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# Effect of Biology Practicals on Academic Achievement in Biology of Senior Secondary School Students in Mubi North Local Government Area, Adamawa State

**Valada Alex and Tabitha Markus Vandima**
Department of Science Education, Faculty of Education Adamawa State University, Mubi, Adamawa State
**Contact:** tabithamvandima@gmail.com

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**Abstract**
This study investigated the effect of biology practicals on academic achievement of senior secondary biology students in Mubi North Local Government Area, Adamawa State. Three research questions and three hypotheses were formulated to guide the study. The population of the study was 2915 senior secondary schools Biology students in Mubi North Local Government Area. A sample for the study was 250 drawn from Senior Secondary two (SS II) students, which were randomly selected through purposive sampling technique. The design was quasi-experimental research which involve pre-test, post-test control groups. The instrument used for data collection was 22 objective and 8 Essay Biology Achievement Test (BAT) adopted from WAEC past question papers. The instruments were subjected to face and content validity by two experts. Mean and standard deviation were used to answer research questions while t-test was used for hypotheses testing at 0.05 level of significance using Statistical Package for Social Science (SPSS). The findings of hypothesis one show that there is significant difference between the performance of students' in pre-test and post-test. The result of hypothesis two also shows that there is significant difference between the performance of students taught using practical method of teaching and those taught using conventional method of teaching while on the other hand, hypothesis three result show that there is significant differences between the performance of students in urban and rural areas. It was recommended among others that, there is also a need for an sufficient facilities such as adequate laboratory and with equipped with practical equipment for the student, which will enable biology student to have more knowledge on the subject, this poor academic performance of the students was attributed to many factors as highlighted in chapter one such as student attitude, test anxiety, study habit among other this could be as result of poor teaching method. Therefore, a biology teacher should have a good teaching method for smooth impacting of ideas to his/her students.

**Keywords:** Biology practical, Academic achievement, Students

## Introduction

Biology is a natural science subject that deals with contents from microscopic organisms to the biosphere in general, encompassing the earth's surface and all living things (Okwo and Tartiyus, 2004). Looking at its essentials, fundamental characteristics and its importance, it is seen today as a standard subject of instruction at all levels of our educational systems.

The discipline is quite popular at all levels of Nigerian education and it has a large student enrolment than any other science subject especially at the upper basic level of the Nigerian education and this was attributed to several factors including the students' perception of the subject as simple and non- availability of other science subjects in some schools such that biology is made compulsory for both science and non-science students. In spite of the popularity of biology among students, the failure rate has remained very high (Akubuilo, 2004). This subject is been taught at all levels of education in two ways i.e theoretical and practical. It has been reported that most of the students are just exposed to the theoretical aspect of teaching biology rather than practicals especially in Mubi North Local Government Area Adamawa State. Reports by chief examiner of West African Examination Council confirm poor achievement of candidates in Biology and the indication is that a good number of candidates could not do well in practical examinations because they lack the basic skills for carrying out simple experiments at the beginning phase especially at public schools. This poor

achievement in Biology by the students in National Examination Council (NECO) and West African Senior School Certificate Examination (WASSCE) as observed over the years has generated a great concern such that Federal Government of Nigeria in recent time organized for a probe of the results in WAEC and NECO (Umoh, 2010). Therefore, this study is aimed at finding the effect of biology practicals on academic achievement of senior secondary biology students in Mubi North Local Government Area, Adamawa State.

Studies were carried out by scholars on how biology practicals affects students' achievement in senior secondary schools both at local and international levels and they came up with different results. In a study conducted by Ezra and Agah (2019), it was discovered that there is significant difference in the effect of practical method and lecture method on students' academic achievement in biology, the results also showed that that male students had higher mean score gain than their female counterpart when taught biology using practical method. In a similar study carried out by Kambaila and Kayamba (2019) in Zambia, it was found that practical biological work substantially enhanced the learner's performance. In addition, statistical test of the performances between boys and girls in the EG revealed that the performances were collectively enhanced. In another study by Chinyere, Bebia and Amba (2020) in Cross River State (Nigeria) using a quasi-experimental research design, it was observed that that there is a significant difference on the academic performance of students taught with practical Biology activities. A significant influence of gender on the academic performance of students offering Biology was also observed.

On the other hand, Chibabi, Umoru, Onah and Itodo (2018) conducted a study to determine the effect of laboratory method of teaching on senior secondary school students' achievement and retention in Biology in Kogi East Senatorial Zone (Kogi State, Nigeria) and found significant difference in the achievement, retention and interaction effect between teaching method and the gender of student in the mean achievement scores of students taught using laboratory teaching method and the other group of student's taught using traditional method of teaching. The study also revealed significant difference in the academic achievement and retention of male and female school students exposed to laboratory method of teaching. The study concluded that laboratory method of teaching is an effective approach of teaching biology at the senior secondary school level. Ngala (2019) investigated the impact of laboratory based teaching method on secondary schools biology students' acquisition of science process skills in Littoral Region of Cameroon And found out that that after the treatment; the experimental schools mean acquisition scores of science process skills were (9.37 to 18.64) and (17.70) for the pre-test and post-test and post-test only groups respectively These results were higher than the post-tests mean acquisition score of the mean acquisition score of science process acquisition skills of the control schools (8.25 to 10.19) and (16.21) pre-test and post-test and the post-test only respectively.

Habu (2015) investigated the effects of modes of laboratory activities on students' achievement in biology that students taught biology using group laboratory activity performed better than their counterparts taught using individual laboratory activity. Male students had higher mean achievement score than their female counterparts. There was no significant interaction effect of mode of laboratory activity and gender on students' mean achievement score. Ude and Ebuoh (n.d.) investigated the effect of Biology practical activities on the academic achievements of senior secondary school biology students in Awgu Local Government Area of Enugu State and also unveiled that gender has significant difference on students' performance when taught with practical.

***Statement of Problem***

In spite of efforts through research to improve performance of students in Biology, the teaching and learning of Biology have continually received much concern from the society sequel to students' poor performance in Biology external examinations. It has been reported in recent years that, students' performance in biology external examinations is generally low and this weakness was attributed to students' inability to understand some Biology concepts theoretically due to the teaching method employed by the biology teachers. While, much has been done on the effect of biology practical method of teaching on students' academic achievement of senior secondary schools in different subjects and in

various localities but not avail, the problem persisted. This situation has created the need for an effective teaching methodology to redressed student's continual poor performance in Biology.

***Research Questions***

The research questions raised to guide the study are;

1. What is the difference between the performance of students in pre-test and post-test?
2. What is the mean achievement scores of the students taught Biology using laboratory/practical method of teaching and those taught using traditional teaching method?
3. What is the mean achievement scores of students taught Biology using laboratory/practical teaching method based on location?

***Research Hypotheses***

The following null hypotheses will be tested at 0.05 level of significance:

**$H_{01}$**: there is no significance difference between the performance of students obtain in pre-test and post-test scores

**$H_{02}$**: There is no significant difference between the mean achievement scores of students taught Biology using laboratory/practical teaching method and those taught using conventional teaching methods.

**$H_{03}$:** There is no significant difference between the mean achievements scores of students taught Biology using laboratory/practical teaching method based on location.

**Results**

The data presented and discussed were in respect to research questions and research hypothesis raised in chapter one.

***Research Question One:*** What is the difference between the performance of students in pre-test and post-test?

**Table 1:** Mean and Standard deviation of students' pre-test and post-test

| Variable | N | Mean | SD |
|---|---|---|---|
| **Pre-test** | 250 | 28.9 | 10.6 |
| **Post-test** | 250 | 50.3 | 15.7 |

Result from table 1 show that the mean performance of post-test is greater than mean performance of pre-test.

***Research question 2:*** What is the mean achievement scores of the students taught Biology using practical method of teaching and those taught using traditional teaching method?

**Table 2:** Mean achievement score of student taught using practical method and those taught using conventional method.

| Variable | N | Mean | SD |
|---|---|---|---|
| **Practical Method** | 150 | 62.8 | 18.8 |
| **Conventional Method** | 100 | 48.3 | 7.9 |

Result from table 2 show that the mean achievement score of students taught using practical method is higher than those taught using conventional method.

***Research question 3:*** What is the mean achievement scores of students taught Biology using laboratory/practical teaching method based on location?

**Table 3:** Mean achievement scores of students taught Biology using practical teaching method based on location

| Variable | N | Mean | SD |
|---|---|---|---|
| **Rural** | 50 | 50.0 | 8.4 |
| **Urban** | 100 | 58.3 | 10.7 |

Result from table 3 show that the mean achievement scores of students taught Biology using laboratory/practical teaching method based on location slightly varies but both the group of students perform better.

**$H0_1$:** there is no significance difference between the performance of students obtain in pre-test and post-test scores

**Table 4:** Summary of t-test analysis of the performance of students obtain in pre-test and post-test scores

| Source | N | Mean | SD | df | T | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| **Pre-test** | 250 | 28.9 | 10.6 | 480 | 10.4 | .000 |
| **Post-test** | 250 | 50.3 | 15.7 | | | |

From table 4, the t-value is 10.4 with the p-value of 0.000. Since the P Value (0.000) is less than 0.05, we reject the null hypothesis and conclude that there is a significant difference between the performances of students obtain in pre-test and post-test scores.

**$H0_2$**: There is no significant difference between the mean achievement scores of students taught Biology using laboratory/practical teaching method and those taught using conventional teaching methods.

**Table 5:** Summary of t-test analysis of students taught using practical method and conventional method

| Method | N | Mean | SD | Df | T | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| **Practical Method** | 150 | 62.8 | 1.51 | 248 | 1.51 | .000 |
| **Conventional Method** | 100 | 48.3 | 7.9 | | | |

From table 5, the t-value is 1.51 while the p-value is 0.000. Since the P Value (0.000) is less than 0.05, we reject the null hypothesis and conclude that there is a significant difference between the performance of students taught Biology using laboratory/practical teaching method and those taught using conventional teaching methods.

**$H0_3$:** There is no significant difference between the mean achievements scores of students taught Biology using practical teaching method based on location.

**Table 6:** Summary of t-test analysis of students taught Biology using practical teaching method based on location

| Variable | N | Mean | SD | Df | T | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| **Rural** | 50 | 50.0 | 8.4 | 148 | 2.68 | 0.43 |
| **Urban** | 100 | 58.3 | 10.7 | | | |

From table 6, the t-value is 2.68 while the p-value is 0.43. since the p-value of 0.43 is greater than 0.05, we now accept the hypothesis and conclude that There is no significant difference between the mean achievements scores of students taught Biology using practical teaching method based on location.

**Discussion**

This study investigated the effect of biology practicals on Senior Secondary School Students performance in Mubi North Local Government Area Adamawa State. This sub-section deal with the discussion of the major findings from the hypotheses formulated and was tested at 0.05 level of significance.

Hypothesis one states that there is no significant difference between the performances of students obtain in pre-test and post-test scores. The t-value is 10.4 with the p-value of 0.000. Since the P Value (0.000) is less than 0.05, the researcher reject the null hypothesis and conclude that there is a significant difference between the performances of students obtain in pre-test and post-test scores. This implies that at the onset of this research, the students' performance level is the same but after the treatment, the students' performance increases. The result of this present study therefore agreed with the study of Ezra and Agah (2019); Kambaila and kayamba (2019); Chinyere, Bebia and Amba (2020) and Chibabi, Umoru, Onah and Itodo (2018) who in their study found out that students post-test result is higher than the pre-test result based on treatment.

Hypothesis two states that there is no significant difference between the mean achievements scores of students taught Biology using practical teaching method and conventional method of teaching. The t-value is 1.51 while the p-value is 0.000. Since the P Value (0.000) is less than 0.05, we reject the null hypothesis and conclude that there is a significant difference between the performance of students taught Biology using laboratory/practical teaching method and those taught using conventional teaching methods. The result of this study concur with the study of Scheneider, Marx & Soloway (2011). Because according to him, it is possible for academic achievement to be attained if biology subject will be learned practically through the use of inquiry method in the laboratory or outside the laboratory. Chibabi, Umoru, Onah and Itodo (2018); Ngala (2019); Habu, Ude & Ebuoh (2015) also in their study found out that students that were exposed to teaching using practical method of teaching perform better than those taught using conventional of teaching.

Hypothesis three states that there is no significant difference between the mean achievements scores of students taught Biology using practical teaching method based on location. The t-value is 2.68 while the p-value is 0.43. since the p-value of 0.43 is greater than 0.05, we now accept the hypothesis and conclude that There is no significant difference between the mean achievements scores of students taught Biology using practical teaching method based on location. This confirmed the assertion of Ajayi and Ogunyemi, (1990), Chinyere, Bebia and Amba (2020) that school location is not a factor that influence academic performance of a learner, what is needed is the zeal and readiness on both teachers and students.

**Conclusion**

Based on the study, it has been reported in recent years that, students' performance in biology external examinations is generally low and this weakness was attributed to students' inability to understand some Biology concepts theoretically due to the teaching method employed by the biology teachers. It is therefore concluded that practical teaching method as a factor that increase students' academic achievement especially in biology should be encouraged. The results of the study also indicated that significant difference exist between experimental and control group which suggests that students in the experimental group performed better than those taught without practical activities. It was also found out that urban students achieved higher than the rural students in biology practical activities.

**Recommendations**

Based on the study, the researcher would like to make the following recommendations which will help to develop/re-strength the academic performance of biology student must especially in Mubi South Adamawa State.

1. There is also a need for a sufficient facilities such as adequate laboratory and with equipped with practical equipment for the student, which will enable biology student to have more knowledge on the subject.
2. This poor academic performance of the students was attributed to many factors as highlighted in chapter one such as student attitude, test anxiety, study habit among

other this could be as result of poor teaching method. Therefore, a biology teacher should have a good teaching method for smooth impacting of ideas to his/her students.

3. The teacher according to Vygotsky's view should also establish many opportunities for students to learn with the teacher and more skillful peers. And they should be taught in such a way that students will be able to apply the knowledge outside the classroom.

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