



Impact of Biology Practical on Academic Performance of Students in Some Selected Secondary Schools in Sabon Gari Local Government Area of Kaduna State

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ABSTRACT

The research work investigated the impact of biology practical on academic performance of students in some selected schools in Sabon Gari Local Government Area of Kaduna State. The objective of the study is to examine the impact of biology practical on performance of students in comparison to those taught with conventional teaching method. Based on the research topic, research questions were formulated, viz what is the difference in the mean academic performance scores of students taught biology using practical concept before and after in the same school? From the objective, research question, hypotheses were formulated stating that, there is no significant difference in the mean academic performance scores. The research design was quasi experimental in nature and data collected were analysed with the Statistical Package for the Social Sciences (SPSS). The results showed that the use of practical method of teaching enhances effective learning of biology. The study concluded that learning of biology cannot be achieved effectively without practical work.

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INTRODUCTION

Science is the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment. Biology is one of the core science subjects taught in our secondary schools. Aliyu (2017) defines biology as the study of plants and animals. Okolo (2018) defined science as the study of natural things around us which simply means the investigation of nature. Abdullahi, (2018) posited that Science is based on research, which is commonly conducted in academic and research institutions as well as in government agencies and companies. Joseph, (2019) define Science as the observation, identification, description, experimental investigation, and theoretical explanation of natural phenomena.

Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The learners may be children, college students, or adults within the general public. Science education is an essential part of education of all people growing up in a fast changing and increasingly complex technological world. Science education is a process of teaching, training and learning to acquire scientific knowledge and skills by the learner.

Scientific processes are the tools required by learner to acquire scientific literacy and the vehicle through which teachers teach science content. Salawu (2014) refers to science educational processes as teaching, learning, exercises, testing, procedure, methods and verification of science knowledge. Irwin (2014) and Wolf (2019) see the processes having three

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major elements namely, objectives, learning experiences and appraisal procedures. Science educational objectives represent the desired performance or behaviours that individuals in a programme are supposed to acquire. Biology is one of the science subjects studied at secondary schools that require the use of practical approach for effective learning.

According to Ibrahim (2018), biology is a natural subject which requires the use of appropriate and effective instructional strategy to understand nature, the environment and the application of biological concepts for everyday use. Biology is a science subject which explains the existence of life. It is a natural science which is concerned with the study of living organisms, their structures, forms and functions, heredity, etc. It is a fundamental science subject which serves as the basis for understanding the complexities of how the body parts of organisms' function. Biology according to Taiwo and Emeke (2014) is the subject which exposes the students to the world of knowledge of self, the immediate and distant environment. Uchenna (2012) states that biology as a branch of science and the prerequisite subject for many fields of learning contributes immensely to the technological growth of a nation. Biology plays important roles in science related studies such as medicine, forestry, agriculture, biotechnology and nursing etc. Uchenna, (2012) postulated that the study of biology in senior secondary schools can equip students with skill concepts, principles and theories that will enable them face the challenges before and after graduation.

Despite the importance of biology in all facets of life, the teaching of biology at the secondary schools is still not effective. Many researchers have identified several factors as the main reasons why poor academic performances in biology still persist. These factors include poor method of teaching, lack of qualified teachers, inadequate infrastructures and lack of laboratories. Okereke (2016) also opined that some teachers shy away from using student oriented method of teaching instead they prefer lecture method. As a core science subject at the senior secondary schools, its basic principles are

utilized in the vocational and technological fields for national development. Owing to this there is need to teach biology using internet facilities as they can be very stimulating to students and provide necessary varieties to science teaching and learning.

Laboratory activities have had a distinctive and central role in the science curriculum and science educators have suggested that many benefits mount up from engaging students in science laboratory activities. Over the years, many have argued that science cannot be meaningful to students without worthwhile practical experiences in laboratory. Unfortunately the term laboratory or practical has been used, too often without precise definition, to embrace a wide array of activities. Lots of arguments have been raised in the past to give justification or rationale for its use. Even though laboratory sessions were generally taken as necessary and important, very little justification was given for their inclusion.

Some laboratory activities have been designed and conducted to engage students individually, while others have sought to engage students in small groups and in large-group demonstration setting. Science is a great enterprise which nations depend on for technological advancement. Science therefore, is receiving much emphasis in education because of its significance and relevance to life and society. Biology as a branch of science and the prerequisite subject for many fields of learning contributes immensely to the technological growth of the nation. This includes medicine, forestry, agriculture, biotechnology and nursing. The study of biology in senior secondary school can equip students with useful concepts, principles and theories that will enable them face the challenges before and after graduation.

The place of laboratory practical in teaching biology cannot be over emphasized. Tairab (2014) opined that practical work has helped students in knowledge acquisition. Daramola (2013) and Qgunniyi (2017) advocated that science, which would be taught in secondary schools, should be technologically oriented, which means to teach science, it must have practical application. Science belongs to the laboratory as



cooking belongs to the kitchen and gardening to a garden. This is the state where science teaching is best done in the laboratories. Ndu (2010) also emphasized the importance of practical teaching of science stating that meaningful learning of science cannot be achieved without practical aspect of science and that science disciplines are not only the acquisition of facts but also embracing the processes.

Woolnough (2014) also found that majority of secondary school teachers indicated that about 40% to 80% of the class time was spent in practical activities. Hodson, (2012) in his own work, classified the reasons given by teachers for engaging in practical work into five major categories like to motivate learners by stimulating interest and enjoyment, teaching laboratory skills, to enhance learning of scientific knowledge, give insight into scientific methods, develop certain scientific methods, these coincides with the classification of practical work reported by Gott, Welford, and Foulds, (2018) when they identified five types of practical works like, inquiry practical, investigative practical, skill practical, illustrative practical, and observational practical.

STATEMENT OF PROBLEMS

The relevance of laboratory practical in the development and performance of students in Biology cannot be over emphasized. Several researches stated earlier indicate the need for effective practical lesson using appropriate equipment. Yet many Biology teachers tend to avoid organizing laboratory practical lesson to their students. Some of the reasons for poor performance of students in examinations include poor science teaching due to teacher's incompetence. Furthermore, most secondary schools' teachers of biology concentrate on meeting the demand of practical examinations.

This has drawn the attention of concerned individuals on the genesis or causes of the situation. There is evidence of effective teaching of biology practical in School and this has affected the performance of student in biology. This could be due to lack of equipment and materials or lack of proper training of the teachers handing the practical. Therefore, this research

work tend to investigate the impact of biology practical activities on the academic performance among senior secondary school students in some selected secondary schools in Sabon Gari Local Government Area of Kaduna State.

Objective of the Study

The objective of the study are to:

1. To examine the impact of biology practical on performance of students in biology concept in Sabon Gari Local Government Area of Kaduna State.

Research Question

The study is guided by the following research question:

1. What is the difference in the mean academic performance scores of students taught biology using biology practical before and after.

Null Hypothesis

A null hypothesis was formulated for the study:

Ho₁ There is no significant difference in the mean academic performance scores students taught biology using biology practical concept before and after.

METHODOLOGY

Research Design

The research design of the study was quasi experimental in nature. A test re-test method was used. This involved a pre-test and a post-test as advocated by Sambo. (2015). It involved two experimental groups and two control groups. All the groups will be pre-tested to determine their equivalence. The researcher decided to select the Quasi-experimental design because the school authority may not allow strict randomization because it can disrupt or divide the class. Quasi-experimental research design permits the use of intact classes.

Population of the Study

Population of the study comprised of all SSII biology students of educational public school in Sabon Gari Local Government Area of Kaduna state. This educational zone had about 10



Secondary Schools that offered Biology. The total number of subjects in the population is two thousand nine hundred and fifty (2950), one

thousand one hundred and eighty two (1,182), were males while one thousand seven hundred and sixty eight (1768) were females.

Table 1: Population of the Study

S/N	Name of school	Male	Female	Total
1.	GSS Hayin Ojo	73	142	215
2.	GSS Chindit	348	198	546
3.	GSS Aminu	163	68	231
4.	GSS Dogon Bauchi	-	532	532
5.	GGSS Hayin Dogo Samaru	-	350	350
6.	GSS Kwangila	74	99	173
7.	GSS Bomo	98	87	185
8.	GSS Muchia	297	162	459
9.	GSS Chikaji	112	98	210
10.	GSS Commercial	17	32	49
Total		1182	1768	2950

Source: Zaria Educational Zone (2019)

Sample of the Study

Random sampling technique was used to select the sample size for the study. Two Senior Secondary Schools were randomly selected out of the (10) Ten Senior Secondary Schools in the Sabon Gari Local Government Area, Kaduna State. The total number of the sample students is 154. Names of various schools were written on pieces of paper, properly folded and put into a rubber basket from which (2) Two schools were randomly picked for the sample and recorded.

Instrumentation

The instrument for data collection is Biology Concept Performance Test on Osmosis and Diffusion, which was developed by the researcher. A copy was attached as Appendix I. Each of the question was assigned one mark. Total score was thirty (30) which would imply that a candidate scored right all the questions.

Selection of Osmosis and Diffusion concepts taught.

The topics was from biology Syllabus

1. Osmosis
2. Diffusion

Validation of the Instrument

Instrument and marking scheme was validated by two lecturers with rank of Senior lecturers from the Department of Biology, Federal College of Education Zaria. The researcher administer pretest to both experimental and control group to know their background knowledge on the concept to be thought.

Procedure for Data Collection

The data for this study was collected through the use of Biology Concept Performance Test. Achievement scores were collected from the test administered before and after the experiment. All tests were administered under examination conditions.

Data Analysis

Data collected were analysed with the Statistical Package for the Social Sciences (SPSS), IBM version 26. Statistical analysis included descriptive statistics using frequencies and percentages, means and standard deviations. The two samples t-test procedure was used to test the research hypothesis. The tests were carried out at the fixed probability level of 0.05 level of significance.

RESULTS

Two groups of biology students in some selected Senior Secondary Schools in Sabon Gari Local Government Area of Kaduna state were involved in this study. The study is aimed at determining the impact of biology practical activities on academic performance among senior secondary school students. The first group consisted of one hundred and fifty four (154) students while the second group used as the experimental consisted of seventy nine (79) students. Performance data (pre-test scores) were collected from the achievement test administered to both groups before the commencement of using practical biology concepts.

One group (experimental) was taught biology using practical concept while the second

group (control) was not involved in the use of practical concepts. Achievement test was administered to the two groups after the exposure of the experimental group to the use of practical concept and performance data (post -test scores). Data were collected after the use of the practical concepts from the two groups. The collected data were analyzed with the Statistical Package for the Social Sciences (SPSS), version 26. The results of the analysis are presented in this study in line with research objectives along with tests of hypothesis formulated. Findings are discussed at the end of the chapter. The distribution of students involved in the study, showed the number of students selected for the study in the two groups.

Table 2: Distribution of the students in the two groups

Groups	Frequency	Percentage	Frequency	Percentage
Male	75	53.3	42	53.2
Female	79	46.7	37	46.8
Total	154	100.0	79	100.0

A total of one hundred and fifty-four (154) Senior Secondary School students were involved in the study. These were made up of 40(53.3%) males and 35(46.7%) female students in the control group and 42(53.2%) along with 37(46.8%) female biology students in the experimental group. The table revealed that male and female students were said to be well represented in the study, thereby eliminating any gender bias in the findings.

Testing of hypothesis

The null hypotheses formulated to test impact of using biology practical activities in the teaching and learning of biology on students' academic performance were tested here in line with the research questions of the study. Tests

were carried out with the two samples t-test procedure at the fixed probability level 0.05. The null hypotheses were tested as follows:

Null Hypothesis:

H₀₁: There is no significant difference in the mean academic performance scores of selected Senior Secondary students taught biology using biology practical concept.

The performance students in the use of the practical activities in the teaching and learning of biology were compared here to determine the impact of the method on performance. The result of the two samples t-test used for the comparison is summarized in Table 3.

Table 3: Two samples t-test on performance students before and after the use of practical activities in teaching and learning of biology

Groups	N	Mean	Std. Dev.	Std. Error	T	df	p-value
	79	13.13	1.712	0.193	28.536	78	0.000
	79	21.87	3.264	0.367			

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The result in Table 3 revealed that mean performance of students in the experimental group differed significantly after they were taught the subjects with practical activities. The t-value obtained for the test was 28.536 at degree of freedom (df) = 78. The p-value obtained for the comparison was 0.000 ($p < 0.05$). With these observations, the null hypothesis that there is no significant difference in the mean academic performance scores of selected Senior Secondary students taught biology using biology practical concept before and after in Sabon Gari Local Government Area of Kaduna State is therefore rejected. The observation implied that use of practical activities in the teaching and learning of biology significantly impacts on academic performance of Senior Secondary School students in study area.

DISCUSSION OF FINDINGS

This study showed that use of practical activities in the teaching and learning of biology at the Senior Secondary School level has significant impact on students' academic performance. Two groups of students were involved in the study. One group (experimental) participated in the use of practical activities for teaching and learning of biology while the second group (control) did not. From the analysis of data collected before and after the use of the practical activities, students who participated in the use of the practical activities were found to have their mean performance significantly improved when compared with their mean performance before the experiment. The finding of this study agreed with Ndu (2010) who emphasized the practical teaching of science that makes learning to be more meaningful.

The researcher posited that learning of science cannot be achieved effectively without practical aspect, stressing that science disciplines are not only the acquisition of facts but also embrace the processes. The finding is in line with Abimbola, (2015) who reported that though some practical scientific experiences may be acquired in everyday life but that the most important part of the experience is through practical work which gives the student the appreciation of the spirit of

science. The report stated, there is no adequate substitute for retention of facts and which can make learning more permanent and that practical work closely linked with theoretical work help to maximize opportunity to practice those scientific methods and that laboratory practical activities in biology provide opportunities for students to actually do science as opposed to learning about science. The findings are in line with Karen (2017) who opined that academic performance of students depends on the effect of laboratory practical which provides them with lesson that are academically stimulating and engaging them meaningfully with tasks that lead to higher grades.

The study found that students who were in the experimental group performed significantly higher when compared to their counterparts in the control group that were not taught with practical activities. The observed difference was not found to be high before the experimental group was exposed to the use of practical activities in the teaching and learning of the subject. The study revealed that the use of the practical activities was responsible for the significantly higher mean performance of students in the study group.

The findings agreed with Nzewi (2018) who asserted that laboratory practical activities can be regarded as a strategy that could be adopted to make the task of a teacher (teaching) more real to the students as opposed to abstract or theoretical presentation of facts, principles and concepts of subject matters and went further to state that practical activities engage the students in hands-on, mind-on activities, using varieties of instructional materials/equipment to drive the lesson home.

Summary of Major Findings

The major finding of the study indicated that the use of practical activities for teaching and learning of biology has significant impact on academic performance of Senior Secondary School students in Sabon Gari Local Government Area of Kaduna State.



CONCLUSION

From the analysis of the data and test of the hypotheses of this study, the researcher wishes to conclude as follows:

1. Use of practical activities in the teaching and learning of biology has significant impact on students' academic performance in the subject.
2. The use of practical activities in the teaching and learning of biology at the Senior Secondary School level in Sabon Gari Local Government Area of Kaduna State has a significant advantage over the lecture method in improving students' academic performance.

RECOMMENDATIONS

Based on the findings from the study, the researcher recommends as follows:

1. Practical activities should be considered as a viable method of teaching and learning of biology at Senior Secondary School level in Sabon Gari Local Government Area of Kaduna State.
2. Stakeholders should encourage the use of practical activities in the teaching and learning of biology at the Senior Secondary School level in Sabon Gari Local Government Area of Kaduna State through supervision and inspection of schools.

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