. These terms were then paired with a basic concept term representing the opposite meaning, yet from the same category of subtest (e.g., above/below; different/same; each/neither) resulting in 28 pairs of basic concept terms to include on the BC-CBM. Words from each subtest on the BBCS-3: R were included on the BC-CBM.

For the BC-CBM, each basic concept term was pictorially represented on an individual card (see figure 1). Two foil pictures were included on the stimulus card. These were similar in content with the target concept (e.g., all pictures include a ball, but only one ball is “above” the girl). A graphic designer created all illustrations included in the BC-CBM, in order to maintain uniformity in the design of each card. The BC-CBM contains 56 cards, which were administered weekly to all participants. The participants were asked to point to the basic concept term from a closed set of three options, requiring no verbal expression from them to demonstrate knowledge of the concept. The cards were randomized each week (Urbaniak & Plous, 2013) in order to avoid order effect and to use comparable and multiple test forms. This enabled a large set of concepts to be mixed and frequently used to monitor progress (Elliott, Lee, & Tollefson, 2001).

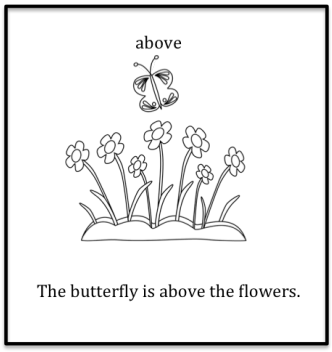
Figure 1. Example of BC-CBM stimulus for “above”.



Intervention

Direct instruction and interactive activities were provided as part of the basic concept intervention methods for the experimental group. Materials used during the explicit instruction portion included: small toys (e.g., animals, cars) used to illustrate the basic concept vocabulary word being taught (e.g., hold up a small toy above the researcher’s head and say “this is above my head”; hold three stuffed animals and indicate which animal is in the middle). Basic concept coloring pages (created by principle investigator) illustrated the basic concept words targeted during the explicit instruction (see figure 2), and crayons used to color the basic concept coloring pages were used for the interactive instruction. The coloring page had the basic concept word written at the top and a sentence containing the target word at the bottom of the page. An illustration of the basic concept term was in the middle of the coloring page.

Figure 2. Example of BC-CBM coloring page for “above”.



Procedures

Assessments

The Bracken Basic Concept Scale—Revised (BBCS–3: R) (Bracken, 2006), was administered to all participants prior to and after the intervention portion of study. The basic concept-curriculum based measure (BC-CBM) was administered to all participants prior to, during, and post intervention. To administer the BC-CBM, researchers (undergraduate and graduate students in the speech-language pathology program) would organize the BC-CBM cards according to a randomized list; show the participant the BC-CBM cards one at a time, and say, "Point to the picture that shows _____" as the initial BC-CBM card was presented to the participant. After the child pointed to the picture they felt illustrated the target basic concept vocabulary word, the researcher recorded their answer on a data sheet and flipped to the next card, then only said the target item for each subsequent card. This format was followed for all cards. The participant was given three minutes to complete as many cards as they were able. Data was collected at 1-, 2-, and 3-minute intervals in order to determine the ideal administration time of the BC-CBM. Explicit instructions were provided to administer the BC-CBM in a uniform manner (see Appendix B for instructions to administer the BC-CBM). Data was collected over 11 weeks (beginning in mid-September and ending in early December).

Explicit instruction

Large group explicit instruction on basic concept terms with interactive activities was administered semiweekly to the 14 participants in the experimental group. The intervention covered two basic concept vocabulary words from different BBCS-3: R subtest categories (e.g., above and daytime) per week. All instruction was provided by the principle investigator (PI), a speech-language pathology graduate clinician supervised by a licensed Speech-Language

Pathologist (SLP). One basic concept term was taught per session (see Appendix C for a sample lesson plan). The PI gave five to eight minutes of explicit instruction to the class in a large group setting. This instruction consisted of identifying the target basic concept word (e.g., above) and using the word and it's negative to illustrate the concept (e.g., "This is above. This is not above"). The PI would check the children's understanding of the basic concept by asking the group to identify which object demonstrated the basic concept. When the majority of the children could identify the basic concept correctly the direct instruction would end with a song or poem (involving movement) including the basic concept vocabulary word (e.g., Twinkle, Twinkle Little Star) (Campbell, Helf, & Cooke, 2008; Ellis, et al., 1995; Thorpe & Borden, 1985).

Interactive instruction

After the song/poem, the participants would be dismissed to their seats to begin the interactive instruction portion of the intervention and were given a basic concept coloring page illustrating the target vocabulary word. The participants were given five minutes to color their coloring page. As they were coloring, the PI instructed the participants to circle the basic concept vocabulary word in the sentence. The coloring sheets were collected at the end of the instructional time and assembled into a basic concept vocabulary mini-book for each participant to take home following the intervention portion of the research. There were 19 basic concept vocabulary words taught during the intervention portion of this research. The intervention took place on Mondays and Wednesdays.

All children in both groups (experimental and control) completed the BC-CBM on Thursdays and Fridays. The intervention was conducted 19 times over 11 weeks. There were school closures due to teacher inservice days and holidays that extended the intervention phase.

After the intervention phase, the BBCS–3: R was administered to all participants in all four prekindergarten classrooms.

Data Analysis

The one-, two-, and three-minute raw scores of the basic concept-curriculum based measure (BC-CBM) were compared to the raw score of the Bracken Basic Concept Scale—Revised (BBCS–3: R) pretest.

The concurrent validity of the BC-CBM was determined by comparing the raw scores from the one-, two-, and three-minute administration of the BC-CBM to the raw score of the BBCS–3: R. The ability of the BC-CBM to track changes over time was analyzed using a one-way repeated measures ANOVA. Out of a total of 240 possible BC-CBM data points, there were a total of 24 missing values (i.e., participant was sick, not available for testing that week, etc.) with a total of 10% of missing values. In educational research, it has been documented that statistical analyses are valid if 10% or less of the data points are missing (Dong & Peng, 2013). Averages from the weekly BC-CBM's before and after scores were computed for the missing values.

Results

The pretest raw scores from basic concept-curriculum based measure (BC-CBM) one-, two-, and three-minute timed tests were compared to the pretest raw scores from the Bracken Basic Concept Scale, Third Edition (BBCS-3: R) using a two-tailed Pearson Bivariate Correlation for the participants (N=30). There were significant correlations between the raw scores of all timed tests and the BBCS–3:R ($p<.01$, $r=.502$; $p<.01$ $r = .532$; $p<.05$, $r=.462$, respectively). Means and standard deviations for pre-test BBCS–3: R raw score and BC-CBM

assessments are reported in Table 1. The two-minute timed test demonstrated the highest correlation with the BBCS–3: R; therefore, it was used for all further analyses.

Table 1. Mean raw score of the BC-CBM and the raw score of the BBCS–3:R.

N = 30 students	Mean	Standard Deviation
BC-CBM 1 minute	7.83**	2.45
BC-CBM 2-minute	13.67**	4.16
BC-CBM 3-minute	19.3*	6.85
BBCS–3:R raw score	97.37	45.3

*Significantly correlated to the BBCS–3:R at $p < .05$

**Significantly correlated to the BBCS–3:R at $p < .01$

An independent *t*-test was used to analyze the mean scores of the experimental and control groups prior to intervention. There was a significant difference between groups for the BBCS-3: R raw scores (t [28] =2.44, $p < .05$), the BBCS–3: R standard scores (t [28] = 2.6, $p < .05$) and the 2-minute timed BC-CBM (t [28] =5.13, $p < .01$). Means and standard deviations are reported in Table 2.

Table 2. Means and standard deviations for pretest assessments.

Group (N = 30)	Experimental	Control
BBCS-3: R raw score	117.29 (42.1)	79.94 (41.6)
BBCS-3: R SS	92.79 (12.3)	80.0 (14.3)
BC-CBM 2-minute	16.71 (3.2)	11.0 (2.9)

The difference in basic concept knowledge from pre- to post-intervention by group was determined by an analysis of variance (ANOVA). For the BBCS-3: R raw score (i.e., how many basic concepts were answered correctly) there was a significant main effect (F =[1,28] 4.804, *p*= .037) for change in basic concept knowledge from pre- to post-intervention, with no significant group by time interaction (F= (1,28) 1.879, *p*= .181). Post-hoc analysis demonstrated that there was a significant difference from pre- to post-test raw scores for the experimental group (*t* = [13] 2.4, $p < .05$) but not the control group (*t* = [15] .608, *p* = .553). For the BBCS-3: R standard scores, there was no significant main effect (F= (1, 28) .247, p = .623). For the BC-CBM, there was no significant main effect for change in pre- and post-test two-minute timed BC-CBM assessments (F = [1,28] 1.01 *p*= .322). Means and standard deviations are listed in Table 3.

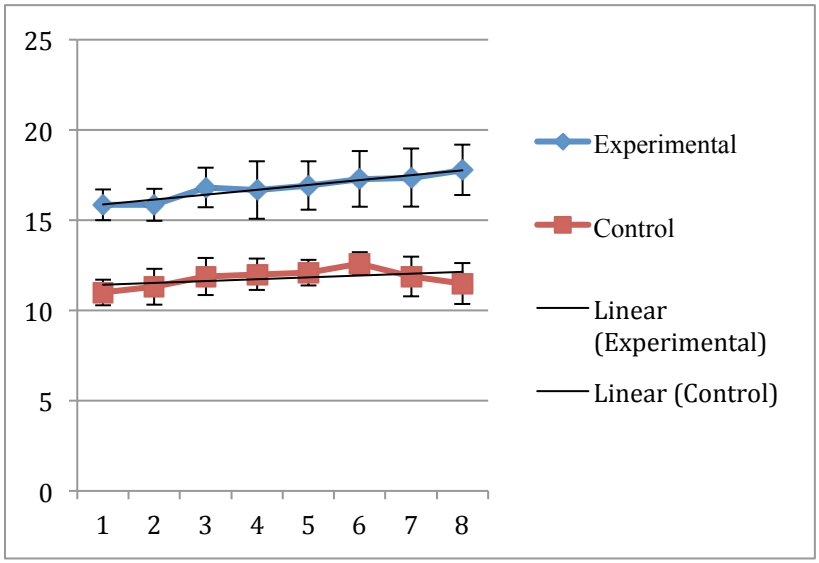
Table 3. Mean and standard deviations of pre- and post-test BBCS-3: R scores by group.

N= 30	Pretest raw	Post-test raw	Pretest SS	Post-test SS	Pretest 2-min	Post-test 2-min
All students	97.37	112.40	85.97	84.60	13.67	14.43
(N= 30)	(45.27)	(48.29)	(14.69)	(13.56)	(4.16)	(5.75)
Experimental	117.29	142.79	92.79	92.00	15.86	17.79
(N=14)	(42.09)	(39.98)	(12.26)	(12.16)	(3.33)	(5.19)
Control	79.94	85.81	80.00	78.13	11.00	11.50
(N=16)	(41.62)	(38.82)	(14.35)	(11.46)	(2.88)	(4.56)

Eight trials of the BC-CBM were taken over the 11-week intervention period from both the control and experimental groups. The average score went from 15.86 at trial one to 17.79 at trial eight in the experimental group and from 11.0 to 11.5 in the control group. Figure 3 shows the average basic concepts correct for the two-minute timed test for both groups for all eight trial

periods. There was not a significant linear trend for the either group. Overall, the experimental group demonstrated an increase in 1.93 basic concepts for the 2-minute test (15.86 to 17.79), while the control group only demonstrated an increase of 0.5 basic concepts.

Figure 3. BC-CBM raw score by trial.



Discussion

A review of the literature clearly demonstrates that while vocabulary knowledge of preschool children is a key factor in predicting literacy success in elementary school, there is little data to demonstrate ways to assess and track change over time of basic concept vocabulary (Bowers & Schwarz, 2013; Hammer et al., 2010; Wilson, 2004). As such, this study was designed to further investigate the use of a Basic Concept Curriculum-Based Measure (BC-CBM) as a way to measure baseline basic concept knowledge, track basic concept knowledge over time, and demonstrate if the BC-CBM was sensitive to instruction. Baseline data were obtained using a standardized assessment, the BBCS-3: R, and an experimental BC-CBM. Participants in the experimental group received explicit basic concept instruction while students

in the control group received classroom instruction only. All children attended two local Head Start preschool programs. Findings from the study are discussed below.

Students from a total of four Head Start classrooms participated in this experiment with complete pre- and post-assessment data available for 30 of the original 53 participants. Results demonstrated that as the pretest raw score on the BC-CBM increased, the BBCS-3: R raw score also increased ($p < .01$). This positive correlation suggests there is concurrent validity for the BC-CBM. The positive relationship between the BC-CBM and the BBCS-3: R signifies that the BC-CBM may be a valid and efficient tool to obtain baseline information regarding basic concept knowledge. This is an important finding since CBMs are designed to be efficient (i.e., a two-minute timed test) and can be administered by a trained individual such as a classroom teacher or paraprofessional as opposed to a standardized assessment that must be administered by someone with advanced training of normative data.

It was important to determine if the BC-CBM would provide valid information regarding a student's baseline basic concept knowledge and to assess the BC-CBM's ability to track change over time. To test this, students were divided into two groups using a quasi-experimental design, since students were already assigned to individual classrooms. Two classrooms participated in the experimental phase and two classrooms served as the control group. There was no significant difference in age between the two groups (control mean age = 53.75 months [SD=3.91] and experimental group age = 53.86 [SD=2.71]). However, there were significant differences in the raw and standard pretest scores for the BBCS-3: R, as well as the raw pretest scores for the BC-CBM, with the control group demonstrating lower scores overall on all three measures. This shows that the BC-CBM scores were able to demonstrate which group had superior baseline basic concept knowledge. Group difference interpretations are limited since the

groups were not matched for baseline basic concept knowledge, however the current research was developed to evaluate the ability of the BC-CBM to monitor progress over time. The correlation between the raw scores of both assessments indicates the BC-CBM was able to monitor progress over time.

After baseline data were obtained from all participants, students in the experimental group were provided large group explicit instruction with interactive activities of specific basic concept vocabulary words. To determine if changes in basic concept knowledge occurred in either the experimental or control group, the BBCS-3: R and BC-CBM were administered at the end of the intervention phase. There was a significant main effect (F =[1,28] 4.804, p= .037) determined by an ANOVA. There was a statistically significant change in basic concept knowledge from pre- to post-testing as measured by the BBCS-3: R raw score for the experimental group, but not for the control group. The experimental group increased their basic concept knowledge by 25 basic concepts on the BBCS-3: R raw score, while the control group only saw an increase in five concepts. The discrepancy in the baseline scores between both groups could have led to the Matthew effect influencing the vocabulary gains of the experimental group. The Matthew effect or "cumulative-advantage" says that individuals with higher baseline knowledge will gain additional knowledge exponentially compared to individuals with decreased baseline knowledge (Merton, 1968; Walberg & Tsai, 1983; Walberg, Strykowski, Rovai, & Hung, 1984). Considering the possible impact the Matthew effect could have had on the experimental group, it is noteworthy that the BC-CBM raw scores demonstrated the gains in basic concept vocabulary words from pre- to post-test. There was no significant group by time interaction (F= (1,28) 1.879, p = .181), which could be because it was expected that both groups would increase in basic concept knowledge through maturation, participation in class, and the

difference in their pretest scores. Although we didn't see the treatment effect, we did have robust gains. Increasing the number of participants or the number of basic concept terms assessed on the BC-CBM may increase this effect.

However, there was no significant change in the standard scores of the BBCS-3: R for either group. This would be expected for a standardized assessment, as it's designed to be given as a onetime snapshot of a child's ability of a skill to compare to normative data. A standardized assessment is to be administered in 1-3 year intervals (not three months apart as in this experiment). These assessments are intended to give information on a person's innate abilities, yet they are limited in the information of the person's functional use of vocabulary in their daily life (Bogue et al., 2014). Thus, the BBCS-3: R standard score, is reliable for differentiating a student that is performing above, at, or below an expected level of performance, but isn't designed to monitor progress over shorter periods of time. When children are in lower grades it is essential that educators are able to evaluate their vocabulary skills in order to make changes to their instruction to facilitate vocabulary growth.

The BBCS-3: R standard scores did not show growth from pre- to post-intervention, yet the differences in the raw scores of the students' demonstrated significant growth. Nevertheless, it is not feasible to administer the BBCS-3: R in its entirety to a classroom of students. In addition to the amount of time required to administer the BBCS-3: R to an individual child, a trained individual is required to administer a norm-referenced assessment. The BBCS-3: R requires a person with a Master's degree in a related field and formal training in the administration, scoring, and interpretation of standardized assessments in order to administer it to an individual (Bracken, 2006). Schools do not have the resources to provide this amount of training and time to administer a standardized vocabulary assessment on a large scale, hence the

need to evaluate a BC-CBM. Group difference interpretations are limited since the groups were not matched for basic concept knowledge, however the current research was developed to evaluate the ability of the BC-CBM to monitor progress over time. The correlation between the raw scores of both assessments indicates the BC-CBM was able to monitor progress over time.

The BC-CBM was created as a measure to use in the classroom to provide a dynamic assessment for educators to monitor a child's basic concept knowledge acquisition. While there was no statistically significant change over time from pre- to post-test for either group, the linear trends indicate that the participants' basic concept knowledge increased over time and the BC-CBM two-minute data was able to show that progress had been made. The current BC-CBM was modeled after the essential basic concept terms listed on the BBCS-3: R. In order to increase the ability of the BC-CBM to monitor a child's vocabulary gains due to classroom teaching, review of basic concept vocabulary words explicitly taught with the current school curriculum should to be completed and possibly added to the BC-CBM.

Study Limitations

The thirty participants for this study all attended local Head Start preschool programs in Northwest Arkansas. The significant difference in groups was not an expected finding. It was assumed that by controlling for SES status (i.e., eligible for Head Start program services) that there would be no difference in vocabulary knowledge. The specific reason for the difference in groups is unknown, but there are some plausible rationales. After the experiment, the Head Start Director noted that many of the students in the experimental group participated in the Head Start 3-year-old program, while very few of the control participants had previous school experiences. The additional year of structured preschool could have increased the participants' baseline vocabulary. The experimental classrooms were chosen based on location (i.e., close to the

researchers primary place of employment) in order to aid in the feasibility of the PI traveling to administer the large group explicit instruction to the experimental group. Also, the experimental site was in close proximity to a University; therefore, there may have been parental educational differences between groups that were not taken into consideration. While further research is warranted to explore these possibilities, it can be noted that group factors other than SES play a role in vocabulary knowledge. Future studies should complete all testing prior to assigning participants to groups and try to match students so there are no significant group differences and randomize the control and experimental groups.

The analysis of the results of current study did not significantly illustrate the ability of the BC-CBM to monitor progress over time. The data points were taken from eight weeks of administration of the BC-CBM. This may not have been adequate time for the BC-CBM to monitor progress. Increasing the occurrences of the BC-CBM administrations and time between the pre- and post-test could possibly give the BC-CBM an opportunity to significantly track progress of vocabulary knowledge. Another limitation of the current study was the number of basic concept words able to be assessed by the BC-CBM. Administering the BC-CBM for only two-minutes may have been too short of a time period. The BBCS-3: R can assess 308 basic concept terms and is not a timed assessment (Bracken 2006). The experimental BC-CBM contained only 56 basic concept terms, which is about 20% of the items on the BBCS-3: R. Limiting the BC-CBM to 2-minutes furthered reduced the percentage of words assessed. Further directions should include administering the entire battery of items on the BC-CBM to all participants. This may increase the administration time of the BC-CBM to six or eight minutes, which would be 20% of the time required to administer the BBCS-3: R. At six to eight minutes a

teacher or paraprofessional would still be able to administer the BC-CBM to a classroom of children without interfering substantially with the classroom instruction.

The current study had a 43% attrition rate from pre- to post-intervention for the participants. This large amount of attrition limited the number and variety of participants to include in the data analysis. Future studies should increase the participant base in order to account for the amount of attrition possible for this population. Informing the parents of the commitment in attendance needed to actively participate in the study could also decrease the attrition rate. A larger amount of participants completing the entire study would lead to possible gains using robust parametric statistics.

Future Directions

Overall, the results of this study support using the BC-CBM as a possible screener for basic concept knowledge and a way to monitor basic concept knowledge over time. Further directions should include replicating this research with larger groups demonstrating similar baseline basic concept ability and control for environmental factors that may influence the child's vocabulary knowledge. These factors could include: education level of the mother, household structure (single parent home vs. two parent home), number of children in the household, and previous school experience of child. More research is also needed in the acquisition of basic concept vocabulary words of children with specific language delays in order to evaluate the effectiveness of the BC-CBM on different populations. A longitudinal study, which administers the BC-CBM to a group of three-year old children and continues to monitor their progress into first or second grades, would be beneficial to evaluating the ability of the BC-CBM to monitor vocabulary growth over a range of ages and time. The BC-CBM could also be aligned with the current curriculum of a preschool and transitioned into a criterion-referenced

assessment (CRA). A CRA differs from a CBM because a CRA is tied to specific skills being taught in the classroom. A CBM is tied to specific basic skills a young child must develop prior to gaining additional knowledge (Gansle, Gilbertson, & VanDerHeyden, 2006). If the BC-CBM were transitioned into a CRA, it would allow educators to monitor the effectiveness of their specific curriculum.

Deficits in basic concept vocabulary knowledge are prevalent in the children from low SES homes, which can impact their academic success into adulthood. This study shows promising direction that an efficient basic concept assessment can be developed in order to address the need to monitor vocabulary growth in preschool children. The experimental BC-CBM showed a significant effect when compared to the raw scores of the Bracken Basic Concept Scale-Revised (BBCS-3: R). Further research is needed to create a successful curriculum-based measure or criterion-referenced assessment to monitor the development of basic concept vocabulary in young children.

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Appendix A

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

September 17, 2014

MEMORANDUM

TO:	Rebecca Smith Lisa Bowers
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	14-08-077
Protocol Title:	*Basic Concept Development in Preschool Children*
Review Type:	☐ EXEMPT ☒ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 09/17/2014 Expiration Date: 09/14/2015

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (http://vpred.uark.edu/210.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 50 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

Appendix B

1. Instructions for administration of BC-CBM

The instructions for administration of the BC-CBM were:

1. Organize cards in the randomized order to match the weekly data sheet assigned.
2. Sit on the child's right side in an area free of distractions.
3. Place the stack of BC-CBM cards in front of the child face up.
4. Tell the child, "I will show you a card with three pictures on it, I will say a word and want you to point to the picture that matches the word. Let's practice."
5. Researcher says to child, "Point to your nose." (Child points to nose.) Say "Good, now point to the table." (Child points to table.) Say, "It looks like you are ready. Let's begin."
6. Researcher says, "I will show you a card with three pictures on it, I will say a word and want you to point to the picture that matches the word." (Start timer) Say the first target word, and record the response, turn the card over to reveal the subsequent card. Then say the next target word on the list (after card is flipped).
7. Mark a "1" for correct response and a "0" for incorrect response, in the corresponding weekly data sheet.
8. Write a 1, 2, or 3 with a circle around it in the corresponding row to indicate which picture/item the child is on at one, two, and three minutes. (Don't stop the timer during the assessment).
9. Stop the assessment at 3-minutes regardless of how many cards the child answered.
10. Give a high five to child and say "great job!"

Appendix C

1. Example of explicit instruction lesson plan for “above”.

	Explicit Instruction		
Concept	**Definition**		
Above	Above means an object is higher than another object		
	Instruction	**Practice**	**Kinesthetic song/poem**
	follow script with two different objects	(hold two objects) “Which one is above?” (switch objects) “Which one is not above?” Repeat two or more times (until the majority of the children demonstrate understanding by answering correctly)	Twinkle, twinkle little star (with hand motions)