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Improving Drawing Skills of Senior Secondary School Biology Students through Home-Assignment Method: A Study of Selected Schools in Sokoto South Local Government, Nigeria

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Abstract:

The study investigated the effect of Home-Assignment Method in improving drawing skills of Senior Secondary School Biology Students in some selected schools in Sokoto South local government, Sokoto state, Nigeria. The study answered two research question and tested two hypotheses. Quasi-experimental design was employed with a sample of 165 SS II students from two selected secondary schools. Experimental group comprises of 86 student who were given home assignment to draw some biological drawing at the end of every lesson. Control on the other hand consist of 79 students who were not given assignment throughout the study. The instrument used in this study is Biological Drawing Achievement Test (BDAT) with reliability coefficient of 0.71. Data obtained through BDAT were analysed using descriptive statistics to answer research questions and t-test to test hypotheses with the aid of SPSS. It was discovered that, home assignment improve drawing ability of students in biology and coverage of course content in good time. It was recommended among others that students should be engaged with home assignment to provide them with the opportunity to practice drawings of biological diagrams

Keywords: *Improving, drawing skills, biology students, home-assignment*

1. Introduction

Biology as field of study concerned, with the study of living things, requires careful observation and experimentation to provide meaningful explanation on the nature and structure of living things. Drawing is an important part of biology and all students are expected to make good and quality drawing regardless of their artistic ability. Drawing helps students to remember the object or specimen and its important observable features. It assists student to translate his visual imagery power and give meaning to what he saw (Uzuogba, 2000). It is therefore imperative for students to take their time and carefully observe the specimen by paying attention to detail so that they can recall major features of the specimen. A drawing is a result of a long period of observation at different depth of focus and magnifications, and single drawing can present features that would require several photographs. Dempsey and Betz (2001) argued that, a photograph shows form but not all the ins and outs an observer may record in a drawing. They added that qualitative information in nature can be collected in the form of drawing which acts as a vehicle for future observation, interpretation and discussion. Mia, cited in Ibrahim (2014), identifies four types of drawing in biology, these includes; drawing from real object, drawing from the chalk board, drawing from the microscope slide and drawing from the text books. The later form of drawing can be encouraged through giving students home assignments. Furthermore, drawing is one of the excellent ways to describe a specimen if the goal of the observer is to provide unique identity of the object or specimen (Leslie, 1995). This will help the student to move beyond simple and mental image of what he believes a particular living organism or part of body look like. Sheredos, Burnston, Abrahamsen, and Bechtel (2012) stated that, diagrams have distinctive characteristics that make them an effective medium for communicating research findings, and impressive tools for scientific reasoning. They added, drawings play a central role in biology because they are highly suited to two key tasks: displaying phenomena at various levels of detail, and constructing mechanistic explanations for those phenomena

Despite the importance of drawing to students of biology, teachers spend little or no time on the development of student drawing skills; they often ask student to copy what they drew on the board within the limited time of the lesson without assessing students work. This may in turn kill students' interest in drawing and eventually result in student failure in answering questions that require drawing skills. Okebukola, (1998) states that there are positive correlation between higher

performance in biology and the drawing ability of the student. Confirming this, the chief examiners report of the West African Examination Council (WAEC) and National Examination Council (NECO), reported that in both essay and practical examination, poor drawing is one of the factors responsible for students poor performance in the senior secondary school biology examination. The reports specify areas of deficiencies like; size of the drawing, clarity of the lines and features of the diagrams, labeling, title, magnification and shading in the drawing (NECO, 2015 and WAEC, 2015).

Teacher poor attitude to development of students drawing skills may not be unconnected to the short period for biology lesson and the depth of the material to cover. In our secondary schools today biology teachers are limited to only 3 periods (1 hour 30 Minute) per week to teach wide range of knowledge and skills such as laboratory, experimental, reasoning and drawing. Due to this limitation of time in the classroom, material to cover and limited resources available, the teacher has to employ another technique of teaching drawing through giving assignment (homework exercise). Ibrahim (2014) recommended that, biology teachers should provide students with the opportunities to practice drawing and labelling at home, as part of their take home assignment which will provide them with the opportunity to develop the drawing and labelling skills through consistent practice. If this can be accomplished, the classroom time can be used for discussion, demonstration and explanation.

Assignment involves engaging students with some activities or exercises either within the classroom or at home. It is an instructional technique that encourages guided inquiry and self-learning, writing skills and report preparation among learners. It is essential for teachers to convey to students that they are performing the exercise to develop their observational skills and therefore enhancing their drawing ability. Student achievement rises significantly when teachers regularly assign homework and students conscientiously do it, it can help children develop good habits and attitudes and teach student self-discipline and responsibility. More importantly, it can encourage learning (Nancy, 2001). Homework can bring together children, parents, and teachers in a common effort to improve Student learning. Teachers are a vital link in making this happen. Cooper, Robinson and Patail (2006), conclude that homework is positively related to academic achievement, and it is more effective with secondary school students than primary school students. Furthermore, Ibrahim (2014) reported that students irrespective of gender and the type of school they attended (public or private) can perform better in terms of biological drawings if they are exposed to the right knowledge and skills. The problem with science teachers is that they don't engage their students with home assignment. Marte and Torberg (2011), reported that mathematicsteachers assigned relatively more homework than their colleagues in science. This may result in having different degrees of classwork in the two subjects.

2. Statement of the problem

The role of biology to human development cannot be over emphasized. Drawing is a significant aspect of biology, because it developed creative and manipulative skills of the learner. However, students' attitude and ability in drawing is not encouraging as highlighted by the chief examiners reports of WAEC and NECO (NECO, 2015 and WAEC, 2015). Hence the need to develop way that could improve students' drawing ability, which include given them opportunity and freedom to draw some biological diagram as take home assignment.

2.1. Objective of the study

The main objective of this study is to find out whether home assignment or exercise can improve student drawing skill or ability. Based on this, this study set the following objectives

- If there would any difference between the mean score of experimental and control group in their ability to draw biological diagrams
- If there would be any difference between the mean score of experimental and control group in the identification of and labelling of various parts of biological diagrams

2.2. Research question

Based on the objective of this study, the following research questions were raised to guide the study:

- Would there be any difference between the mean score of experimental and control group in their ability to draw biological diagrams
- Would there be any difference between the mean score of experimental and control group in the identification of and labelling of various parts of biological diagrams

2.3. Null-Hypotheses

Based on the research questions raised in this study, the following hypotheses were tested:

- There is no significant difference between the mean score of experimental and control group in their ability to draw biological diagrams
- There is no significant difference between the mean score of experimental and control group in the identification of and labelling of various parts of biological diagrams

3. Research Methodology

The research design used in this study is quasi-experimental. This was because the researchers have no control over random selection of students from various schools within the study area. The principals of the two selected secondary schools assigned students from one classroom each to the researchers. This resulted in using a classroom from one school as control group, and the other from another school as experimental group. Both groups were taught using the same methods like lecture, demonstration and discussion methods of teaching. The difference is that, students in the control group draw the diagrams during the lesson, while those in the experimental were required to observe the diagram during the lesson, and use their textbooks to draw such diagram at home as their take home assignment. The duration of the treatment is six weeks while the topics taught includes circulatory system in man (diagrams of human circulatory system and structure of the heart); transport system in plant (diagrams of transverse section of Roots, Stem and Leaf); excretory system in man (diagrams of human urinary system, structure of the kidney and the Urinary tubule or Nephron).

4. Population

The population of the study comprises of all senior secondary school students from the 20 schools in Sokoto south local government area. The defined population consist of 285 SS II students from two selected secondary schools in Sokoto south local government area.

4.1. Sample and Sampling Technique

The sample size for this study is 165 Students which were estimated using Krejcie and Morgan table for determining sample from a given population. Samples were selected independently using random sampling techniques where each student has equal chance of being selected.

4.2. Instrumentation

The instrument used in this study is an achievement test titled Biological Drawing Achievement Test (BDAT). It is made up of 5 questions extracted from the past WAEC and NECO biology question papers. The test was divided into two sections. In section A, students were asked to make three large labelled drawing, while in section B they were asked to identify various features of the two diagrams presented on the question paper. The instrument was validated by expert in the field of biology who have been marking WAEC and NECO senior secondary school biology examination. They were presented with a copy of the instrument and a table of specification showing the topics taught and its objectives. Reliability coefficient of the instrument was ascertained after a pilot study was conducted and coefficient of 0.71 was obtained using kuder Richardson formula. Data obtained was analyzed using descriptive statistics to answer research questions, and t-test to test for significant difference in the two hypotheses at 0.05 significance level

5. Results

The two hypotheses and research questions were tested and answered from the data obtained using BDAT which has two sections with a total score 100. Section A was allocated 60 marks while section B had 40 marks. Scores of students from section A of experimental and control group were compared to answer research question 1 and test hypothesis 1. On the other hand, students' scores from section B were used to answer research question 2 and test hypothesis 2. The result of data analysis obtained using SPSS software were presented in Tables 1 to 4 below.

Groups	N	Mean	Standard Deviation	Mean diff.	
Experimental	86	32.37	8.24		
				3.65	
Control	79	28.72	10.26		

Table 1: Descriptive Statistics on the Drawing Ability of Experimental and Control Groups

The analysis in Table 1 shows the descriptive analysis on the drawing ability of the experimental and control group. It was revealed from the table that mean score of experimental group (32.37) is higher than that of control group (28.72). The mean difference between the two groups is found to be 3.63 in favour of the experimental group. This indicated that experimental group have higher drawing ability than the control group. This answered research question 1 which state that "Would there be any difference between the mean score of experimental and control group in their ability to draw biological diagrams"? The analysis also shows that scores of experimental group are less spread (more homogenous) compared to that of control group (more heterogeneous), with standard deviation 8.24 and 10.26 for experimental and control group respectively.

Groups	N	t-cal	Df	P-value	Sig.-value
Experimental	86				
		2.53	163	0.37	0.05
Control	79				

Table 2: T-Test Analysis on the Drawing Ability of Experimental and Control Groups

The t-test analysis in Table 2 revealed that t-calculated is 2.53 while p-value is 0.037 which is less than significant value (0.05). Since P-value is greater than significant value, hypothesis 1 is rejected. Therefore, it indicated there is significant difference between the mean score of experimental and control group in their ability to draw biological diagrams

Groups	N	Mean	Standard Deviation	Mean diff.
Experimental	86	22.53	6.65	
				0.29
Control	79	22.24	5.53	

Table 3: Descriptive Statistics on the Identification of Various Parts of Biological Diagrams

From the analysis in Table 3, the mean score of experimental group is 22.53 while that of control group is 22.24. The mean difference between the two groups is 0.29 in favour of experimental group. This answered research question 2 which states that, would there be any difference between the mean score of experimental and control group in the identification of and labelling of various parts of biological diagrams? Similarly, the descriptive analysis shows that scores of experimental group are more spread compared to the control group with standard deviation 6.65 and 5.53 for experimental and control group respectively.

Groups	N	t-cal	Df	P-value	Sig.-value
Experimental	86				
		0.307	163	0.66	0.05
Control	79				

Table 4: T-Test Analysis on the Identification of Various Parts of Biological Diagrams

The t-test analysis in Table 4 revealed that the t- calculated value is 0.307 while P-value is 0.66 which is greater than significance or alpha-value (0.05). This indicated that hypothesis 2 which state that, there is no significant difference between the mean score of experimental and control group in the identification of and labelling of various parts of biological diagrams is accepted.

6. Discussion

The data analysis contained in Table 2 revealed that P-value is less than significant value. This resulted to the rejection of hypothesis 1 by the researchers. It then confirmed that there is significant difference between the mean score of experimental and control group in their ability to draw biological diagrams. It indicated that home assignments improve drawing ability of students in biology. This finding come is in agreement with Cooper, Robinson and Patall (2006) who concluded that homework is positively related to the academic achievement of student especially at secondary school level. It also confirmed the finding of Ibrahim (2014) who reported that students irrespective of the type of school (Public or Private) and gender can perform better in terms of biological drawings if they are exposed to the right knowledge and skills. The analysis in table 2 shows that P-value is greater than significant value which means that hypothesis 2 is accepted, indicating that there is no significant difference between the mean score of experimental and control group in the identification of and labelling of various parts of biological diagrams. This disagree with Cooper, Robinson and Patall (2006) which means that there are certain degree to which home assignment is related to student academic performance. It therefore confirmed that home assignment alone is not responsible for student performance in labelling and identification of various parts of biological diagram.

The periods used during the experiment is six weeks, it was discovered that all the six weeks were used for teaching control group. Experimental group were taught in less than six weeks, more specifically in five week. It was further observed that there were more classroom activities in the experimental group than in control group. This is in line with Marte and Torberg (2011), who stated assigning relatively more homework may lead to different degrees of classwork.

7. Conclusion

Drawing is an important part of biology and help students to remember the object or specimen and its important observable features. Home assignment is an instructional techniques that encourages guided and self-learning, writing skills and report preparation among learners. This research discovered that, home assignment improves drawing ability of students in biology, but it does not improve students' ability in labelling and identification of various parts of biological

diagram. Similarly given home assignment can improve more classroom activities and coverage of course content in good time.

8. Recommendations

In view of the findings of this research, the following recommendations were put forward:

- Students should be engaged with home assignment to provide them with the opportunity to practice drawings of biological diagrams
- Parent should encourage their children to practice biological drawings by checking their books and make sure they do all the home assignment given to them
- Student should do all assignments given to them and submit to their teachers for marking and corrections
- School authorities should regularly inspect student note books to ensure that their home assignment are marked and corrected by their teachers

9. References

- i. Cooper, H., Robinson, J. C. & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987-2003. *Review of Educational Research*, 76, 1-62
- ii. Dempsey, B. C. & Betz, B. J. (2001). Biological Drawing a Tool for Learning. *American Biology Teacher* 63 (4), 271-279
- iii. Ibrahim, R. U. (2014). Influence of Instruction on Students' Performance in Biological Drawing in Sokoto State, Nigeria. *Sokoto Educational Review* 15, (12), 82-90
- iv. Leslie C. W. (1995). *Nature Drawing a Tool for Learning*. Dubuque. Kendall/Hunt Publishing Company Limited
- v. Marte R. & Torberg F. (2011). Homework Assignment and Student Achievement in OECD Countries. Discussion papers No 711, Statistics Norway, Research Department.
- vi. Nancy P. (2001). *Helping your Student with Homework a Guide for Teachers*. Washington D. C, U.S. Department of Education
- vii. Okebukola P. A. (1998). Highlight of Strategies for Greater Achievement in Science Education. *An Environmental Education Series* (2), STAN. 123-145
- viii. Sheredos B, Burnston D. C, Abraham A. Betchel W. (2012). Why do Biologist Use so Many Diagrams. A paper presented at the biennial meeting of Philosophy of Science Association November 2012.
- ix. Uzoagbo I. N. (2000). *Understanding Art in General Education*. Africana Publishers Limited