



INFLUENCE OF VOCABULARY DEVELOPMENT ON READING COMPREHENSION OF SECONDARY SCHOOL STUDENTS IN SCIENCE

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Abstract:

This study examined the influence of vocabulary development on reading comprehension of secondary school students in Basic Science in Ekiti State, Nigeria. This study adopted a quasi-experimental of pre-test, post-test control group research design on 150 JSS 2 students selected from six secondary schools using purposive sampling technique. The instruments used for this study are: vocabulary test and reading comprehension test and the participants pre-test were used to measure students' prior knowledge. The findings of the study revealed that vocabulary knowledge, reading comprehension and students' prior knowledge are related to students' achievement in Basic Science. The findings also showed that the combined influence of vocabulary knowledge, reading comprehension, students' prior knowledge and students' achievement in Basic Science was found to be statistically significant. The study therefore suggested that teachers should make concerted efforts to embark on rigorous and explicit teaching of vocabulary as it has a potential of supporting students' reading comprehension.

Keywords: vocabulary development, reading comprehension, prior knowledge, achievement, junior secondary school students and basic science

1. Introduction

A significant body of research has demonstrated efforts to increase vocabulary development in children through teacher's instruction manual (Marzano and Pickering,

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2005). The important role of teaching vocabulary in facilitating high levels of student achievement was also demonstrated by effective school research (Kamil, et al., 2008; Kame'enui and Baumann, 2012). Loftus and Coyne (2013) contended that teaching students to develop vocabulary means providing explicit instruction on important words from text and teaching students strategies to help them learn word meanings independently. This assertion is important for both oral and written vocabulary development to increase as students grown-up to enable them to comprehend increasingly more complex grade level texts.

Stanovich (1986) opined that vocabulary knowledge is involved in a reciprocal relationship with reading ability. He speaks further that the relationship is one that continues throughout reading development and remains in force for even the most fluent adult reader. Readers who are not proficient in using vocabulary strategies will struggle with gaining comprehension from content-related texts. Recent study conducted by the language and reading research consortium (2015) demonstrated how students' knowledge of vocabulary influences reading development among first, second and third graders. The study of Quellete and Beers (2010) also established that vocabulary influences both word recognition and reading comprehension. Several studies have identified strategies for assisting students with learning problems. For instance, Farstrup and Samuels (2008), and O'Conner (2007) suggested that pre-teaching the meaning of the words that are critical for developing background knowledge and necessary to comprehend the main concepts of the text is important. This later point has significant implication, given a growing emphasis on prior knowledge. In consequence, it is essential that teachers understand the potential influence of prior knowledge to students' learning.

It is common sense that a student would demonstrate better reading comprehension and acquire more complex concepts when he/she had greater pre-existing knowledge of a topic. More recently, Liebfreund (2015) opined that integrating text with prior knowledge allows critical thinking about the text. In her study on the success with informational text comprehension: an examination of underlying factors, she found that prior knowledge was a better and consistent predictor of students in informational text. In a similar study, Thompson and Zamboanga (2014) submitted that prior knowledge influences new learning.

Prior word knowledge aids in activating and increasing reading comprehension and fluency while reading. Hart and Risley (2003) argued that students, who do not have sufficient word knowledge to understand what they read, avoid reading and because they do not read very much, they do not have opportunity to see and learn many new words. It is important to note that, students who lack word knowledge of

his/her subject area will definitely have problem. The more students understand these vocabularies, the easier it is for them to understand information they may read or hear about the topic. When looking at increasing comprehension in content areas, it is important to consider strategies for increasing vocabulary development of students with learning difficulties, especially in the area of reading comprehension. Hedrick, Harmon and Wood (2008) identified three critical areas to focus on. These include: (a) an understanding of the students' vocabulary learning, (b) the features of content vocabulary, and (c) effective vocabulary instruction ideal for particular disciplines, including mathematics, social studies, and science. The authors claimed that although strategies may be flexible, they should be appropriate for the context in which the word learning will occur. Further on vocabulary development, Marzano, (2004) and Jitendra, et al., (2004) suggested that when teaching new words, teachers need to relate them to other words and concepts by employing instructional strategies such as modeling, guided practice, checking for understanding, and multiple opportunities for practice for explicit and timely feedback. On the basis of this, this study therefore had the following guiding research questions.

2. Research Questions

- Are vocabulary knowledge, reading comprehension and students' prior knowledge related to students' achievement in basic science?
- Will vocabulary knowledge, reading comprehension and students' prior knowledge contribute to students' achievement in basic science?
- In what ways will vocabulary knowledge, reading comprehension and students' prior knowledge predict students' achievement in basic science?

3. Method and Materials

The study explores a quasi-experimental research of pre-test, post-test control group design with an instructional intervention in Basic Science. Teachers selected for the study were trained. The participants were 150 Junior Secondary School students two from six schools selected across the three senatorial districts of Ekiti State, Nigeria using a purposive random sampling technique. The schools were selected based on the size of the schools as well as willingness to participate in the study. Intact classes were used in all the schools selected for the study to avoid unnecessary interruption of the normal class settings. The instruments used for this study included, the vocabulary test and reading comprehension test while the participants pre-test were used to measure their

prior knowledge. The vocabulary test was a 25 multiple choice items extracted from four selected topics in the pupils' text material, while the reading comprehension test was also a 25 multiple choice items extracted from another four topics different from the topics where vocabulary test were drawn with four options prepared by the researcher using Ndu, F. O. C and Somoye, E. O. (2011). *Basic Science: An Integrated Science Course for Junior Secondary School, UBE Edition, Book 2*. Longman Nigeria Limited. The tests were aimed at measuring students' vocabulary knowledge, difficulty of the text and ability of students to understand the text materials.

The content and face validities of the tests were ascertained by experts in the fields of Language Education, Science Education and Test Evaluation for proper scrutiny. In order to ensure the reliability coefficients of the two tests, the researcher carried out a pilot test using 20 non-participating students from the schools not included in the study. The tests were employed once and the scores from the single administration of the tests were subjected to split half reliability estimate and the results obtained were 0.87 and 0.90 for vocabulary test and reading comprehension test respectively.

The participants were divided into two groups (75 experimental groups and 75 control groups). At the beginning of the study, the researcher, trained research assistant and the teachers met two times before the start of the study. Teachers were assigned in experimental and control groups, those assigned to the experimental groups were trained on how to carry out effective strategies step by step for two hours in each school selected for the study for the period of a week. The teachers were taught the strategies to be used in teaching the students to include: (1) recognizing unknown words (2) decide if they need to understand it to understand the passage (3) attempt to infer the meaning from context and (4) attempt to infer the meaning from the word parts and multiple exposures to words, (Laflamme, 1997; Graves, 2006).

The participating teachers were advised to give a student-friendly definition of terms by using explicit instructions on how to use identified vocabulary correctly. The teachers were made to follow these steps using pupils' text. The teachers assigned to the control groups did not receive such training. After training, both groups of students were pre-tested at the beginning of the study and the essence of the pre-test was to determine the students' prior knowledge of the new vocabulary words they would encounter during their reading of science text materials. The teachers' daily lesson plans were checked to ensure conformity with the rules of the study. The experimental groups were later given an explicit instruction by the trained teachers for the periods of 6 weeks in the second term of 2015/2016 session. The meanings of all strange words and vocabularies identified by the teachers were taught and contextual meanings were

given to this group. The teachers used in the control group schools were employed to teach their students using conventional method of teaching without deepen into strange words and vocabularies, at the end of the lessons, post-test was given to the two groups using the same questions used as pre-test and the scores obtained from the two tests were recorded and analyzed using appropriate statistics such as Pearson's Product Moment Correlation and Multiple Regression Analysis at 0.05 alpha level.

4. Results

Question 1: Are vocabulary knowledge, reading comprehension and students' prior knowledge related to students' achievement in basic science?

In order to answer this question, Pearson's Product Moment Correlation analysis was used to find the relationships among the pairs of independent variables and achievement of students in basic science as shown in Table 1.

Table 1: Inter-correlations among vocabulary knowledge, reading comprehension and students' prior knowledge related to students' achievement in Basic Science

Variable	1	2	3	4
Vocabulary knowledge	1.000	.428**	.532**	.336**
Reading Comprehension		1.000	.742**	.883**
Prior Knowledge			1.000	.634**
Achievement in Basic Science				1.000

P < 0.01, N = 150

Table 1 presents the inter-correlations among vocabulary knowledge, reading comprehension, prior knowledge and students' achievement in Basic Science. The result showed that vocabulary knowledge correlated significantly with reading comprehension ($r = 0.428$, $p < 0.01$), prior knowledge ($r = 0.532$, $p < 0.05$) and students' achievement in Basic Science ($r = 0.336$, $p < 0.01$). Reading comprehension was high and positively correlated with prior knowledge ($r < 0.742$, $p < 0.01$) and students' achievement in Basic Science ($r = 0.634$, $p < 0.01$). This implies that vocabulary knowledge, reading comprehension and students' prior knowledge are related to students' achievement in Basic Science.

Question 2: Will vocabulary knowledge, reading comprehension and students' prior knowledge contribute to students' achievement in Basic Science?

In order to answer this question, regression analysis was used to establish the relative contribution of predictors to students' achievement in Basic Science as shown in Table 2.

Table 2: Regression Analysis showing the contribution of predictors to students' achievement in Basic Science

Model	SS	df	MS	F	Sig.	R	R ²	Adjusted R ²	SE
Regression	6727.851	3	2242.527	27.384	.000	.600	.360	.347	9.049
Residual	11956.419	146	81.893						
Total	18684.000	149							

Table 2 shows the regression analysis of the contribution of predictors to students' achievement in Basic Science. The result revealed that vocabulary knowledge, reading comprehension and students' prior knowledge jointly contributed 36% ($R = 0.36$) to the observed variance in students' achievement in Basic Science. There was a significant composite relationships among the predictors variables and students' achievement in Basic Science ($R = 0.60$, $p < 0.01$). The combined influence of vocabulary knowledge, reading comprehension, students' prior knowledge and students' achievement in Basic Science was found to be statistically significant ($F_{3, 146} = 27.384$, $p < 0.01$).

Question 3: In what ways will vocabulary knowledge, reading comprehension and students' prior knowledge predict students' achievement in basic science?

In order to answer this question, regression analysis was used to establish the prediction of the independent variables to students' achievement in Basic Science as shown in Table 3.

Table 3: Regression Analysis showing the predictors to students' achievement in Basic Science

Model	Unstandardized Coefficient		Standardized Coefficient	T	Sig.
	B	SE	Beta		
Constant	48.935	6.727		7.274	.000
Vocabulary Knowledge	.348	.061	.443	5.681	.000
Reading Comprehension	.318	.085	.268	3.739	.000
Prior Knowledge	.326	.066	.387	4.957	.000

Table 3 shows the regression analysis of the predictors of students' achievement in Basic Science. The result revealed that vocabulary knowledge was the strongest predictor of students' achievement in Basic Science (Beta = 0.443), followed by students'

prior knowledge (Beta = 0.387) and reading comprehension (Beta = 0.268). The effect of vocabulary knowledge ($t = 5.681$, $p < 0.01$), reading comprehension ($t = 3.739$, $p < 0.01$) and students' prior knowledge ($t = 4.957$, $p < 0.01$) on students' achievement in Basic Science is positive and statistically significant in each case.

5. Discussion

This study established that vocabulary knowledge, reading comprehension and students' prior knowledge correlated significantly with students' achievement in Basic Science. By implication, knowledge of vocabulary, reading comprehension and students' prior knowledge are important for students' achievement in Basic Science. These findings lend credence to the findings of Liebfreund (2015) and Thompson and Zamboanga (2014). Based on these findings, it is believed that students' knowledge of vocabulary, reading comprehension with robust prior knowledge may interplay in students' achievement in Basic Science.

The study also found that there was a combined influence of vocabulary knowledge, reading comprehension and students' prior knowledge on students' achievement in Basic Science. This result is supported by the studies of Thompson and Zamboanga (2014) whose studies revealed that prior knowledge influences new learning. The finding is also in accord with the report of the LARRC (2015) who demonstrated that vocabulary knowledge influences reading development in the beginner readers. The findings of this study further showed that students' knowledge of vocabulary, reading comprehension and students' prior knowledge are good predictors of students' achievement in Basic Science. The finding is in line with the findings of Liebfreund (2015) who found that prior knowledge was a better and consistent predictor of students in informational text.

6. Conclusion and Recommendation

Based on the findings of this study, there is evidence to conclude that each or combinations of students' knowledge of vocabulary, reading comprehension and students' prior knowledge explained significant variance in students' achievement in Basic Science. One possible explanation for this finding is that students who had better prior knowledge were good at vocabulary and in turn tend to be good in reading comprehension. It is therefore recommended that teachers should make concerted efforts to embark on rigorous and explicit teaching of vocabulary as it has a potential of supporting students' reading comprehension.

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