READABILITY OF SCIENCE TEXTBOOKS AND ACADEMIC PERFORMANCE OF MALE AND FEMALE SENIOR SECONDARY SCHOOL STUDENTS IN EKITI STATE

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Abstract

The study investigated the readability of science textbooks and academic performance of male and female Senior Secondary School students in Ekiti State. It was designed to find out how readability of science textbooks could enhance better academic performance of students' in Senior Secondary Schools. The study made use of survey type of descriptive research design. The sample consisted of 600 Senior Secondary School students who were selected from 15 Senior Secondary Schools in five Local Government in Ekiti State. Multistage random sampling technique was used in selecting the schools. One hundred and twenty science students were randomly selected from three schools in each of the local government. Two research instruments were used – Cloze test and students' achievement test. The reliability coefficients of 0.62 for Chemistry, 0.69 for Physics and 0.79 for Biology respectively were 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 science textbooks had significant influence on students' academic performance. The result also revealed that no significant difference was found between the academic performance of male and female students who used the selected science textbooks. The result however revealed a significant difference in the performance of students who used different textbooks i.e. Chemistry, Physics and Biology. Based on the findings of the study, it was recommended that teachers should be guided with readability level of students and content coverage in the selection and recommendation of textbooks. The curriculum planners and evaluation unit of the Ministry of Education should be conversant with the determination of readability level of science textbooks to be used in schools and be so guided in their recommendations. Students using any of the selected science textbooks should intensify efforts at reading them to enhance their academic performance. Government should equip school libraries with readable science textbooks.

Introduction

The Science Teachers Association of Nigeria (STAN), some Universities and State Governments have developed innovative science curricula and also mounted conferences, workshops and seminars aimed at facilitating the teaching and learning of science in Nigeria. In spite of all these laudable efforts, there is empirically-based evidences to show that students have difficulty in reading and mastering the concepts and principles outlined in the National Science Core Curricula prescribed for the Senior Secondary Schools (Aghenta, 1992 cited in Afolabi, 2009)

The researcher observed that the difficulty in the readability of science textbooks

contribute substantially to many of the educational problems generally encountered by students and particularly their inability to master some of the contents of science syllabus. Difficulties experienced in reading and understanding of science textbooks by students may also be due to abstractness of some concepts in science.

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.

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). Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend. Teachers also complain of students' low performance at both internal and external examination. The annual releases of Senior Secondary Certificate Examination results (SSCE) conducted by West African Examination Council (WAEC) justified the problematic nature and generalization of poor secondary school students' performance in different school subjects (Adebule, 2004).

However, not much research has been done on reading of science textbooks as it affects male and female students' performance in senior secondary schools. Ogundele (2003) was of the opinion that research in the areas of readability of science textbook as it affects students' performances is required in secondary schools.

The last two decades have been devoted to addressing gender inequality in education. Some studies (Okebukola, 1993; & Jiboku, 2008) have shown an all – time low participation of women in education. Educators have therefore expended tremendous efforts in the study of the personal factors affecting academic achievement especially in the sciences and social sciences. Notable among these variables is the study of the phenomenon of gender or sex equity in education. A rich harvest of explanation of causes, understanding of cost to the society and possible intervention has brought about several researches, workshops, seminars and training in this area.

Experts in the study of gender such as Hyde (2004) as well as Hyde & Mezulis (2001), believed that the cognitive differences between females and males have been exaggerated. For example, Hyde (2004) pointed out that there is considerable overlap in the distribution of females and males scores on math and visuospatial tasks. In a personal study by the U.S. Department of Education (2000), boys did slightly better than girls at mathematics and science.

Overall, though, girls were far superior students, earning better grades and were significantly better than boys in reading. In another national study, females had higher reading achievement and better writing skills than male with the gap widening as students progressed through school. Females are more likely than male to be assigned to special/remedial education classes – females are more likely to be engaged with academic materials, be attentive in class, put forth more academic effort, and participate more in class than boys (Dezolt & Hull, 2001).

From the above background information, it was considered necessary to embark on a research that will investigate the readability of science textbooks and academic performance of male and female senior secondary school students.

Statement of the Problem

Educators over the years are concerned about the need to improve students' academic performance generally and particularly in science subjects. A lot of researches have been carried out on inadequate science facilities, poor methods of teaching and poor students' motivation as factors affecting their academic performance. Little attention has been paid to the issue of the science textbooks as they influence the academic performance of male and female students in science. This study will establish a relationship between readability of science text books and academic performance of male and female students and shall also examine the question on either gender would have effects on the readability of science textbooks or not.

Purpose of the Study

The study investigated the readability of science textbooks and academic performance of male and female in Senior Secondary Schools. The study therefore, was specifically designed to find out the mean performance of students using the selected science textbooks in the schools of study. The study also compared the performance of the students using the selected science textbooks in each of the science subjects in the various schools.

Research Question: Is there any difference between male and female students' academic performance in the selected science textbooks.

Research Hypothesis One: There is no significant difference between the academic performance of male and female students who use the selected science textbooks.

Research Hypothesis Two: There is no significant relationship between readability of science textbooks and academic performance of secondary school students.

Significance of the Study

The study would serve as a reliable assessment on which the senior secondary school science curriculum improvement could be made in the areas of objectives, content, learners' activities and evaluation.

It is also hoped that the findings of this study would pose challenges to authors and publishers on the need to re-assess their publications and make readable texts available to students in their subsequent editions.

It would serve as a guide to the curriculum planners and the Ministry of Education in the recommendation and selection of appropriate science textbooks for the use of senior secondary school students.

Finally, the findings of the study would serve as a diagnostic measure to the Science Teachers' Association of Nigeria (STAN) in

selecting readable science textbooks that would meet the needs of students and boost their performance in science subjects.

Research Design

The design was a descriptive research design of the survey type. This design was used because of the largeness of the population. The researcher chose the sample to be representative of the entire population. The researcher described the situation and occurrences just as it occurred in the population. The variables were found in their natural phenomena.

Population

The population consisted of all Senior Secondary School three students in Ekiti State. This includes schools that have been graduating students for at least five years. The three basic natural science subjects are offered in the schools. The schools used are those schools that are using the selected textbooks for the science subjects chosen.

Sample and Sampling Techniques

The sample of this study consisted of 600 Senior Secondary Class three students selected from 15 selected senior secondary schools in Ekiti State. One hundred and twenty students each were selected from five local government areas. All the questionnaire given to the respondents were returned.

Multistage random sampling technique was used in this research. The first stage was to select the three senatorial district in Ekiti State, the second stage, five local government areas were selected in each senatorial districts. While one school was selected from each local government area. Stratified random sampling technique was used to select students based on class, sex, age and subject. Stratification was based on science subjects – i.e. Physics, Chemistry and Biology, the researcher went to the selected schools and asked the science teachers to name the science textbooks they were using. Two science textbooks were selected for each subject based on the most commonly use in schools.

Research Instruments

Two instruments were used for the study. These are: Cloze tests and Achievement Test which were used to determine the readability level of the students. The Cloze Tests were made for Biology, Chemistry and Physics. Achievement Test was also made for Physics, Chemistry and Biology. These were tagged Biology Achievement Test (BAT), Chemistry Achievement Test (CAT) and Physics Achievement Test (PAT) respectively. The reliability coefficients of 0.62 for Chemistry, 0.69 for Physics and 0.79 for Biology respectively were obtained with the use of Kuder-Richardson formula KR21

Results and Discussion

Question 1: Would gender have effect on the readability of science textbooks?

To answer this question, the mean scores of male and female students in the selected science subjects were computed. The result is shown in Table 1.

Table 1: Descriptive analysis showing the mean scores in academic performance of male and female students using the selected science textbooks.

Science subject	Male			Female		
	N	mean	S.D	N	mean	S.D

Physics	96	16.56	7.21	85	15.12	7.65
Chemistry	130	11.65	5.65	74	11.65	6.17
Biology	127	13.08	6.77	88	13.25	6.77

Table 1 shows that the mean scores of male students in physics, chemistry and biology are 16.56, 11.65 and 13.08 respectively while that of female in physics, chemistry and biology 15.12, 11.65 and 13.25 respectively. The mean score of both male and female students are very close. This implies that gender would not have any significant influence on performance of students in science subjects.

The bar chart representation of this mean score of male and female in the selected science textbooks is shown in Figure 1

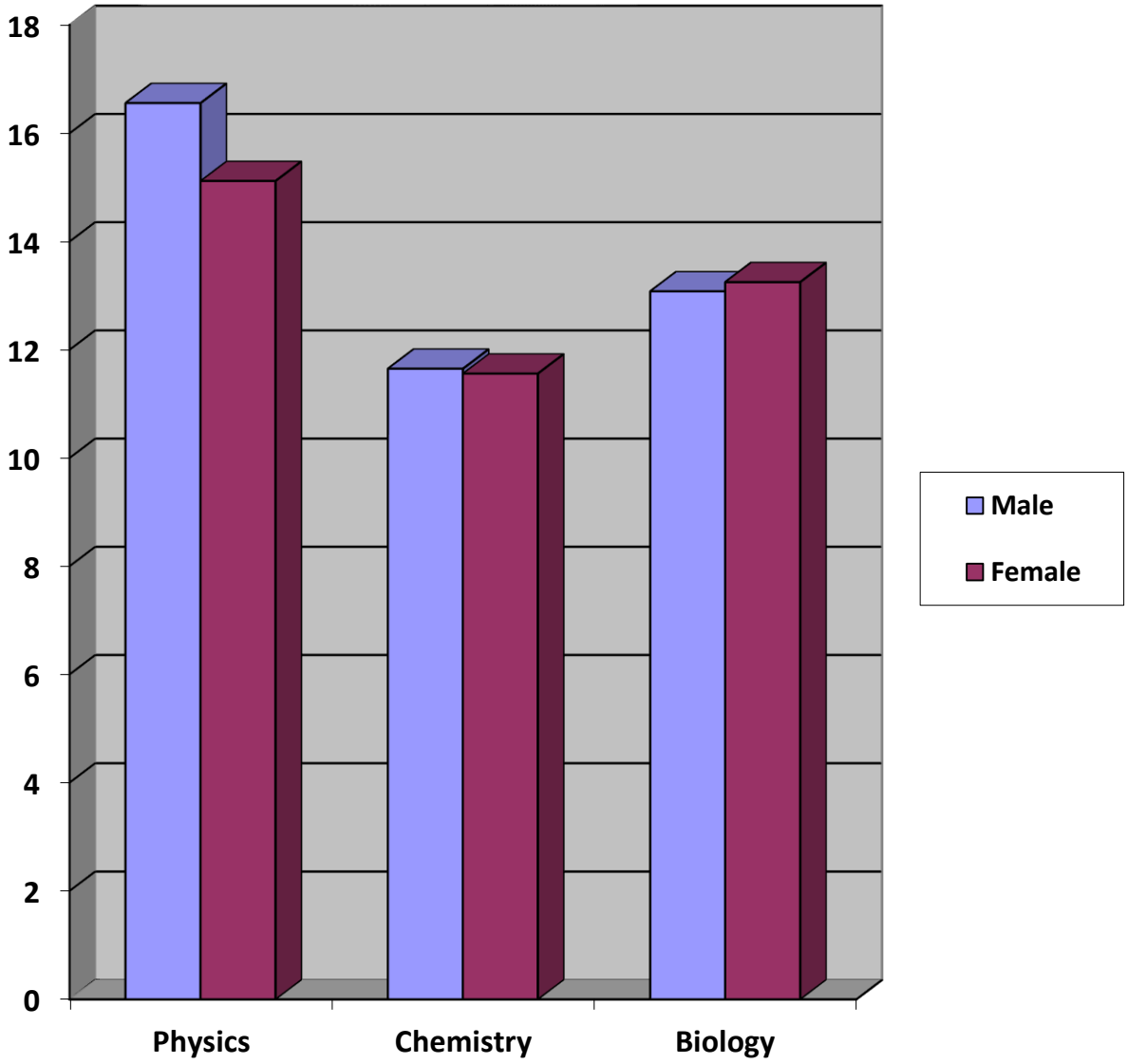

Fig.1 Bar chart showing the means scores of male and female students using the selected science textbooks.

Hypothesis 1

H_{01}: There is no significant difference between the academic 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 science subjects were compared using t –test statistics at 0.05 level of significance. The result is presented in Table 2.

Table 2: t-test Comparison of the Influence of Gender on Students Academic Performance in Science Subjects.

Group	N	Mean	S.D	*df*	$t_{cal.}$	$t_{tab.}$
Male	353	13.50	6.79			
Female	247	13.41	7.01	598	0.160	1.960

P > 0.05

The null hypothesis is accepted (t_{cal} = 0.160, P > 0.05). Therefore, there is no significant difference between the performance of male and female students who used the selected science textbooks.

To test the influence of gender on the performance of students in each of the selected science subjects, t-test statistics was also applied. The result is presented in Table 3. This is further explanation of Table 2.

Research Hypothesis Two: There is no significant relationship between readability of science textbooks and academic performance of secondary school students.

Table 3: t-test Summary of the Influence of Readability on Gender Performance of Students in Selected Science Subjects

Science Subject	Group	N	Mean	S.D	*df*	$t_{cal.}$	$t_{tab.}$
Chemistry	Male	130	11.65	5.65	202	0.627	1.960
	Female	74	11.65	6.17			
Biology	Male	127	13.08	6.77	213	0.183	1.960
	Female	88	13.25	6.77			
Physics	Male	96	16.56	7.21	179	1.327	1.960
	Female	85	15.12	7.65			

P > 0.05

The influence of gender on the performance of students in each of the selected science subjects is not statistically significant at 0.05 level of significance i.e. Chemistry ($t\text{-}_{cal}$ = 0.627, p>0.05), Biology (t -cal = 0.183, p>0.05) and Physics (t-cal = 1.327, p>0.05). It implies that gender will not significantly influence the performance of students in science subjects.

Discussion

The result of the descriptive analysis showed that all the selected science textbooks were appropriate for the use of class of students

meant for. The textbooks were at readability levels of the students.

The result also revealed that, there was no significant difference between the performance of male and female students who used the selected science textbooks. This finding agreed with the view of Ayodele (2009) and Fatoba (2014) who found no gender differences with respect to students performance in science. This was at variance with many researches that found significant difference between the male and female performance in science Inyang and Hannal (2000); Omoniyi (2003) and Lietz (2006) who found that boys in Secondary Schools surpass their female counterparts in Science and Mathematics

Conclusion and Recommendations

This study examined influence of the readability of some selected science textbooks on academic performance of male and female senior secondary school students in Ekiti State.It is concluded that the level of understanding and academic performance of male and female senior secondary schools determined to a large extent by the readability of science textbooks in use .No gender difference in the performance of secondary school students.

Based on the findings, the following recommendations are made:

1. Teachers should be guided with readability level of the students and content coverage in the selection and recommendation of science textbooks for student use.
2. Students using any of the selected science textbooks should intensify efforts at reading them to enhance their academic performance.
3. Government should make it a point of duty to equip every school library with appropriate science textbooks that are at the readability level of the s

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