

Influence of Gender and School Location on Senior Secondary School Student's Achievement in Biology Inagbani Education Zone of Enugu State, Nigeria

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Abstract

The study examined the influence of gender and school location on senior secondary school student's achievement in biology in Agbani Education Zone of Enugu State. 328 students were sampled (164 males and 164 females respectively) from Four (4) co-education schools and four intact SS3 classes both from rural and urban schools were used. The sampling technique used was multiple stage sampling technique. The research design used was ex-post facto design since the students used for the study has been assigned to appropriate tends of gender (male and female) and school location (rural and urban) and cannot be manipulated by the researcher. Biology Achievement Test (BAT) was used as the instrument for data collection. Two (2) research questions and two (2) research hypotheses were formulated. Research questions were answered using mean, simple percentage while the hypotheses were answered using z-test at 0.05 level of significance.. The findings showed that there was a significant difference in the mean achievement score of male and female students. Male students achieved higher than their female counterparts in Biology Achievement Test. Findings further revealed that there was significant difference in the achievement mean scores of students in rural and urban school located areas. The urban students achieved higher than rural students. Based on the findings, it was recommended that government should recruit more qualified biology teachers and distribute them equitably to schools irrespective of location and also females should be provided with adequate motivation to make them perform better in sciences.

Keywords: Gender, School location, Achievement, Biology

Introduction

Science and technology have permeated every aspect of human endeavor and assumed eminent position in Nigeria educational system (Adeyianju 2003). The emphasis is evidently in response to the acclaimed assertion that science and technology education are indispensable to the nation's development. Iwuzor (2000) observed that science is an area of learning which enhances a nation's development and progress especially in the era of automation by virtue of its numerous values to humanity. The implication is that the technological progress of any country is predicted on a sound science education. To this extent, a country's development, be it economic, social or political can be taken as a function of the advances she is able to record in science and technology. Erinosh (2006) further opined that science is basically about becoming aware, exploring, understanding and personal exploration of the environment. This implies that science teaching in schools should enable learners acquire deep understanding of science so as to enhance transfer of knowledge in daily life challenges.

Nwogu (2001) saw science as both organized body of knowledge and a process of finding knowledge about the universe, the structure and reactions of matter, the conservation and transfer of energy and the interactions of living things and their environment. The development of any nation, which depends on science and technology, hinges on the nation's science education. Science education is a distinct form of creative human activity which involves distinct ways of seeing, exploring and understanding reality. Science, being a fundamental part of everyday life and essential to our understanding of the world, teaches us a way of finding out about the world (by becoming curious and seek explanations) and this helps us to develop a growing body of ideas and information about the ways things work. All branches of Science have important contributions to make in Nigeria's technological advancement, one of such science subjects is Biology. Biology is a science subject offered in the senior secondary schools in Nigeria.

Biology is a natural science subject consisting of contents from microscopic organisms to the biosphere general, encompassing the earth's surface and all living things (Okwo and Tartiyus, 2004). Considering its characteristics and importance, biology is a standard subject of instruction at senior levels of Nigerian educational system. It is one of the core subjects at Secondary School Certificate Examination (SSCE) whose study is very relevant to man's successful living (Akindele, 2009). It also has a large students' enrolment than any other science subject especially at the secondary levels of the Nigerian Education (Ofoegbu, 2003). According to Ugwu & Eze (2005), biology education enables the individual to understand himself, parts of his body and their functions. It inculcates in the individual scientific skills, attitudes in his or her approach to

personal and social problems. Biology education enables individuals to question superstitions due to sustained interest arising from the comprehension of causes of effects. Biology Education cuts across many social problems and its knowledge helps in providing insight into such problems and at the same time may proffer solution to them. Thus biology as a science subject should be properly taught and this should be evidenced in the students' performance in the subject in standard examinations like the West African Senior School Certificate Examination (WASSCE).

In spite of the importance of biology, it is pertinent to note that most students still see and learn Biology as an abstract subject and the performance of students in the subjects is not still encouraging (Ezechi 2014). The poor performance of students in science especially biology has continued to be a major concern to all and particularly those in the main stream of science.

The poor performance of students in biology has been attributed to a number of factors which include teacher factors (low qualification, lack of experience, poor salaries and allowances, poor supervision, student factors (unwillingness to learn, bad peer groups influence, among others) (Adesogun, 2016). As a result of failure experienced, some students begin to doubt their intellectual abilities and come to believe that their efforts to achieve are futile. The performance of the students may however be influenced by gender.

Gender factor in academic attainments has been the concern of educational researchers and administrators over the years. Different researchers have offered varying hypotheses to explain their observed gender differences in academic attainment. Yang (2010) defined gender as the social attributes and opportunities associated with being male and female and the relationships between women and men; girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes. Gender refers to the social meanings associated with being a male or a female, including the construction of identities, expectations, behaviors and power relationships that are derived from social interactions (Ambe-Uva, Iwuchukwu and Jibrin 2008). In Nigeria, and perhaps the whole of Africa, gender bias is still very prevalent (Arigbabu & Mji, 2004). This is a view to which Onyeizugbo (2003) has also alluded in pointing out that sex roles are somewhat rigid in Africa particularly in Nigeria, gender differences are emphasized. It is a common place to see gender stereotypes manifested in the day-to-day life of an average Nigerian. Certain vocations and professions have traditionally been regarded as men's profession (medicine, engineering, architecture) and others as women's (nursing, catering, typing, arts). Typically, parents call boys to wash cars, cut grass, fix bulbs, or climb ladders to fix or remove things.

In education, gender inequalities have always existed and can be viewed from different perspectives, which includes subjects allocated to a particular gender as being more relevant to the dispositions and academic performances of students. On the other hand, chores such as washing dishes, cooking, cleaning and so on, are reserved for the girls. In a nutshell, what are regarded as complex and difficult tasks are allocated to boys, whereas girls are expected to handle the relatively easy and less demanding tasks. As a result of this way of thinking, the larger society has tended to see girls as the "weaker sex". Consequently, an average Nigerian child goes to school with these fixed stereotypes. Gender issues, both on the part of the teachers and students, have been documented to affect achievement generally (Erinosho, 2005; Kennedy, 2000).

Gender differences have become critical issues of concern around the world most especially to educators and researchers. Hansman, Tyson and Zahidi (2009) reported that there is no country in the world that has yet reached equality between women and men in different critical areas such as in economic participation or education. Longe and Adedeji (2003) in their study on increasing girls access to technical and vocational education in Nigeria, Ezirim (2006) in the study on "scaling up girls participation in science education: towards a score card on quality education" asserted that gender has impact on science education.

Gender role differentiations are also encouraged in pictorial illustrations in textbooks which usually portray males as doctors, lawyers, engineers, professors while the females are seen as nurses, cooks, mothers etc. This creates mental picture in the mind of the readers of the role expectation from the society (Umoh, 2003). Parents at home are not left out in this gender stereotype; parents buy ball for the male child and "teddy bear" for the female child. Teachers also encourage gender stereotype by giving different treatment to males and females in class. Teachers often go further to give different career guidance to males and females. The society also frowns at seeing a male cooking or female climbing a tree. The males are also assigned leadership positions and females are to assist or to follow, since Nigeria gained her independence, she had never produced a female president or governor (Ezendu and Obi, 2013). For years now, the expectations for boys have differed from that of girls in biology, thus enhancing gender stereotyping academic activities which has seriously influenced student's academic performance especially in senior school certificate examinations.

Again, a number of significant relationships are found between the teachers rating of students and their performances. It is obvious that some teachers are gender bias and are bound to favor one gender than the other. Results of many researchers on the influence of gender on academic performance of students are inconclusive. Okereke and Onwukwe (2011) in their study discovered that male students performed better than female students

in the study of influence of gender on school performance. The findings of Ariyo (2006) also revealed significant gender difference in favor of boys. On the contrary, Oludipe (2012) and Kola and Taiwo (2013) observed in their various studies that there is no significant difference between male and female performance. Similarly, Udousoro (2003), in the study on gender differences in computing participation, stated that there is no significance difference in the academic performance of male and female students. Considering all these views, one cannot draw any meaningful conclusion on the influence of gender on academic achievement of students since studies on gender differences in achievement are still inconclusive. The researcher therefore considers it worthwhile to also investigate the influence of gender in senior secondary school student's achievement in biology in Agbani Educational Zone. Apart from gender school location may also influence achievement of student in biology.

Ezeudu (2003) opined that school location implies urban-rural setting. Urban schools are those schools in the municipalities or schools found within the towns and rural schools are those located in the villages or semi-urban areas. Ezike (2001) stated that urban areas are those with high population density, high variety and beauty while rural areas are those with low population, subsistence mode of life, monotonous and burden. Ezechi (2014) stated that location of a school determines to a large extent the level of students' performance in biology. This means that the performance of students is directed by the location of the school. Therefore, the area in which a school is located can affect the educational performance of a student. Owoeye & Yara (2011) in their studies on school location and academic performance of secondary school students in Ekiti State, Nigeria asserts that the various review of literature on school location influence on academic performance is not the same. While some maintain that urban students perform better in examinations than their rural counterparts, others found out that rural students (in spite of all odds) perform better. Some have submitted in their findings and concluded that no particular set up (urban or rural) can claim superiority over the other because their performances are the same. In addition, Owoeye (2002) & Onah (2010) in their separate studies indicated that schools in urban areas achieved more than schools in the rural areas in science subjects. Specifically, Owoeye (2002) observed in his study that schools in urban locations had better academic performance than their rural counterpart in science.

Conversely, Onah & Ugwu (2010) in their study to determine the factors which predict performance in secondary school Physics in Ebonyi North educational Zone of Ebonyi State, asserted that the influence of school location on the performance in secondary school physics was not significant, hence, they concluded that school location does not influence physics performance of students in secondary school. Similarly, in a study of school location versus academic achievement in physics, Macmillan (2012) observed that there was no significant difference in the mean performance scores of students in urban schools that were exposed to learning physics through Computer-Assisted Instruction (CAI) and students in rural schools that were also exposed to the same treatment. In addition, Kolawale & Popoola (2011) in their study revealed that the mean performances of students from urban and rural locations in mathematics are not statistically different. Therefore the present study wants to add to the debate because from the literature above, studies on school location are inconclusive.

Statement of the Problem

Over the years, the achievement of students in biology examinations in Nigerian Secondary Schools has been poor despite the assumed easy nature of the subject. This has been attributed to several factors such as inadequate laboratory equipment, methods of teaching, student's attitude mention but a few.

Furthermore, the influence of gender and school location in biology achievement which shows to be contradictory has not been resolved. For example, some researchers revealed that there was no significant difference in the achievement of male and female and urban and rural students in biology while some studies observed significant difference in the achievement due to gender and school location. Consequently, the problem of this study is: what is the influence of gender and school location in the achievements of biology students in Agbani Education Zone.

Research Questions

The following research questions guided the study:

1. What are the mean achievement scores of male and female students' in biology as measured by BAT?
2. What are the mean achievement scores of rural and urban students in biology as measured by BAT?

Hypotheses

1. There is significant difference in the mean achievement scores of male and female students in biology as measured by BAT.
2. There is significant difference in the mean achievement scores of rural and urban Students in biology as measured by BAT.

Methodology

The design employed in this study was ex-post-factor design. This design was used because the students that

were be used for the study have already been assigned to appropriate tends of gender (male and female) or location (urban and rural) by nature. The researcher does not have any hand in determining who becomes a male or female or still who comes to urban or rural location. The researcher met the subjects already assigned to the appropriate levels of the variable whose influence are being investigated. Multi stage sampling technique was used to select a sample size of 328 students (162 males and 166 females) from four co-educational schools located in Agbani Education zone of Enugu state Nigeria. Two co-educational schools from the rural and 2 co-educational schools from the urban were selected to produce four (4) schools. The co-educational schools were used to make the researcher to collect data from male and female students who had received the same biology instructions from the same teacher and at the same time. This ensured that differences in teacher variables and quality of instructions received in biology do not cause variation in responses by two sexes.

Achievement Test, titled Biology Achievement Test (BAT) was developed by the researcher and was used as the instrument for data collection. The BAT was prepared from a pool of past West African Examination Council (WAEC) objective questions covering the following topics; regulation of internal environment, the mammalian skin, human hormones and nervous coordination. The instrument contains thirty objective questions. The instrument was both content and face validated by experts. The reliability coefficient obtained for BAT was 0.86. The biology teachers in the schools taught the students for the period of four weeks based on the topics selected. After that, the Biology Achievement tests (BAT) were administered to the selected respondents and collected after a period of 45 minutes. Each item was scored one mark each. The maximum mark was 30 marks. The research questions were answered using mean and percentage while the null hypotheses were tested at 0.05 probability level using z-test.

Results

Findings of the study are presented in the table below:

Research Question 1:

What are the mean achievement scores of male and female students' in biology as measured by BAT?

Table 1: Mean Achievement Scores of Male And Female Biology Students In BAT.

SCHOOLS	\bar{X} (MALES)	PERCENTAGE (%)	\bar{X} (FEMALE)	PERCENTAGE (%)
C.S.S. AMAGUNZE	11.95	29.00	9.00	21.95
C.S.S. AMURI	12.90	31.46	9.2	22.66
MODEL HIGH SCH. AMECHI	17.80	43.42	15.17	37.00
MARYLAND SEC.SCH. ENUGU	16.68	40.69	12.85	31.35
AVERAGE	14.83	36.12	11.55	28.24

Table 1 above indicates that the mean achievement scores of male biology students are 11.95, 12.29, 17.80 and 16.68 for the respective schools sampled with an average mean scores of 14.83 which represents 36.12%. Again, the mean achievement scores of female biology students are 9.00, 9.20, 15.17, and 12.85 respectively with an average mean achievement score of 11.55 representing 28.24%. Therefore, male biology students achieved better than their female counterpart in Biology Achievement Test

Research Question 2:

What are the mean achievement scores of rural and urban students in biology as measured by BAT?

Table 2: Mean Achievement Scores of Rural And Urban Biology Students in BAT

SCHOOL	LOCATION	MEAN SCORE	TOTAL MEAN SCORE	PERCENTAGE MEAN (%)
C.S.S AMAGUNZE	RURAL	10.52		
C.S.S AMURI	RURAL	10.52		
			21.04	34.44
M.H.S AMECHI	URBAN	16.48		
M.S.S ENUGU	URBAN	15.00		
			31.48	51.62

Table 2 clearly shows that the mean achievement scores of rural biology students are 10.52, 10.52 respectively with the total mean score of 21.04 which represents 34.44%. On the other hand, the mean achievement score of the urban students are 16.48 and 15.00 in the respective schools sampled, with total mean

achievement score of 31.48 which represents 51.62%. Thus, urban students' achieved better than the male in biology achievement test.

Hypothesis 1

There is significant difference in the mean achievement scores of male and female students in biology as measured by BAT.

Table 3: Z- Test Analysis of Academic Achievement of Male And Female Biology Students As Measured By BAT

GENDER	SAMPLES (N)	MEAN	SD	DF	Z-TEST VALUE		REMARK
					t-cal	t-critical	
MALE	164	15.75	4.44	15.3	9.13	1.96	REJECT NULL HYPOTHESIS
FEMALE	164	11.55	4.21				

The table above revealed that the calculated z-value (z-cal) is more than the tabulated z-value at 0.05 level of significance with 15.30 degree of freedom. (i.e. $z\text{-cal}=9.13 > z\text{-critical} = 1.96, P=0.05$). Hence, the null hypothesis is rejected. Thus, there is significant difference in the achievement scores of biology students (male and female) in Agbani Education Zone.

Hypotheses 2

There is significant difference in the mean achievement scores of rural and urban Students in biology as measured by BAT.

Table 4: Z- Test Analysis Of Academic Achievement Of Urban And Rural Biology Students As Measured By BAT.

SCHOOL LOCATION	SAMPLE (N)	MEAN	SD	DF	Z-TEST VALUE		REMARK
					z-cal	z-crit.	
URBAN STUDENTS	164	15.62	4.22	26.43	11.93	1.96	NULL HYPOTHESIS REJECTED
RURAL STUDENTS	164	10.81	3.55				

The table above shows that the calculated z- value is greater than the tabulated z-value. Thus ($z\text{-cal} < z\text{-critical}$) at 0.05 level of significance and 26.43 degree of freedom. (i.e; $z\text{-cal} =11.93 < z\text{-crit} =1.96$ and $P=0.05$). Therefore, the null hypothesis (H_0) is rejected. Hence, there is significant difference in the achievement scores of rural and urban biology students in Agbani Education Zone as measured by BAT.

Discussion

In research question 1, table 1 indicated that male students had the average achievement score of 36.12% while that of the female is 28.24%. This clearly shows that male students performed significantly better than their female counterpart, hence gender influences the achievement of students in Agbani Education Zone of Enugu State. This result agrees with the findings of Okereke and Onwukwe (2011) who reported that male students achieved significantly better than female students in chemistry and Musa & Umar (2016) but not in line with the work of Nnamani and Oyibe (2016), and Okorie & Eze (2016) who observed the females biology students achieved more than males biology students.

In research question 2, findings showed that urban students scored 51.62%, hence achieved significantly better than the rural students with the score of 34.44% in biology achievement test. The result is in line with the findings of the study carried out by Okereke and Onwukwe (2011), Agbaje and Adebisi (2014) , and Musa (2016) who reported that the performance of urban students are quite higher that students in the rural areas. This is contrary with those of Okorie & Eze (2016) who observed that the rural students achieved higher and better than their urban counterparts. In the researcher's view, the urban students may have performed better than the rural students as a result of teachers not wanting to go to rural schools to teach, students spend so much time on farm work at the expense of the time they should spend on their study. On major market days most of the students would prefer to go to the market to sell their products or their parents product rather than going to school. In addition, the urban schools are constantly supervised by ministry officials as against the rural schools. This implies that students from rural schools who may have the same ability with students from urban schools are limited by some factors that prevent them from being their best in their academic.

Conclusions

Based on the findings of the study, the following conclusions are hereby drawn:

1. There is a significant difference in the academic achievement of rural and urban biology students with

the urban students achieving better than students in schools located in the rural areas. Therefore, school location significantly influences student's academic achievement in biology.

2. Male students significantly achieved better than the females students in Biology Achievement Test (BAT).

Recommendations

In view of the findings in this work by the researcher, the following recommendations are proffered by the researcher:

1. The government should as a matter of urgency recruit more qualified biology teacher and distribute them equitably to schools irrespective of location.
2. The National Policy on Education of Federal Republic of Nigeria is based on integration of the individual into a sound and effective citizen and equal educational opportunities for citizens of the nation irrespective of sex, girl child should be provided with adequate motivation, since it involves mobilization effort of male and female to accord the nation the full contribution of its citizen.

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