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Effect of Language of Science on Upper Basic Students' Interest in Basic Science in Benue State, Nigeria

By

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**ABSTRACT**

*This study found out the effect of language of science on Upper Basic students' interest in Basic Science. The study adopted quasi experimental pre-test post-test non-randomized group design. The population of the study was 1084 Upper Basic III students from 22 UBE schools in Makurdi. A sample of 138 students was drawn from four Universal Basic Education (UBE) schools using multi-stage sampling techniques. The schools were randomly assigned into Experimental and Control groups of two classes each. Intact classes were maintained in all the schools. Lesson plans were prepared for both Experimental and Control groups. Two research questions and two hypotheses were formulated answered using Mean and Standard Deviation and ANCOVA statistics respectively. Data was collected using Basic Science Interest Inventory (BSII). The reliability of BSII was established at 0.79. Results revealed that students taught genetic concepts with language of science have higher interest rating than those taught with Social language. However, the difference in interest rating between male and female students was not statistically significant. This indicated that language of science has effect on the students' interest in genetics. Based on the findings, it was recommended among others that teachers should integrate language of science in classroom teaching and learning activities.*

**Keywords:** Language of Science, Social Language, Basic Science and Interest

**INTRODUCTION**

Science as a concept has been defined by many authors in different ways. Ezeudu (2012) views science as a systematized body of knowledge derived through investigation using specific procedure often called the scientific methods. Adejoh and Ekele (2014) see science as dealing with the study of nature. National Teacher's Institute, (NTI, 2011) states that science is concerned with finding out about things in the environment using the apparatus of observation, experimentation, and measurement among others. From the foregoing, science can

therefore be defined as the process of acquiring knowledge or information about our natural world.

According to Adejoh and Ekele (2014) the development of any nation is dependent on the level and standard of science and technology practiced by that country. Nations all over the world, Nigeria inclusive, are striving hard to improve their science and technology. Even nations that have achieved the status of been developed or civilized nations achieved it through deliberate and strategic efforts in improving their science and technology. In view of the importance of science education, the

National Policy on Education (FRN, 2012) emphasizes the teaching and learning of science and technology at all levels of education in Nigeria. At the Basic Education level, the science that is taught there is known as Basic Science.

Basic Science, according to Alebiosu (2008) is a subject of study which presents science disciplines in all its ramifications or diversity in a unit whole so as to appreciate the inter-dependency of all the science disciplines. The relevance of Basic Science as a subject for building a solid foundation for better future science learning cannot be over emphasized. Many efforts have been made to properly utilize the various components of the process to enhance higher interest rate of students in Basic Science. For instance, Sambo (2015) evaluated the mode of implantation of the Basic Science curriculum to find the most appropriate way of implementation. Similarly, Upu (2015) compared teaching methods with the aim of identifying which method is best at teaching Basic Science, while Mhile (2016), examines the attitudes of students towards learning of Basic Science. Yet the interest rate of Basic Science students has not reached the desired level. Another aspect of teaching and learning which is often neglected is the language of the subject.

Fakeye (2011) defines language as a code whereby ideas about the world are presented through conventional systems arbitrary to communication. David (2006) opines that language is undoubtedly one of the most important areas of the curriculum. To him language is both a means to an end and an end in itself. The flexible nature of language has made it possible for it to accommodate various disciplines of life endeavours. Thus, every discipline has its language and as such science has its own language as well. The language of science is

the precise terminology, symbol and expression that are associated with science discipline that are not often encountered in other contexts and even when they are encountered in other contexts, the meanings they connote in other contexts are quite different from what their meanings in science are. Bloom and Lahey as cited in Science Teachers' Association of Nigeria (STAN, 2013) believe that language of science is a code whereby ideas about the world are presented through a conventional system arbitrary to science discipline. Jarret (2009) opines that academic language in science is more abstract than the social language even though the social language forms the foundation upon which science language is built. To him, the technical nature of the language of science presents an obvious challenge to learners of science as they are required to learn a new language at the same time acquire subject matter.

This is particularly not easy for learners studying in their second or third language which is the case of the Nigerian child, having to gain proficiency in English language which is not their mother tongue but the lingua franca of the nation before acquiring science language. According to Vine (2007), the language of science has many features like symbols, root words, technical terms and so on. Due to the complexities involved with the language of science, it has become an issue because researcher like Adekunle (2008) believes that quite often, difficulties associated with the teaching and learning of Basic Science may be traceable to language difficulties rather than the lack of intellectual capacity of the learners to cope with the learning situation. This is because teachers often communicate with learners using vocabularies and patterns too high for the students' cognitive structure, and if these words are not explained to the level of the

learners' understanding, it could create a gap in the communication between the teacher and learners.

Another reason for the poor achievement of students in Basic Science may be due to lack of interest. Interest as defined by Okoro (2011) is an emotionally oriented trait which determines the vigor which the learner tackles Education and other activities. The degree and direction of achievement in Basic Science is largely determined by the kind of interest developed by the students. Vine (2007), state that due to the complexities involved with the language of science, it is problematic to students more so that the subject involves activities like description, correlation, classification and explanation which generate terms that are technical. Even when the students try to learn, they do it by rote memorization instead of internalizing the instruction which will enable them achieve the highest level of learning which is problem solving. This could widen the communication gap and cause the students to lose interest in learning Basic Science.

With regards to gender, one issue of gender in Education is gender bias. Gender bias refers to the different treatment of individuals based on gender. According to Clerkin (2008) such treatment can be negative or positive and is often subtle and executed unwittingly. In Nigeria where gender differences are emphasized, Certain vocations and professions have traditionally been regarded as men's like Medicine, Engineering, and Architecture among others. While the women take to nursing, catering, typing and so on. With regards to Basic Science, the results of the interest rate of male and female students have been conflicting. Other researchers suggest that male have higher interest rates in Basic science than female (Iweka, 2006, Obiekwe,

2008), While other researches indicate no gender difference in the interest rate of Basic Science Students (Okeke 2007, Nzewi 2010): As a result, it is not clear whether gender has an impact in Basic Science interest especially with regards to the use of the language of science.

### **Statement of the Problem**

Basic science is regarded as pure science. It is the foundation of all science. It does not only make the learner scientifically literate but also forms the bedrock upon which all future science learning is built. However, the achievement of students in this subject has been found to be below expectation. This low achievement has been attributed to various components of teaching and learning process including the lack of interest by students to learn Basic Science.

One aspect of teaching and learning process that is important but often neglected is the language of the subject. Most researches about language in science are mostly focused on the language of instruction, but language of the subject is important in the teaching and learning of Basic Science. This is because; it serves as the basic fundamental principle underlying the processes that gives rise to scientific knowledge. Thus, concept formation and attainment in science is depended on the language of the subject without which the students resort to learning by rote memorization. This stunts students' interest in scientific reasoning and problem-solving skills. It is in view of these that the present researcher seeks to find out if students when equipped with the language of the subject will affect their interest in Basic Science.

### **Purpose of the Study**

The main purpose of this study is to find out the effect of language of Science on

the interest of students in Basic Science. Specifically, the study:

- i) examined the interest of Upper Basic III students when taught Basic Science with language of science,
- ii) ascertained the interest of male and female students of Upper Basic III students taught Basic Science with language of science,

### **Research Questions**

The following research questions guided the study.

- i) What are the mean interests rating scores of Upper Basic III students taught Basic Science with language of science and those taught with social language?
- ii) What are the mean interest rating scores of male and female Upper Basic III students taught Basic science with language of science?

### **Hypotheses**

The following hypotheses were formulated and tested at 0.05 level of significance.

- i) There is no significant difference in the mean interest rating scores of upper Basic III Students taught Basic Science with language of science and those taught with social language.
- ii) There is no significance difference in the mean interest rating scores of male and female Upper Basic III Students taught Basic Science with language of science.

This study is based on Noam Chomsky's theory of universal grammar,

Lev Vygotsky's theory of social constructivism and Jean Piaget's of cognitive development.

Looking at the theories reviewed, the proponents of these theories agree with the importance of language, interaction and communication. Chomsky (1960) believes that the capacity to learn language is innate. Piaget says the capacity occur in stages. They all agree that the development of a particular language structure is a function of the environment and experience, thus these theories are considered adequate by the researcher for this study.

Sambo, Kukwe, Mahmuda & Egarri (2014) did a comparative analysis of students' interest in Basic Science in Nassarawa state. The total population for the study was all the three Educational zones of the state. A sample of 2177 student was drawn from 20 schools. The study lasted for three years. The study adopted a survey design. One research question and one hypothesis guided the study. Data was collected using questionnaire and was analyzed using chi-square statistics. The study indicated that most students lack interest in Basic Science because among other factors, their inability to understand the meanings of most of the words contained in the subject. The researcher recommended among other things that motivational variables like science vocabularies be taken care of. It is in this regard that the current study wants to find if the language of science is taken care of, it might enhance the achievement of students.

Brown (2013) investigated language identity and the stress of learning science language on students. The design of the study was a two-group randomized quasi experimental design. The population of the study was students of ages between 15-18 years of summer institute Stanford

University. The sample of the study was 60 students comprising 29 males and 31 females who were randomly assigned to experimental and control groups. The instruments for data collection were Stroop and Flankers tests. The method for data analysis was t-test at 0.05% level of significance. T-test results showed a t- value of 2.9166 with 58 as degree of freedom and a standard error distance of 84.570. The result shows that complex language of science is not only difficult to understand but also serve as a stressor that limits students' cognition. Therefore, the researcher recommends adequate attention to language of science issues. This work highlights the importance of language of science and so it is in line with the current studies.

**METHODOLOGY**

The design for this study is quasi-experimental, pre-test, post-test, non-randomized group design. This design is deemed fit because the subjects of the research will not be randomized as in true experiments. Thus, be used in intact classes in order to avoid disrupting the normal school program. However, the classes will

be assigned into experimental and control groups. Both groups will be administered pre-test and post-test. The target population of this study was all the 1084 Upper Basic III UBE students in Makurdi Metropolis.

A sample of 138 Upper Basic III students of co-educational schools was used for the study. Instruments that were used for data collection for this study were Basic Science Interest Inventory (BSII) and Lesson plans constructed by the researcher and validated by expert. The reliability of BSII was established at 0.79 using Cronbach Alpha. Mean scores and standard deviations were used to answer research questions while Analysis of Covariance (ANCOVA) was used to test the research hypotheses at 0.05 level of significance.

**DATA ANALYSIS AND FINDINGS**

**Research Question 1**

What are the mean interests rating scores of Upper Basic III students taught Basic Science with language of science and those taught with Social language? Answer to the Research Question is presented in Table 1.

**TABLE 1:** Mean and Standard Deviations of Interest Rating Scores of Upper Basic III Students Taught Basic Science with Language of Science and those Taught with Social Language.

Group	N	Pre-BSII		Post-BSII	
		$\bar{X}$	S.D	$\bar{X}$	S.D
Language of science	78	53.33	15.43	54.62	16.95
Social language	60	52.30	16.24	52.30	16.54
Mean diff.		1.03		2.32	
Total	138				

Table 1 show that at pre BSII, students to be taught Basic Science with Language of science have a mean interest rating score of 53.33 with a standard deviation of 15.43 and the students to be

taught with social language have a mean interest rating score of 52.30 and a standard deviation of 16.24. The mean difference between the two groups is 1.03. This shows a level of homogeneity. At post BSII,

students taught Basic science with language of science have a mean interest rating score of 54.62 with a standard deviation of 16.95. While those taught with social language have a mean interest rating scores of 52.30 and a standard deviation of 16.54. The mean difference between the groups at post BSII is 2.32.

**Hypothesis 1**

There is no significant difference in the mean interest rating scores of Upper Basic III students taught Basic science with language of science and those taught with Social language. Findings are presented in Table 2.

**TABLE 2:** Results of Analysis of Covariance (Ancova) Of Interest Rating Scores of Upper Basic III Students Taught Basic Science with Language of Science and those Taught with Social Language.

Source	Type III Sum of Squares	$\frac{1}{df}$	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	36918.899 <sup>a</sup>	2	18459.449	1633.075	.000	.960
Intercept	26.470	1	26.470	2.342	.128	.017
Pre-test	36737.090	1	36737.090	3250.066	.000	.960
<b>Groups</b>	<b>52.035</b>	<b>1</b>	<b>52.035</b>	<b>4.603</b>	<b>.034</b>	<b>.033</b>
Error	1525.971	135	11.303			
Total	435042.000	138				
Corrected Total	38444.870	137				

a. R Squared = .960 (Adjusted R Squared = .960)

Reading through Table 2, F (1,135) = 4.603; p= 0.034<0.05. This significant value is less than the alpha value of 0.05 level of significance. Hence, the null hypothesis is rejected. This implies that there is a significant difference in the interest rating of Upper Basic III students taught Basic

science with language of science and those taught with Social language.

**Research Question 2**

What are the mean interest rating scores of male and female Upper Basic III students taught Basic science with language of science? Answer to this research question is presented in Table 3.

**TABLE 3:** Means and Standard Deviations of Interests Rating Scores of Male and Female Upper Basic III Students Taught Basic Science with Language of Science.

Gender	N	Pre-BSII		Post-BSII	
		$\bar{X}$	S. D.	$\bar{X}$	S.D
Male	42	52.50	17.02	54.19	17.50
Female	36	54.31	13.49	55.11	16.52
Mean diff.		1.81		0.92	
Total	78				

From Table 3, it can be observed that at pre BSII, the male students have a mean interest rating score of 52.50 and a

Standard deviation of 17.02. While female students have a mean interest rating scores of 54.31 with a Standard deviation of 13.49

and a mean difference of 1.81. At post BSII the male students have a mean interest rating score of 54.19 with a Standard deviation of 17.50 while the female students have a mean interest rating score of 55.11 with a standard deviation of 16.52 and mean difference of 0.92

### Hypothesis 2

There is no significant difference in the mean interest rating scores of male and female Upper Basic III students taught Basic Science with language of science. Findings are presented in Table 4.

**TABLE 4:** Results of Analysis of Covariance (ANCOVA) of Interest Rating Scores of Male and Female Upper Basic III Student Taught Basic Science with Language of Science.

Source	Type III Sum of Squares	$\frac{r^2}{df}$	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	20727.793 <sup>a</sup>	2	10363.897	555.737	.000	.937
Intercept	29.717	1	29.717	1.594	.211	.021
Pretest	20711.364	1	20711.364	1110.594	.000	.937
<b>Gender</b>	<b>19.431</b>	<b>1</b>	<b>19.431</b>	<b>1.042</b>	<b>.311</b>	<b>.014</b>
Error	1398.668	75	18.649			
Total	254788.000	78				
Corrected Total	22126.462	77				

a. *R Squared* = .937 (*Adjusted R Squared* = .935)

Table 4 indicate that  $F(1,75) = 1.042$ ;  $p = 0.311 > 0.05$ . This significant value is more than the alpha value of 0.05 level of significance. Hence, the null hypothesis is accepted. This implies that there is no significant difference in the interest rating scores of male and female Upper Basic III students taught Basic science with language of science.

### DISCUSSION OF FINDINGS

The findings of this study reveal that a significant change in interest rating scores was found to exist among students taught Basic Science with language of science and those taught with Social language. The students taught Basic Science with language of science have higher interest rating scores than those taught with Social language. (Tables 1 and 2). This means that language of science was significant in enhancing students' interest in Basic Science. The

finding is in agreement with that of Sambo et al. (2014), who found out that, students' interest in Basic Science could be improved through the use of language of science. In the same vein, Fakeye (2011) argue that more creative approach to science vocabularies will reduce the turn-off and increase students' interest in Basic Science. Teaching Basic Science with language of science is expected to be highly stimulating by transforming difficult and abstract boring concept into pleasurable experiences thereby increasing students' interest in Basic Science. The students that were taught Basic Science with language of science must have experience these possibilities and thus had their interest in Basic Science increased more than those taught with Social language.

The findings also indicate that there was no significant difference in the mean interest rating scores of male and female

students taught Basic Science with language of science (Tables 3 and 4). This finding is in line with Fakeye (2011) who indicated no gender difference in the interest rating of students in Basic Science. Similarly, the findings agree with Brown (2013) who argues that more creative approaches to teaching Basic Science vocabulary might get the student more interested in Basic Science irrespective of gender. Students' interest in Basic Science may have been an outcome of interaction and communication between the teacher and students, and among students themselves. As the students gain more competence and proficiency in language of science, their interest is developed and deepened.

## CONCLUSION

Based on the findings of this study, it is concluded that the use of language of science enhances higher students' interest in Genetics irrespective of gender. This implies that if Basic Science teachers integrate language of science with the content of Science, it will enhance students' interest in Basic science. Based on the findings, the following recommendations are made:

- i. Students should realize that Science as a discipline has its own language which is specific in its usage and so treat it beyond Social usage.
- ii. Teachers of Basic Science should integrate language of science and the content of Basic science during classroom activities.
- iii. Teacher training institutions should prepare teachers in training with techniques and strategies to identify and integrate language of science and content of Basic Science.

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