East Asian Journal of Multidisciplinary Research (EAJMR)
Vol. 2, No. 3 2023: 1119-1128

Statistical Analysis on Influence of Biology Laboratory Practical on Senior Secondary Students' Academic Performance in Ilorin East Lga, Kwara State

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ARTICLEINFO

Keywords: Statistical Analysis, Influence of Biology Laboratory Practical, Senior Secondary Students' and Academic Performance

Received : 05, January
Revised : 10, February
Accepted: 15, March

ABSTRACT

High achievement especially in Biology is usually enhanced by proper Biology laboratory practical. However, it is assumed that most Biology teachers resort strictly to the use of theoretical method in teaching. This has constantly led to poor performance of students in the Senior Secondary School Certificate Examination across Nigeria. Therefore, this study investigated the statistical analysis on influence of Biology laboratory practical on students' academic performance of Senior Secondary Students in Ilorin East, Kwara State, Nigeria. The study was a descriptive survey type. One hundred and twenty (120) students were sampled for the study using proportionate and simple random sampling technique in Ilorin East L.G.A, Kwara State, Nigeria. A researched designed questionnaire was used to accumulate information from respondents. Three research questions and two research hypotheses formulated were tested using percentage, mean, frequency count and independent t. test and ANOVA at 0.05alpha level of significant. The result of findings revealed that Biology laboratory practical has a great influence on senior secondary school students' academic performance and also on the level of understanding and retention capabilities of students but there was no significant influence of Biology laboratory practical on students' academic performance based on gender but not was significant based on class size. It is thus recommended that; all Biology teachers should engage students more in pratical activities more than the theory aspect to facilitate better understanding among the students, Ministry of Education should provide adequate laboratory equipment and good laboratory environment to promote spirit of curiosity in students and stakeholders should build more infrastructure such as laboratories, classrooms and others.

INTRODUCTION

Science is defined as a body of knowledge, a way or method of investigating and a way of thinking in the pursuit of an understanding of nature (Abimbola, 2013). Science refers to a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena. The term science also refers to the organized body of knowledge people have gained using that system. Less formally, the word science often describes any systematic field of study or the knowledge gained from it (www.sciencemadesimple.com/science-definition.html.).

Biology as a branch of Science deals mainly with the study of livings. It is the branch of science that involves the study of life of plants, animals, humans, and any other types of living organisms (Abidoye, 2021). Since plants and animals are both living organisms, biology has two main branches- Botany and Zoology. Botany is the study of plants and zoology is the study of animals. However, due to the broad nature of biology, it other branches include but not limited to anatomy, microbiology, genetics, evolution, cell biology, histology, environmental biology, taxonomy, limnology etc. The influence of Biology on the life of individual globally cannot be compared with any other science subject. According to the national policy on education (Federal Republic of Nigerian, 2013), learning of biology will provide the student with suitable laboratory and field skills in biology.

Teaching of biology has been believed to be difficult due to its abstract nature. The highly conceptual nature of Biology makes it particularly difficult for students to understand (Udoh, 2014). Abidoye (2021) therefore, stated that in order for the objectives of teaching and learning of biology to be achievable, more emphasis should be placed on field studies, guided discovery, laboratory techniques and skills. The teaching and learning of biology motivate students to; develop practical techniques and process skills; acquire knowledge and develop understanding of fundamental biological principles, concepts, terms and facts; show understanding of the applications and uses of biological knowledge in daily life; develop an understanding of current issues and developments in biology.

The influence of biology on the life of every individual globally cannot be over emphasized. As a field of science, biology helps us understand the living world and the way its many species (including human) functions, evolve and interact. Advances in medicine, agriculture, biotechnology and many other areas of biology have brought improvements in the quality of life. Biology gives knowledge to the effect of substances that may induce changes in the body. It allows for the understanding of growth factors and the prevention of diseases. Biology can provide answer to large-scale environmental problems. The concepts of some fields of biology enables people to understand the effect of global warming on the earth and the ways to reduce those effects.

Nworgu (2006) said that teaching of biology involves three major domains of educational objectives namely cognitive, affective and psychomotor skills. The studies show that most teachers of biology mostly emphasize the cognitive domain at the expenses of the other two domains. The development

of psychomotor domain involves practical activities which require laboratory facilities and equipment. Biology laboratory activities are hands-on experiences which emphasizes process skills (Dike, 2008) which Agbo (2003) posited as motor skills that help the scientist to find answers to problems and enhance the learning of science. In order for the laboratory to be effective, students need to understand not only how to do the experiment, but why the experiment is worth doing, and what purpose it serves for better understanding of a concept, relation, or process Omiko (2015).

Adebisi & Ajayi (2015) commented that if science is to be learned effectively, it must be experienced and close to the students through practical activities. The National Policy on education (NPE, 2013) states clearly the need to train students to be able to manipulate their environment in order to develop the society. This is only possible when the students are trained with relevant resources in the laboratory. Etiubon & Udoh (2017) posited that practical activities develop students' manipulative skills, attitude and interest that simplify science concepts. It makes difficult and abstract concepts real, remove misconceptions, ignite, increase and sustain students' interest in science through various activities using sourced science materials to enrich science learning experiences. This is aimed at preparing students to become productive individuals at the job place and has opened access to creativity and knowledge.

Abidoye (2021) conducted a research on the effect of laboratory practical on Senior Secondary School Students' academic performance in Biology in Ilorin South LGA, Kwara State and the findings revealed that the impact of laboratory practical was significant to the students' performance. Buba & Marcel (2019) investigated the effect of practical teaching method on academic achievement of senior secondary biology students in Mubi Educational Zone, Adamawa State. The findings show that there is significant effect on practical teaching method on students' academic achievement in biology.

Akinwunmi & Falemu (2020) examined the effect of Biology practical work on academic performance of senior secondary students in Ikere local Government Area of Ekiti State, Nigeria the result shows that there was no significant between female and male on academic achievement in Biology. Kayode (2016) conducted a research using A pretest-posttest quazi experimental control group to determine the effects of class size on the academic achievement of Senior Secondary Schools students using 135 SS II students randomly selected from the three (3) geo-educational zones of Ogbomoso-South Local Government Area of Oyo State and the findings indicated significant difference in the performance of students. Gwamna, Jatau & Ugwu (2021) conducted research the effects of class size on performance and attitude in ecology among secondary schools' students in Sabon-Tasha Education Zone, Kaduna State, Nigeria. The findings showed that; significant difference exists between the academic performance of students in large class size and small class size.

METHODOLOGY

Research Type

The study employed descriptive research of the survey type. Survey type of research describes and interprets events and ideas the way they are without any external manipulation. Hence, a survey method will be appropriate for this study because it will randomly selected samples to be used for the study.

Population, Sample and Sampling Techniques

The population for this study comprised of selected students in senior secondary schools in Ilorin East L.G.A in kwara State. The target population consisted of biology students from both public and private secondary schools. There are 348 public secondary schools and 114 registered private schools in Kwara State making grand total of 362 Secondary Schools in Kwara State. The total number of public secondary schools in Ilorin East is 30 while private secondary schools are 25 making a grand total of 55 secondary Schools in Ilorin East LGA. The scope was delimited to 6 secondary Schools consisting of three (3) private and three (3) public schools. The target population consisted of one hundred and twenty (120) biology students from public and private secondary schools. The students were selected from the sampled schools using simple random sampling technique.

Research Instrument

This study made use of an adapted questionnaire tagged "Senior Secondary School Student Perceived Influence of Biology Laboratory Practical on their Academic Performance in Ilorin East, Kwara State". The questionnaire items were constructed as 40 much as possible to elicit correct and accumulate information required for the study from the respondent. The questionnaire consisted of two sections A and B. Section A includes information on personal data of the respondents, which included: name of school, gender and class while section B contained items carefully organized in respect to the research questions raised. The section required the respondents to make choice from four options of a Likert scale answer by ticking their choice: SA (Strongly Agreed), A (Agreed), D (Disagreed) and SD (Strongly Disagreed)

Data Analysis Techniques

The data collected from the study was utilized to answer the research questions and to test the hypotheses. The data was analyzed using descriptive and inferential statistics. Demographic information was subjected to frequency and percentage (%), the research questions were answered using Mean and Standard Deviation. Hypotheses 1 was tested with T-test while hypothesis 2 was tested using ANOVA (Analysis of Variance) in order to test the Senior Secondary School student perceived influence of biology laboratory practical on their academic performance. The hypotheses were tested at 0.05 alpha level of significance.

RESULTS

Demographic Information of the Respondents

Table 1 shows the frequency and percentage distribution of respondents according to gender and class size. Out of 120 students sampled in this survey, 48 students which correspond with 40% of the total respondents were male

while 72 students which correspond with 60% were female while students class size showed that 4 (3.3%) of respondents were in SS1, while 107 (89.2%) were in SS2 and 9 (7.5%) were in SS3.

Table 1: Demographic Information of Respondents

	Variable	**Frequency**	**Percentage**
Gender	Male	48	40
	Female	72	60
	Total	**120**	
Class Size	SS1	4	3.3
	SS2	107	89.2
	SS3	9	7.5
	Total	**120**	**100**

Research Question 1: What are the Statistical Analysis on influence of Biology laboratory practical on students' academic performance?

In response to this question, the students were asked to indicate their level of agreement or disagreement on the fifteen items on their perceived influence of Biology laboratory practical. The results in table 2 revealed that all the items listed has perceived influence of Biology laboratory practical because all the items had a greater mean than 2.50 which is the cut-off point. These items include; Biology practical activities make my learning and mastery faster than theory classes, inadequate laboratory equipment affect your performance in Biology, topics taught in biology Practical classes have no link with my academic performance in Biology, inadequate supervision during biology practical affects my performance in Biology, practical classes in biology stimulate my critical thinking and creativity, well-equipped laboratories stimulate interest in practical biology classes, Exposure to practical activities enhances my understanding of subject matter, The type of Student-Teacher relationship that practical activities create improves my academic performance in practical biology classes among other.

Table 2: *Mean and Standard Deviation on* Statistical Analysis *on influence of Biology laboratory practical on students' academic performance*

Items	**Mean**	**S.D**
Biology practical activities stimulate my interest in Biology	3.26	0.60
Biology practical activities enable me to remember biology terms taught in theoretical classes	3.26	0.60
Biology practical activities make my learning and mastery faster than theory classes	3.17	0.64
Incorporation of Biology practical with the theory classes enhances my performance in Biology	3.30	0.54

Inadequate laboratory equipment affect your performance in Biology	3.25	0.52
Topics taught in biology Practical classes have no link with my academic performance	3.26	0.53
	3.38	0.57
Inadequate supervision during biology practical affects my performance in biology		
	3.18	0.63
The type of Student-Teacher relationship that practical activities create improves my academic performance in practical biology classes		
	3.63	0.53
Practical classes in biology stimulate my critical thinking and creativity		
Well-equipped laboratories stimulate interest in practical biology classes	3.58	0.50
Exposure to practical activities enhances my understanding of subject matter	3.33	0.50
The type of Student-Teacher relationship that practical activities create improves my academic performance in practical biology classes	3.18	0.63
The provision of laboratory facilities makes learning biology more comprehensive to me	3.39	0.49
practical activities help me to develop intellectual skills needed to understand other concepts	3.30	0.46
The practical activities that I do in biology practical classes help me develop better biological skills that boost my performance	3.31	0.46
Biology practical activities enable me to participate more actively than the theoretical method of teaching	3.37	0.56

Research Question 2: Does Biology laboratory practical have Statistical Analysis on students' academic performance based gender?

H01; There is no significant on Statistical Analysis on influence of gender in the use of Biology laboratory practical on students' academic performance in Senior Secondary schools.

Table 3 shows the mean score of male students is 49.21(SD=4.91) while that of the female student is 50.47 (SD= 3.48) at df = 118, t -value = -1.65 and p> .05 alpha level. .This implies that male students do not perceived the use of Biology

Laboratory practical more than the female counterpart. Therefore, the null hypothesis which states that there is no significant on Statistical Analysis on influence of gender in the use of Biology laboratory practical on students' academic performance in Senior Secondary schools is not reject.

Table 3: T-test Analysis on Statistical Analysis on influence of Biology laboratory practical on students' academic performance based on gender

Gender	N	**Mean**	SD	***Cal t-value***	***Df***	***Sig.***
	48	49.21	4.91	-1.65	118	1.01
	72	50.47	3.48			

Research Question 3: Does Biology laboratory practical have Statistical Analysis on students' academic performance based based on class size? The corresponding hypothesis to research question four is hypothesis 3.

Ho2; There is no significant on Statistical Analysis on influence of class size in the use of Biology laboratory practical on students' academic performance in Senior Secondary School.

An analysis of variance (ANOVA) was conducted to test for perceived influence of Biology laboratory practical on students' academic performance based on class size as presented in Table 4. The analysis conducted shows that there was no statistically significant {F (*0.157*) p>05.}. Therefore, the null hypothesis which state that there is no significant perceived influence of class size in the use of Biology laboratory practical on students' academic performance in Senior Secondary School is not rejected.

Table 4: Analysis of variance (ANOVA) on influence of Biology laboratory practical on students' academic performance based on class size

Class size	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	20.21	7	2.89	7	0.40
Within Groups	245.0590	2.72			
Total	265.27	56			

Summary of Major Findings

The major summary of the findings of this study was indicated below:

1. There is perceived influence of Biology laboratory practical on students' academic performance of Senior Secondary School Students in Ilorin East, Kwara State Nigeria
2. There is no significant perceived influence of gender in the use of Biology laboratory practical on students' academic performance in Senior Secondary schools in Ilorin East, Kwara State Nigeria

3. There is no significant perceived influence of class size in the use of Biology laboratory practical on students' academic performance in Senior Secondary School in Ilorin East, Kwara State Nigeria.

DISCUSSION

This study examined the perceived influence of biology laboratory practical on students' academic performance of Senior Secondary School Students in Ilorin East Local Government Area, Kwara State. The result revealed that there was perceived influence of Biology laboratory practical on students' academic performance. This is in line with the findings of Abidoye (2021) conducted a research on the effect of laboratory practical on Senior Secondary School Students' academic performance in Biology in Ilorin South LGA, Kwara State and the findings revealed that the impact of laboratory practical was significant to the students' performance.

The finding of the study revealed that there was no significant perceived influence of Biology laboratory practical on students' academic performance of Senior Secondary School based on gender. This result indicated that both male and female Biology students hold similar views on the perceived influence of Biology laboratory practical. This tallies with the findings of Akinwunmi &Falemu (2020) observed the Effects of Biology Practicals on Academic Performance of Secondary School Students in Biology in Ikere Local Government Area of Ekiti State, Nigeria. The result indicated that there was no significant in the performance of male and female. The finding revealed that there is a significant influence of class size on the perceived influence of Biology laboratory practical on students' academic performance in Senior Secondary School Ilorin. The finding corroborates with that of Gwamna, Jatau & Ugwu (2021) who conducted the effects of class size on performance and attitude in ecology among secondary schools' students in Sabon-Tasha Education Zone, Kaduna State, Nigeria and result showed that significant difference exists between the academic performance of students in large class size and small class size.

CONCLUSIONS

With respect to the findings of this study, it is concluded that student's academic performance in Biology was significantly influenced by Biology laboratory practical in Ilorin East, Kwara State. Also, student's academic performance in Biology was not significantly influenced by gender. Male students did not perform better than their female counterparts in Biology but was significantly influenced by class size. It was found that large class size had negative effect on students' academic performance in biology.

RECOMMENDATIONS

Based on the findings made in this study, it is therefore recommended that:

1. Ministry of Education should provide well equipped laboratory facilities and good laboratory environment to promote spirit of curiosity in students.

2. All Biology teachers should engage students more in Biology pratical activities to facilitate better learning and understanding among the male and female students.
3. The class size should be control Stakeholders in the field of education should ensure that Biology laboratory facilities are properly maintained

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