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IMPACT OF REALIA INSTRUCTIONAL MATERIAL ON ACADEMIC ACHIEVEMENT AMONG SECONDARY SCHOOL BIOLOGY STUDENTS IN LAPAI METROPOLIS OF NIGER STATE

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Abstract

This study investigated the impact of Realia Instructional Material on academic achievement among secondary school biology students in Lapai metropolis of Niger State. Quasi experimental research design was used for the study. A total of 160 (SS II) biology students from two randomly selected government owned secondary schools in Lapai metropolis were used for the study. One school was assigned to experimental group and taught the concept of pollination in plant using realia instructional material while the other school was used as control group and taught the same concept using conventional lecture method. The test instrument used for data collection was a 30-item test questions drawn from West Africa Examination Council (WAEC) and National Examinations Council (NECO) past questions and modified and used for this study. The test instrument was validated by relevant experts, pilot tested and its reliability coefficient determined to be 0.81. Two null hypotheses were formulated and tested at 0.05 significant level. t-test statistic was used to analyze the data obtained. Findings of this study revealed that, the use of realia instructional material enhanced students' academic achievement on the concept of pollination in plant. It was therefore, recommended amongst others that, government should organize seminars, workshops and conferences on the use of realia instructional material as an instructional strategy for teachers at secondary school level to enhance effective teaching and learning of biology in particular and sciences in general.

Key word: Academics, Achievement, Biology, Instructional Material, Plant, Pollination, Realia and Students

Introduction

Educationists, policy makers, parents as well as the society in general is highly interested in better result from science students at secondary school level because, knowledge of science is one of the prerequisite requirements for admission into higher institution for manpower development necessary for individual and national development. Unfortunately, researches reveal that secondary school students have been performing below expectation especially in science subjects (Osakwe, 2003 & Bosse, 2007). Low performance consistently recorded by secondary school science students at final Senior School Certificate Examinations (SSCE) conducted by West African Examinations Council (WAEC) and National Examinations Council (NECO) has become an issue of concern not only to individual members of the society but also to the Government (Nancy, 2010; Cepni & Kose, 2006; Okwo & Otubah, 2007 & Nwachukwu,

2007). Many researchers have reported that many factors are responsible for mass failure of secondary school science students. Some of the identified factors include

(i)   Teachers' poor pedagogical strategy
(ii)   Inadequate and relevant instructional materials
(iv)   Students' poor attitude towards studies amongst others (Okwo & Iliya, 2004; Koroka & Ezenwa, 2009; Jong, 2010 & Mohammed, 2011). Some researchers reported that inadequate and irrelevant instructional materials in most of our secondary schools are the major factors responsible for the students' poor performance. Researchers asserted that use of Realia (real material) as an instructional material by science teachers would help minimize the rate at which science students performs poorly at their final SSCE examinations (Abdullahi, 1982; Akinbobola, 2005 & Bosse, 2007).

(v)

Realia (real material) has been defined in many ways by many researchers. For instance, Akinbobola (2005) referred to Realia in classroom teaching as real objects or representation like charts, graph, specimens, and models which can either be of two or three dimensional objects that teachers use to teach abstract and difficult concepts more effectively. This definition implies that, except the individual student touches, handles or manipulates the instructional materials, hears, sees or examines the instructional materials, his base for learning will be limited. Hitch (2004) and Mohammed (2011) observed that absence of perceptive learning material consequently hinders conceptual understanding of the learning topic and also hinders learner's ability to transmit concrete knowledge to abstract mode of thought.

Mohammed (2011) reported that, the use of realia adds interest, activity and novelty to the lesson. Realia (real Material) if effectively used by teachier in classroom, provides framework where information can be defined, collected, ordered, explain and communicated (Adedokun, 2009). Realia also enables some group of phenomena to be visualized and comprehended (Mohammed, 2011).

Thus, in order for both teacher and students to achieve and retain their objectives in teaching and learning of sciences especially Biology, issues involving innovations in methodology must be properly addressed using the locally generated empirical evidences as instructional materials.

Statement of the Research Problem

The development of a country in terms of science and technological advancement depends greatly on the knowledge of science among her citizens. Scientific knowledge cannot be effectively acquired unless it is effectively taught. It is therefore, disheartening to observe from research findings that, teaching of science subjects especially Biology at secondary school level of our educational system is ineffective resulting to poor performance of students at final Senior School Certificate Examinations (Damirel, 2004; Osakwe, 2003; NECO, 2012 & WAEC, 2013). Bosse (2007) revealed that, poor performance of students in public examinations is mostly attributed to teachers' poor instructional strategy due to lack of relevant instructional material. WAEC (2014) revealed that Biology students' performance in the areas of drawing, labeling and interpretation of experiments is very poor. This is due to lack of instructional material or poor usage of instructional material during instruction hence, students' poor performance at the final SSCE examinations. This research study is therefore aimed at investigating the Impact of Realia instructional material on academic achievement among secondary school biology students in Lapai metropolis of Niger State.

Aim and Objectives of the Study

This study aimed at investigating the Impact of Realia instructional material on academic achievement among secondary school biology students in Lapai metropolis of Niger State. Specifically, the study strived to achieve the following objectives. They are to determine:

(i) The Impact of Realia instructional material on academic achievement among secondary school biology students in Lapai metropolis of Niger State.

(ii) The gender impact of Realia instructional material on achievement among secondary school biology students in Lapai metropolis of Niger State.

Research Question

The following research questions were raised to guide the study:

(i) Is there any significant difference between the academic achievements of students taught the concept of pollination in plant using Realia instructional material and those taught by conventional lecture method?

(ii) Is there any difference in academic achievement of male and female students taught the concept of pollination in plant using Realia instructional material?

Research Hypotheses

The following null hypotheses were formulated and tasted at 0.05 significant level

HO_1. There is no significant difference between the academic achievement of biology students taught the concept of pollination in plant using Realia instructional material and those taught by conventional lecture method.

HO_2. There is no any difference in academic achievement of male and female biology students taught the concept of pollination in plant using Realia instructional material

Research Methodology

Research Design

The research design adopted for this study is quasi – Experimental Research Design (Non – Equivalent, Pretest, Posttest, Experimental and Control group design) as is shown in table1

Table 1: Research Design Layout

Group	School	Pretest	Treatment	Postest	Male	Female	Total
Experimental Group	MKSS, Lapai	O_1	X	O_2	48	42	90
Control Group	DSS, Lapai	O_1	-	O_2	36	34	70
Total					84	76	160

Where:

O_1 and O_2 = Pretest and Posttest for Experimental and Control groups

X = Treatment (using Realia) and - Conventional method.

Population of the Study

The population for the study comprises of all the one thousand and eighty (1,080) senior secondary two students {male (620) and female (460)} in Lapai metropolis of Niger State. From the population, a sample size of one hundred and sixty (160) SSII students {male (84) and female (76)} was used for the study.

Sample and Sampling Techniques

Two Co-educational Public Secondary Schools were randomly sampled and used for the study. The sampled schools are (1) Mamuhmadu Kobo Secondary School (MKSS), Lapai and (2) Day Secondary School (DSS), Lapai. MKSS, Lapai was randomly assigned to experimental group while DSS, Lapai was assigned to control group. In each of the schools, an intact class was randomly selected and used for the study.

Instrumentation

Treatment Instrument and Test Instruments were the two instruments used for the study. Treatment instrument comprise of Realia instructional material which was used on the experimental group to teach the concept of Pollination in plant and Conventional lecture method which was used on the control group to teach the same topic in biology. Test instrument on the other hand is a 30- Multiple Choice Test Items on Pollination in plant which was used for data collection (pretest and posttest). The test items were adapted from WAEC and NECO past examination question papers.

Validation of the Test Instrument

A total of forty questions were initially drawn from WAEC and NECO past questions and were modified by the researchers. Thereafter, they were given to three experts in the area of biology education for validation. Their suggestions and recommendations led to dropping of ten items and the remaining thirty items were used as the final test items for data collection. Each correct answer carried 1mark given a total of 30 marks. This score was later converted to percentages to obtain the final score of individual students in both the experimental and control groups.

Reliability of the Instrument

Pilot test was conducted at Zainb Kure Secondary School, Lapai which was not among the sampled schools used for the study. Test – retest method was used with an interval of two weeks between the first and second administration of the test items. The two set of scores obtained were subjected to analysis using Pearson Product Moment Correlation (PPMC) and r value of 0.81 was obtained indicating that, the instrument is reliable and can be used for the study.

Method of Data Collection

After the researchers have visited the sampled schools for permission to use the schools and permission granted, staff and students of the schools given orientation about the research, a pretest was administered to both experimental and control group students. Thereafter, the experimental group was taught the concept of pollination in plant using Realia instructional material while control group was taught the same topic using Conventional lecture method. After the treatment, posttest was administered to both groups, their scripts were collected and marked and posttest scores were obtained. The two set of scores obtained (pretest and posttest) were analyzed using mean, standard deviation and t-test statistics using the Statistical Package for Social Science (SPSS) Version 20:00

Results and Discussions
Pretest Result
Table 2: Mean, Standard Deviation and t-test analysis of Experimental and Control groups in pretest.

Group	N	df	Mean (x)	SD	t	p-value
Experimental group	90		15.83	8.518		
		158			.067	.793
Control group score	70		16.17	7.844		

Result in table 2 shows the mean score of the experimental group to be 15.83 with Standard Deviation of 8.518 and that of the control group to be 16.17 with Standard Deviation of 7.844 and P-value of 0.793. This result indicates no significant difference in their mean scores. Therefore, the entry behavior of the two groups was equivalent.

Research Hypotheses
HO_1. There is no significant difference between the academic achievement of biology students taught the concept of pollination in plant using Realia instructional material and those taught by conventional lecture method.

Table 3: Mean, Standard Deviation and t-test analysis of the Experimental and Control groups in Posttest.

Group	N	df	Mean(x)	SD	t-cal	P-vale
Experimental group	90		49.17	13.460		
		158			3.882	.040
Control group	70		30.00	9.738		

S= Significant at 0.05

Table 3 shows that the experimental group taught pollination in plant using Realia instructional material had a mean score of 49.17 with Standard Deviation of 13.460 and the control group had a mean score of 30.00 with Standard Deviation of 9.738. This result reveals a significantly difference between experimental and control groups. The result also revealed that, t-calculated value was 3.882 and P-value of 0.040 which is significant at 0.05. Therefore, hypothesis one is rejected since there is a significant difference between the mean achievement scores of experimental group taught pollination in plant using Realia instructional material and control group taught without Realia instructional material.

HO_2. There is no any difference in academic achievement between male and female biology students taught the concept of pollination in plant using Realia instructional material

Table 4: Mean, Standard Deviation and t-test analysis of male and female students in experimental group.

Variable	N	df	Mean(x)	SD	t-cal	P-value
Male	54		49.44	13.382		
		88			.126	.726
Female	36		48.75	14.162		

NS= Not Significant at P< 0.05

Table 4 indicates that the male students had mean score of 49.44 with standard deviation of 13.382, while female students had a mean score of 48.75, and Standard Deviation of 14.162. The t-calculated is 0.126 and P-value is 0.726. The result indicates that there is no significant difference in the mean score of male and female in the experimental group. This therefore implies that gender has no significant difference in academic achievement when they are exposed to the same treatment using Realia instructional material.

Discussion of Results

The pretest result indicates no significant difference in the pretest mean score of experimental and control groups. The result therefore indicates that, the entry behavior of the two groups were equivalent on the concept of pollination in plant before the treatment.

Analysis of research hypothesis one revealed that the experimental group achieved significantly higher than the control group. Also, male and female students had no significant difference in their academic achievement when taught the concept of pollination in plant using Realia instructional material.

Table 3 indicates that, the experimental group achieved significantly higher than control group. The t-cal was 3.882 and P-value was 0.040 which is lower than 0.05 significant level. This then implies that it is significant at 0.05. Therefore, hypothesis one is rejected. This finding is in consonant with that of Nancy (2010); Okwo et al (2007); David (2008); Nwachukwu and Nwosu, (2007) as they all reported that the experimental group achieved higher than the control group when Realia instructional material was used to teach students as compared to the use of graphic, diagrams and charts for teaching senior secondary school biology students. They reported that, the use of Realia enhance learning achievement of students.

Table 4 revealed that, male students had mean score of 49.44 with standard deviation of 13.382, while female students had a mean score of 48.75 with Standard Deviation of 14.162. The t-cal was 0.126 and P-value was 0.726 which is higher than 0.05 significant level. This then implies that, it is not significant at 0.05. This result therefore reveals that there was no gender difference in academic achievement of biology students taught the concept of pollution in plant using Realia Instructional Material. However hypothesis two is accepted. This finding is in consonant with the finding of Farkonh (2010) who reported no significant difference in academic achievements of students, when system approach for solving chemistry practical was used in secondary schools, however disagree with the findings of Msheliza (2000); Kim & Axelrod (2005); Okwo and Otubah (2007); Nwachukwu

and Nwosu (2007) who reported that the experimental group male students achieved better than their female counterparts when they are exposed to the same treatment.

Summary, Conclusion and Recommendations

Summary
The study investigated the Impact of Realia Instructional Material on academic achievement among secondary school biology students in Lapai metropolis of Niger State. The students used for this study were found to be equal in terms of their entry behavior on the concept of pollination in plant. There was a significant difference between the achievement scores of experimental and control group students. However, there was no gender difference.

Major Findings of the Study
The following findings have been made from the research work:

(i) Academic achievement of the biology students in the experimental group was found to be enhanced as a result of Realia Instructional Material used for teaching them the concept of pollination in plant.

(ii) Realia Instructional Material was found to be gender friendly as it enhanced them academic achievement on the concept of pollination in plant equally.

Conclusion
The conclusions drawn from the research are as follows:
The effectiveness and efficient use of realia instructional material enhanced students understanding and achievement. This is evident in the experimental group mean score which is higher than that of the control group in posttest. The use of realia makes teaching and learning more explicit. It serves as a clue to understanding of same concepts. Emphasis should therefore be laid on the use of realia instructional material for teaching of biology in our secondary schools.

Recommendations
In view of the findings of this research study, the researchers recommend the followings:

(i) Teachers should be encouraged to use Realia instructional material during classroom instruction.

(ii) Seminars, workshops, conferences, should be organized for teachers on the use of Realia instructional material.

(iii) Government, educational administrators/principals of various schools should support and encourage the creativity of science teachers by giving some incentives for the effective usage of Realia Instructional Material during classroom instruction.

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