

EFFECT OF IMPROVISED INSTRUCTIONAL MATERIALS ON SENIOR SECONDARY SCHOOL STUDENTS ACHIEVEMENT IN BIOLOGY IN ENUGU SOUTH LOCAL GOVERNMENT AREA OF ENUGU STATE, NIGERIA.

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Abstract

The research work focused on the effect of improvised instructional materials on senior secondary students' achievement in biology in Enugu state local Government Area of Enugu state. Three research questions and three hypotheses were raised to guide the study. The study employed a quasi-experimental design. One hundred (100) were used for the study. The instrument for data collection is Biology Achievement Test (BAT). The instrument was face and content validated. The reliability of the instrument using Kuder-Richardson formula-20 (K-R 20) was 0.83. The data collected was analyzed using mean and the hypothesis was tested at 0.05 level of significance using ANCOVA. Findings among others include that students taught with improvised instructional materials performed better than students taught without instructional materials. The researcher recommended among others that teachers should improvise instructional materials. This will give the students enough understanding of biology concepts as the child's local environment will be used as source for the material.

Keywords: improvised, instructional material, achievement, biology

Introduction

Biology is one of the science subjects that senior secondary school students offer at the senior levels in the Nigerian secondary schools, (FRN, 2007). Biology is a very important science subject and a requirement for further learning of a number of science-related professional courses like medicine, agriculture, pharmacy, etc. In contemporary Nigeria, greater emphasis is placed on science and technological development. Today, Biology pervades literally every field of human endeavor, and plays a fundamental role in educational advancement. This is seen in all the technological advancement in the world today, which is because of scientific investigations. However, the issue remains that in most secondary schools in Nigeria, there is high rate of failure in the subject.

In our march towards scientific and technological advancement, we need nothing short of good achievement in biology at all levels of schooling. Unfortunately, achievement of students in biology at the end of the secondary school has not improved in the last decade (Folorunso, 2014). Folorunso (2014) has linked poor achievement trend in biology particularly to the lack of instructional resources in schools due to poor funding of schools. The poor funding of schools has hindered the principals from providing the teachers with adequate instructional resources.

The National Policy on Education (FME, 2014) emphasizes the need for teaching and learning of science processes and principles. The policy recommends practical, exploratory and experimental methods of teaching. In this regards, Okebukola (2014) stated that the

basic tools that science uses in the learning of science processes are the instructional materials. Studies have shown that the use of instructional materials have improved students achievement. Instructional materials are wide varieties of equipment and materials use for teaching and learning by teachers to stimulate self-activity on the part of the students. The teaching of Biology without instructional materials may certainly result in poor academic achievement

This implies that the mastery of Biology concepts might not be fully achieved without the use of instructional resources that the students are abreast with. Folorunso (2014) observed that there is lack of adequate and appropriate instructional resources for effective teaching of Biology in schools. For Ibitoye and Fape (2007), the poor achievement in biology was traced to poor usage of instructional resources for biology teaching and learning, poor state of infrastructure facilities, large class size, poor teaching, use of faulty assessment practice, and inadequacy of quality teachers. According to Okebukola (2014), the poor state of laboratory facilities and inadequate use of instructional materials has constituted a cog in the wheel of students' achievement in Biology in the Senior School Examination. The verbal exposition does not promote skill acquisition, objectivity, and critical thinking abilities that will enable the child to function effectively in the society. The teaching of Biology cannot be done effectively without interaction between the teacher, students and the environmental resources. The Biology curriculum is planned to enable the teacher use activity oriented, child-centered approach (guided inquiry) to teach (Nzewi & Nwosu, 2009). However, evidence from research has shown that instructional materials, resources and equipments for science, especially biology are either in short supply or are completely lacking in schools to the extent that teachers end up with verbal exposition of scientific principles, facts and concepts. (Wasagu, 2011). Studies have also revealed that the achievement of Nigerian students in Ordinary Level Biology was generally and consistently poor over the years (Nwagbo, 2009). This has been a major source of concern to the school administrators, parents and the government at large.

Biology is resource intensive, and in an era of poor funding or scarcity of resources, it may be very difficult to find some of the original materials and equipment for the teaching of Biology in schools adequately. A situation that is further compounded by the galloping inflation in the country and many at times, some of the imported sophisticated materials and equipment are found to be expensive and irrelevant; hence the need to produce materials locally.

Abolade (2004) stated that some of the factory produced/imported instructional materials have also been discovered to be based on foreign ideas and culture. It is against this background that the need to fashion out ways by which local resources can be used for developing instructional materials becomes necessary. There is the need therefore for improvisation

Improvisation is the provision of alternatives to real things. Improvisation is the making of substitutes when the real equipment or material is not adequate or available (Okebukola, 2012). It is the art of providing and using alternative materials or resources in the absence of the real or factory made one. Oyediran (2010) also defines improvisation as the art of using materials or equipment obtained from local environment or produced by the teacher, and with the assistance of the local personnel to enhance instruction. In other to teach by inquiry method or use activity based instructions, improvisation is required since instructional materials seem not to be adequate (Okebukola, 2012). Bassey (2012) defined improvisation as the process of making equipment and materials by the students or by engaging the services of others in the absence of real or manufactured ones. Generally, improvisation of instructional materials is an attempt to adapt and make use of local

resources in the teaching/learning process when the ready-made materials are not available or are in shortfall or not within the reach of users.

Esu (2014) however noted that improvisation demands adventure, creativity, curiosity and perseverance on the part of the teacher, such skills are only realizable through well-planned training programme on improvisation. The use of improvised instructional materials for Biology teaching has been long advocated (Olumirin, 2014). For Olumirin (2014), the production of instructional materials had undergone several reviews and processes by experts from various fields. Improvisation serves the following purposes in the education system: It reduces the money spent on the purchase of equipment in educational institutions; ensures the realization of lesson objectives; helps in solving the problem of lack of equipment in educational institutions; gives room for a teacher to demonstrate his creative skills and gives room for the use of cheap local materials as alternatives to the expensive foreign ones (Olumirin, 2014). Also, gender may also influence student achievement in biology when taught using improvised instructional material. Gender has been defined as a cultural difference between women and men based on the biological division between male and female. According to Okeke (2011) gender refers to the social or cultural construct, characteristics, behaviours and role which society ascribes to males and females. Gender is a social or cultural determinant that varies from place to place or culture to culture. It is not universal, unlike sex which is biologically determined and universal too. In recent times gender related issues in science education has continued to receive serious attention judging by the quanta of studies done to that effect. For example Babajide (2010) opined that science subjects are given masculine outlook by educational practitioners. In addition to this, the studies by Ogunleye (2012) show that science achievement depends on gender. But, Nwosu (2011) found that students' acquisition of science process skills are not gender specific. Also, the studies by Ogunleye & Babajide (2011); Agommuoh & Nzewi, (2003) lend credence to non-significant gender effect in science achievement. However Agommuoh (2010) found that gender influences students' conceptual shift in favour of the male. Therefore, the researcher consider it worthwhile to investigate the influence of gender on achievement. Apart from the influence of gender, school location may also influence achievement of students when taught using improvised instructional material. School location means urban and rural schools. Urban schools are those schools located at satellite towns. They are schools situated at the major cities of a particular country. While rural schools are schools located at the villages or semi-villages. Studies indicate that students in urban school perform better in science than their counterpart in the rural schools (Onah, 2011; and Owoeye, 2012). However, some researchers as Bosede (2010) and Ezeudu (2013) show that location have no effect on students' academic achievement. Hence, the researcher therefore considers it worthwhile to investigate the influence of school location on the students' achievement in biology when taught with improvised instructional materials.

Statement of the Problem

Evidence from the studies reviewed shows that failure rate in biology at senior certificate examinations is high. This could be attributed to a number of factors; one of such factors is lack or total absence of instructional materials. In teaching and learning, instructional materials play a key role towards concretizing learning. Instructional materials make learning meaningful and help to improve students' academic achievement. However these advantages of instructional materials have not reflected in the education system because of the dearth of these instructional materials in our schools. Hence, the need for alternative instructional materials through improvisation.

Biology is resource intensive, and in an era of poor funding or scarcity of resources, it may be very difficult to find some of the original materials and equipment for the

teaching of Biology in schools adequately, improvisation becomes the next option. Studies have shown the importance of improvisation in teaching of Biology. This study therefore, is geared towards finding out if the use of improvised instructional materials could bring a solution to the problem of poor achievement of students in biology. It is against this background that the research therefore found a need to investigate the effect of improvised instructional materials on students' achievement biology

Research Questions

The following research questions guided the study:

1. What is the mean achievement scores of students taught biology using improvised instructional materials and those taught without instructional materials?
2. What is the influence of gender on students' achievement in biology when taught using improvised instructional materials?
3. What is the influence of school location on achievement in biology when taught using students improvised instructional materials?

Hypotheses

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

Ho1: There is no significant difference in the mean achievement scores of students taught biology using improvised instructional materials and those taught without instructional materials.

Ho2: There is no significant difference between the mean achievement scores of the female and male students taught biology using improvised instructional materials.

Ho3: There is no significant difference between urban and rural students taught biology using improvised instructional materials.

Methodology

The design of the study was pretest post quasi experimental design. Simple random sampling was used to select 2 co-educational schools out of 14 secondary schools in Enugu South L.G.A of Enugu state.

The sample size was 100 students from two intact classes in each school. The instrument for data collection is the Biology Achievement Test (BAT). BAT was face and content validated. Reliability coefficient of 0.83 was obtained for the instrument using Kuder-Richardson formula-20(K-R 20). The researcher trained the biology teachers using the lesson plans prepared by the researcher. One intact class in each school was assigned to experimental group and the other to the control group. Improvised instructional materials were used to teach the experimental group while students in the control group were taught without instructional materials. The teaching lasted 3 weeks. Research questions were answered using mean while the hypothesis were tested at 0.05 level of significance using ANCOVA.

Results

Research Question 1: What is the mean achievement scores of students taught biology using improvised instructional materials and those taught without instructional materials?

Table 1: Mean (\bar{X}) achievement scores of students taught biology using improvised instructional materials and those taught without instructional materials.

MATERIAL	n	PRETEST		POSTTEST		GAIN SCORE
		X	SD	X	SD	X
Improved	48	7.08	4.20	16.48	2.86	9.40
Without Instructional Material	52	5.32	3.00	12.40	7.08	7.08

Table I showed that the mean scores for student taught biology using improvised instructional materials was 16.48 while that of the students taught without instructional material was 12.40. Meanwhile the gain score for students taught using improvised instructional material is 9.40 while that of students taught without instructional material is 7.08. Students taught using improvised instructional materials therefore, performed better than students taught without instructional material in Biology.

Research Question 2: What is the influence of gender on students' achievement in biology when taught using improvised instructional materials?

Table 2: Mean (\bar{X}) achievement scores of male and female students taught using improvised instructional material.

GENDER	N	PRETEST		POSTTEST		GAIN SCORE
		X	SD	X	SD	X
MALE	57	6.70	4.73	13.40	4.92	6.70
FEMALE	43	5.44	2.99	13.32	4.90	7.88

Table 2 revealed mean achievement score of 13.40 for male students, while female students had mean achievement scores of 13.32. Male students therefore, performed slightly better than their female counterparts in Biology.

Research Question 3: What is the influence of school location on achievement in biology when taught using students improvised instructional materials?

Table 3: Mean (\bar{X}) and Standard Deviation (SD) on the influence of location on students' achievement in Biology when taught using student's improvised instructional material

MATERIAL	N	PRETEST		POSTTEST		GAIN SCORE
		X	SD	X	SD	X
URBAN	50	7.60	2.14	13.16	4.88	5.56
RURAL	50	5.24	3.12	13.60	4.94	8.36

Table 3 revealed that the mean achievement score of 13.16 for urban students, while rural students had achievement mean scores of 13.60. However, urban student had gain score of 5.56 while rural students had 8.36. Therefore rural students performed better than urban students in biology.

Table 4: Analyses of Covariance of students achievement scores by improvised and without instructional materials.

SOURCES OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG
Covariates model	1033.901	8	129.237	3.991	.000
Intercept	2931.561	1	2931.561	90.541	.000
Pretest	312.098	1	312.098	9.639	.000
Method	124.470	1	124.471	3.844	.012
Gender	46.201	1	46.201	1.427	.097
Location	142.57	1	142.567	4.403	.007
Method x Gender	4.330	1	4.190	.356	.437
Method x Location	39.416	1	39.416	1.272	.121
Gender x Location	11.959	1	11.959	.356	.305
Method x Gender x Location	81.015	1	81.015	2.508	.037
Error	2827.173	87	21.585		
Total	41435.333	93			
Corrected Total	3861.333	92			

Ho1: There is no significant difference in the mean achievement scores of students taught biology using improvised instructional materials and those taught without instructional materials.

Data in table 4 showed that there is a significant main effect for mode of instruction on students achievement in biology $f(1, 92) = 3.844, p < .012$. The null hypothesis therefore, was rejected indicating that there is significant difference in the mean achievement score of students taught biology using students' improvised instructional materials and those taught without instructional materials.

Ho2: There is no significant difference between the mean achievement scores of the female and male students taught biology using improvised instructional materials.

Table 4 revealed non significant main effect of gender on students achievement in biology $f(1, 92) = 1.428, p > .097$. The null hypothesis was therefore, not rejected indicating that there is no significant difference in the mean achievement scores of male and female students in biology.

Ho3: There is no significant difference between urban and rural students taught biology using improvised instructional materials.

Table 4 revealed significant main effect of location on students achievement in biology $f(1, 92) = 4.403, p > .007$. The null hypothesis was therefore, rejected indicating that there is significant difference in the mean achievement scores of urban and rural students in biology.

Summary of Findings

1. There was significant difference in the mean score of students taught using students improvised instructional material and those taught without instructional materials. Students taught using improvised instructional materials performed better than students taught without instructional materials.
2. There was no significant difference in the mean achievement scores of male and female students in biology.
3. There was significant difference in the mean achievement scores of urban and rural students in biology. Rural students performed better than the urban students in biology.

Discussions

Students taught using improvised instructional materials performed better than students taught without instructional material. The improvised instructional materials were

more effective because the materials were produced in their environment and during the production process, their interests were captured which lead to maximizing comprehension of the subject matter. This finding is in line with the observations of Ehikioya (2010), Olagunjo(2010), Abolade (2004), Mbajiorgu (2003), Onasanya and Omosewo (2010), Adeyemi and Olaleye (2010) who found out that improvised instructional Material influence students' achievement.

Results showed that there is no significant difference in the mean achievement scores of male and female students in biology. The finding supports Onasanya and Omosewo (2010) who found out that improvised instructional materials in the comparison of the male and female mean scores of experimental and control groups were the same entry level with regard to academic ability. The studies by Ogunleye (2012) showed that science achievement depends on gender. Nevertheless, Nwosu (2011) found that students' acquisition of science process skills are not gender specific. Also, the studies by Ogunleye & Babajide (2011); Agommuoh & Nzewi, (2003) lend credence to non-significant gender effect in science achievement. However, Agomuoh (2010) found that gender influences students' conceptual shift in favour of the male.

The finding of the study showed that rural students performed better than urban students in biology. This could be as a result of the fact that students in the rural areas have more advantage of having pools of natural resources around them, which helped that to be more conversant with some of the improvised instructional materials, thereby improving their academic achievement more that the students in the urban area. The findings of Bosede (2010) and Ezeudu (2013) showed that locations have no influence on students' academic achievement. Contrary to the finding of this study, Onah (2011) and Owoeye (2012) found out that students in urban school perform better in science than their counterpart in the rural schools.

Conclusion

From the results obtained in the study, it was found that students taught biology using improvised instructional materials performed better than students taught without instructional material; there is no significant difference between the performance of male and female in Biology; rural students performed better than urban students in biology;

Recommendations

Based on the findings of this study, the following recommendations are made:

- a. The teaching of Biology in secondary school should be conducted in a manner that students will effectively understand and learn the concept taught. It should be practical as the use of improvised instructional materials has play greater role in students' achievement.
- b. Teacher should try to improvise instructional materials and encourage students to do the same. This will gives students enough understanding of Biology concepts as the child's local environment will be use to source for the materials.
- c. It is suggested that regular meaningful workshop on improvisation technique for Science teachers should be conducted to improve and update their competence in teaching.

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