

READABILITY OF BIOLOGY TEXTBOOKS AND STUDENTS' ACADEMIC PERFORMANCE IN SENIOR SECONDARY SCHOOLS IN EKITI STATE NIGERIA

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ABSTRACT

The study investigated the readability of Biology textbooks and students' academic performance in Senior Secondary Schools in Ekiti State Nigeria. The study was designed to find out how readability of Biology textbooks could enhance better academic performance of students' in Senior Secondary Schools. Survey type of descriptive research design was used for the study. The sample consisted of 215 Senior Secondary School students who were selected from five Senior Secondary Schools in the state. Multistage random sampling technique was used in selecting the schools from both urban and rural centres in the state. The research instruments used were cloze test and Biology Achievement Test. The reliability coefficient of 0.79 was obtained with the use of Kuder-Richardson formula KR21. The instruments were administered and data collected were analyzed using Pearson Product Moment Correlation and t-test statistics. The results revealed that readability of Biology textbooks had significant influence on students' academic performance. Location (urban or rural) has no significant influence on readability of Biology textbooks. No significant difference was found between the academic performance of male and female students who used the selected Biology textbooks. The result however revealed a significant difference in the performance of students who used the two different selected Biology textbooks. Based on the findings of the study, it was recommended that the Biology teachers should be guided with readability level and content coverage in the selection and recommendation of textbooks. Authors of Biology textbooks should be provided with feedbacks on the suitability and readability of the Biology books so that they can revise the texts in circulation with appropriate language, dictions, diagrams, pictures and local examples that will make their published materials highly readable to the target class of readers. The curriculum planners and evaluation unit of the Ministry of Education should be conversant with the determination of readability level of Biology textbooks to be used in schools and be so guided in their recommendations.

Keywords: Readability, suitability, performance, cloze test.

INTRODUCTION

Reading serves a wide range of purposes in the lives of different categories of people who are literate. Reading is the basis for learning different subjects in schools. Whatever, the aspect of life one is considering, one discovers that the ability to read efficiently enhances individual ability to function in an effective manner (Perekeme, 2012). Readability, according to Ziriki (2009) is defined as reading ease, especially as it results from a writing style. It is also said to be the reading difficulty level of a textbook in relation to the class for which it is meant. The readability level of a book therefore, is one of the factors that determine the understanding of a subject by the students. Readability, according to Frank (2006), can be used as a rough estimate for placing written material in appropriate grade level.

Researchers over the years have blamed poor performance of students in secondary schools on inadequate facilities, poor methods of teaching and lack of motivation for students (Duyilemi,2004). The issue of readability of textbooks as they influence the performance of students had received very little attention. The fundamental question on ‘what makes a book readable for a particular set of readers’ needs to be addressed. This question is very important when one recognizes the strong relationship between understanding of biology or science materials and the reading level of the material (Fletcher, 1975; Duyilemi, 2004; Fatoba,2014).

The importance of reading texts in biology and other science subjects has been widely acknowledged. For example Tobrise (2005) believed that reading science textbook is an important activity in science academic endeavour. Teachers and parents should be more concerned with the amount of learning a student is able to achieve when reading a biology textbook. It could be mentioned therefore that what a reader is able to comprehend while reading a particular science text depends on some variables. These include: reader factors and text factors. Among the text factors are the prints, the familiarity of the subject-matter, and familiarity of the sentence types, vocabularies, diction, and illustrations and so on. Reader factors are language competence, background, and prior knowledge, purpose for reading, interest and meta-cognition

Students stand the chance of benefiting less from a text, which contains so many unfamiliar sentence structures and concepts thereby resulting in slow pace of reading such a textbook and reading may therefore be meaningless. Textbook is a very important material in the teaching – learning process. It has the attributes of conveying permanent information unlike other learning materials, which could be transient. It combines durability with portability and can be used where there is no electricity or any other source of power. It serves as a basic source of knowledge and formal learning (Afolabi, 2009)

On the students’ academic performances in Nigeria, differential scholastic achievement of students in Nigeria has been and is still a source of concern and research interest to educators, government and parents. This is so because of the great importance that education has on the National development of the country. All over the country, there is a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2004).

Several authors maintain that writing sustains the development of reasoning, communication and connections (Connolly and Vilardi, 1989; Countryman, 1992). Closely related to this is the view of Morgan (1998) that “although there have been considerable descriptions of the use of writing in science subjects, there has been relatively little analysis of the texts themselves”. In agreeing with this, Pugalee (2001) opined that if writing is to become an integral part of biology curriculum, the scarcity of research must be addressed. Ogundele (2003) was of the opinion that research in the areas of readability of biology textbook as it affects students’ performances is required in secondary schools.

Research Hypotheses

The following null hypotheses were generated and tested at the 0.05 level of significance.

H₀₁: Readability of Biology textbooks has no significant influence on students’ academic performance in Biology.

H₀₂: Location has no significant influence on readability of Biology textbooks

- H₀₃: There is no significant difference between the performance of male and female students who use the selected biology textbooks.
- H₀₄: There is no significant difference between the performance of students who use Modern Biology for Senior Secondary Schools and those who use Essential Biology for Senior Secondary Schools.

METHODOLOGY

The design was a descriptive research design of the survey type. The researcher described the situation and occurrences just as it occurred in the population. The variables were found in their natural phenomena.

The population consisted of all Senior Secondary School three students in Ekiti State Nigeria. This includes schools that have been graduating students for at least five years. The schools used are those schools that are using the selected Biology textbooks. Most of the schools used by the researcher were co-educational schools in both urban and rural locations.

The sample of this study consisted of 215 Senior Secondary School students who were selected from five Senior Secondary Schools in the state. Multistage random sampling technique was used in selecting the schools from both urban and rural centres in the state. The research instruments used were cloze test and Achievement Test. The reliability coefficient of 0.79 was obtained with the use of Kuder-Richardson formula KR21.

Data Analysis

The instrument was administered and data collected were analyzed using Pearson Product Moment Correlation and t-test statistics. All the hypotheses were tested at 0.05 level of significance.

Hypothesis 1

H₀₁: Readability of Biology textbooks has no significant influence on students' academic performance in Biology.

The null hypothesis was tested by correlating readability scores in Biology with students' academic performance scores in Biology, using Pearson Product Moment Correlation Statistics at 0.05 level of significance. The result is presented in Table 1.

Table 1: Pearson Product Moment Correlation Analysis of Readability of Biology Textbooks and Students' Academic Performance in Biology

Variable	N	Mean	S.D	r _{cal}	r _{tab}
Readability Scores	215	29.71	14.19	0.327	0.195
Academic Achievement Scores	215	13.15	6.74		

Table 1 shows that r cal. (0.327) is greater than r tab. (0.195) at 0.05 level of significance. The null hypothesis is rejected. Therefore readability of Biology textbooks has significant influence on students' academic performance in Biology.

Hypothesis 2**H₀₂: Location has no significant influence on readability of Biology textbooks.**

Students' scores on readability of Biology textbooks in rural and urban locations were compared and subjected to statistical analysis involving t-test statistics at 0.05 level of significance. The result is shown in Table 2.

Table 2: t – test Comparison of Influence of School Location on Readability of Biology Textbooks.

Group	N	Mean	S.D	Df	t _{cal}	t _{tab}
Urban	107	29.70	13.88	213	0.011	1.960
Rural	108	29.72	14.56			

$p > 0.05$

Table 2 shows that t-cal (0.011) is less than t tab. (1.960) at 0.05 level of significance. The null hypothesis is accepted. Therefore, location has no significant influence on readability of Biology textbooks.

Hypothesis 3**H₀₃: There is no significant difference between the performance of male and female students who use the selected science textbooks.**

To test the hypothesis, the mean scores of male and female students' academic performance in biology were compared using t –test statistics at 0.05 level of significance. The result is presented in Table 3.

Table 3: t-test Comparison of the Influence of Gender on Students' Academic Performance in Biology.

Group	N	Mean	S.D	df	t _{cal.}	t _{tab.}
Male	127	13.08	6.77	213	0.183	1.960
Female	88	13.25	6.77			

$P > 0.05$

Table 3 shows that t –cal (0.183) is less than t-tab (1.960) at 0.05 level of significance. The null hypothesis is accepted. Therefore, gender has no significant influence on the performance of students in Biology.

Hypothesis 4**H₀₄: There is no significant difference between the performance of students who use Modern Biology for Senior Secondary Schools and those who use Essential Biology for Senior Secondary Schools.**

The hypothesis was tested by comparing the performance scores of students in Modern Biology and Essential Biology using t-test statistics at 0.05 level of significance. The result is presented in Table 4.

Table 4: t-test Comparison of Students Performance in Modern Biology and Essential Biology

Variable	N	Mean	S.D	Df	t _{cal.}	t _{tab.}
Modern Biology	110	30.74	11.75	213	4.76	1.96
Essential Biology	105	39.00	13.68			

$P < 0.05$

Table 4 shows that t cal (4.76) is greater than t tab (1.96) at 0.05 level of significance. The null hypothesis is rejected. Therefore, there is significant difference between the performances of students who use Modern Biology for Senior Secondary Schools and those who use Essential Biology for Senior Secondary Schools.

CONCLUSION AND RECOMMENDATIONS

It is concluded that the level of understanding and academic performance of students are determined, to a large extent by the readability of the biology textbooks in use.

- Teachers should provide feedbacks on the readability of science textbooks to the publishers and authors who in turn should revise the recommended biology textbooks in the light of comment raised.
- Authors of biology textbooks should select the appropriate language, dictions, diagrams, pictures, examples etc that will make their published materials (textbooks) highly readable to the target class of readers.
- Students using any of the selected biology textbooks should intensify efforts at reading them to enhance their academic performance.
- Teachers should be guided with readability level and content coverage in the selection and recommendation of Biology textbooks for students.
- The evaluation unit of the Ministry of Education should invite experts who will help them to determine the readability level of Biology textbooks to be used in Senior Secondary Schools so that both teachers and students can choose appropriate Biology textbooks for teaching and learning.

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