

Practical Activities for Effective Teaching of Biology: An Issue for Students' Academic Performance and Sustainable National Development

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Abstract: The study investigated the importance of on practical activities for effective teaching of Biology. The work was carried out in Enugu East Local Government Area of Enugu State. The design of the study was quasi-experimental design. The researcher used simple random sampling to select 120 (one hundred and twenty) students. Two research questions and two null hypotheses guided the study. the instrument for data collection is the Biology Achievement Test (BAT) which consisted of 20 multiple choice items with four answer option. The instrument was used for both pretest and posttest. The instrument was face and content validated by experts. The reliability of the instrument was determined using Kuder-Richardson formular 20 (K-R 20). The internal consistency obtained was 0.84. The research questions were answered using mean and standard deviation while z-test was used to test the hypothesis at 0.05 level of significance. The results revealed that practical activities has a positive effect on the achievement of students since the students taught with practical activities achieved higher than those students taught without practical activities and that female students achieved better than the male students when taught with practical activities. The researcher recommended among others that Government should equip the laboratories to make the teaching of biology more comprehensive, easier, enjoyable and effective and that Biology should be taught with practical activities so that the students will do science instead of learning about science.

Keywords: Practical activities, Effective teaching, Biology, Issue, Students' Academic Performance, Sustainable national development.

INTRODUCTION

Science is a great enterprise which nations depend on in order to advance technologically. Science and technology constitute the basis for advancement in all the fields of human endeavours. Since learning is expected to produce individuals that are capable or solving their problems as well as those of the society. Such individuals are expected to be confident, autonomous and self-reliant. 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. These fields of learning include medicine, forestry, nursing, biotechnology, agriculture etc. The study of biology in secondary school must equip students with useful concepts, principles and theories that will enable them face the challenges before and after graduation. This can be achieved by getting students involved in practical activities which should be part and parcel of biology teaching.

Practical activities in biology provide opportunities for students to actually do science as opposed to learning about science. Nzewi [1] asserted that practical activities can be regarded as a strategy that could be adopted to make the task of teaching more real to students as opposed to abstract or theoretical presentations of facts, principles and concept of subject matters. Nzewi [1] maintains that practical method should engage the students in hands-on, mind on activities using a varieties of instructional materials/equipments to drive the lesson home. Mohammed and Fayyaz [2] opined that the ultimate goal of practical activities is to train students in way of practicing science so that the students could become good scientists in future. By providing students with practical activities that are academically stimulating, students are more likely to engage meaningfully with the task at hand and then achieve higher grades [3].

Michael [4] pointed out that through experimentation and laboratory activities, learners acquire cognitive skills such as understanding variables, interpreting and applying existing knowledge to new

situation. Current West African Examination syllabus [5] recommended that the teaching of all science subjects listed in the syllabus should be practically based. The use of practical in teaching and learning of biology concepts should therefore be considered if we hope to produce students that would be able to acquire the necessary knowledge, skills and competence needed to meet the scientific and technological demands of the nation.

The National Policy on Education stipulated that the objective of Biology Education should include making the students to understand the structure and functions of living organisms as well as appreciate nature, acquire adequate laboratory and field skills in order to carry out and evaluate experiment and projects in Biology, acquire necessary scientific skills such as observation, classification and interpretation of data, acquire scientific attitudes for problem solving, acquire relevant knowledge in biology needed for future advance studies in biological science, be able to apply biological principles in everyday matters that affect personal, social, environmental, community health and economic problems. Unfortunately, the ugly situation observed in the majority of our secondary schools is lack of exposure of the students to practical activities. In many secondary schools, teachers do not conduct practical for students until the Senior Secondary Certificate Examination (SSCE) requirements for practicals are released. Michael [4], observed that in most Nigerian secondary schools practical work are usually been intensified in the last few weeks of the final year just before the onset of the Senior School Certificate Examination. Even in the laboratories, teachers alone handle the materials and students only observed, copy and go away with little in their memory. A lot has been done to improve science teaching in secondary schools in Nigeria. In spite of this, students continue to perform poorly in science subjects of which biology is one. Mohammed and Feyyaz [2] explained that the poor capital investment in terms of equip laboratory contributes to students low academic performance in biology. The Chief Examiners report in Biology for Standard Examination body like the West African Examination Council (WAEC) can be useful also in buttressing the poor achievement level of the students. The Chief Examiner for biology in Nov/Dec 2007 reported poor performance with a mean score of 24 and standard deviation of 12.17. The candidates' weakness include inability to describe the procedure for testing starch in leaves, inability to state similarities between specimens among others. The Chief Examiners report for biology II in May/June [6] reported that the students are weak and they identified weaknesses include inability to relate features with functions, a manifest lack of practical skills, poor diagrams, poor spellings of labels and technical terms among others. This implies that the students were not exposed in making accurate identification, drawing and labeling of the specimens studied, since the teacher

emphasize more on theory, neglecting practical work. Thus the students have no alternative than to cram the little illustration made by the teacher during teaching and therefore find it difficult to recognize, draw and label specimens which were given to them. Because of the existing problem, the researcher was motivated to investigate the importance of practicals activities for effective teaching of Biology in secondary schools in Enugu East Local Government Area of Enugu State.

Research Questions

- What is the mean achievement scores of SS1 students taught biology using practical activities and those taught without practical activity?
- What is the effect of practical activities on the achievement of SSI male and female students in Biology?

Hypothesis

- There is no significance difference in the mean achievement score of SS1 students taught biology using practical activities and those taught without practical activity.
- There is no significant difference in the mean achievement score of SS1 male and female students taught biology using practical activity.

RESEARCH METHOD

The design used for the study was quasi experimental design. The design was adopted because intact classes were used. The study was carried out in Enugu East Local Government Area of Enugu State. The population of the study comprised all the SS1 (Senior Secondary One) students. The sample size comprised of one hundred and twenty (120) students. Single sex schools were purposively selected. One male and one female school were selected using simple random sampling (Balloting). Two intact SS1 class in each school was selected using simple random sampling.

The instrument for data collection is Biology Achievement Test (BAT) developed by the researcher. The instrument was used for both pretest and posttest but was rearranged during posttest. The instrument consisted of 20 multiple choice items with four answer options. The instrument was face and content validated by experts. The reliability of the instrument was determined using Kuder-Richardson's formula – 20 (K-R 20). The internal consistency index obtained was 0.84. The research questions were answered using mean and standard deviation. While z-test was used to test the hypotheses at 0.05 level of significance.

Experimental Procedure

Two intact classes in each school were used for the study. One intact class was called the control group while the second one was called the experimental group. The BAT was first administered to the students

in each group. This generated the pretest data. The two groups were now exposed to study on teaching types or methods. The control group was taught theoretically and the experimental group was taught practically in the biology laboratory.

Finally, the two groups were given a posttest of twenty questions which is the same as questions used in pretest but in a rearranged form.

Table-1: Mean and standard deviation of students taught biology with practical activities and those taught without practical activities

		X Mean	SD (Standard Deviation)
Control Group	Pretest	11.56	1.39
	Posttest	15.08	0.93
Experimental Group	Pretest	11.92	1.04
	Posttest	16.78	1.74

From table 1, it is observed that mean scores of the experimental group is 11.92 and 16.78 in the pretest and posttest respectively while that of the control group is 11:56 and 15.08 in the pretest and post-test respectively. This shows that the mean scores of the

RESULTS

Results obtained from the analyzed data were presented below based on the research questions.

Research Question 1

What is the mean achievement scores of SSI students taught biology using practical activities and those taught biology without practical activity?

experimental group is higher than the mean score of the control group.

Research Question 2

What is the effect of practical activities on the achievement of SS1 male and female students in Biology?

Table-2: Mean and Standard deviation of SS1 male and female students in biology

		Male		Female	
		\bar{X} (Mean)	SD (Standard Deviation)	\bar{X} (Mean)	SD (Standard Deviation)
Control Group	Pretest	11.50	0.42	11.60	0.60
	Posttest	16.70	0.54	16.77	0.67
Experimental Group	Pretest	15.10	1.00	15.14	0.95
	Posttest	17.93	1.25	18.35	1.16

The table above shows that the males and females in the control group has posttest scores of 16.70 and 16.77 respectively. While males and females in the experimental group have posttest mean of 17.93 and 18.35. This shows that females have higher mean scores than males. Thus females achieve better than males in biology using practical activity.

Hypothesis 1

There is no significant difference in the mean achievement score of SS1 students taught biology using practical activity and those taught without practical activity.

Treatment	\bar{X}	SD	Df	P	z-cal/t-cal	Zcrit/t-crit	Decision
Experimental	62.3	23.46	118	0.05	4.34	1.96	Rejected
Control	46.33	16.38					

From the table, the calculated value of z (z-cal) = 4.34 is greater than the critical value of z (z crit) = 1.96. The null hypothesis is rejected. Thus there is significant difference between the mean achievement scores of SSI students taught biology using practical

activities and those taught biology without practical activite.

Hypothesis 2

There is no significant difference in the mean achievement score of SSI male and female students taught biology using practical lesson.

Treatment	\bar{X}	SD	Df	P	z-cal/t-cal	Zcrit/t-crit	Decision
Female	71.06	21.74	58	0.05	3.36	1.96	Rejected
Male	52.36	21.27					

From the table, calculated value of Z = 3.36 is greater than critical value. Z crit = 1.96. The null hypothesis is rejected. There is a significant difference

in the mean achievement score of male and female students taught biology using practical activity.

SUMMARY OF FINDINGS

The findings of the study are:

- Practical activity has positive effect on the academic performance of SS1 Biology students. Since students taught with practical activities achieve better than those taught without practical activity.
- Females achieve better than males when taught with practical activity.

DISCUSSIONS

Table 1 revealed that students taught Biology using practical activities achieved better than students taught without practical activities and that there is a significant difference between mean achievement scores of students taught biology using practical activities and those taught without biology activities. This finding supports Karen, Zonrette, Navelle and Jeanney [7] that stated that by providing students with practical activities that are academically stimulating, students will engage meaningfully with the task and achieve higher in assessment grades. It is also in line with opinion of Nzewi [1] that practical activities in biology provide opportunities for students to actually do science as opposed to learning about science. It is also agreed with the work of Nwagbo [8] that practical activity method is more effective in fostering student's acquisition of science process skills than lecture method.

Table 2 revealed that female students taught with practical activity achieved higher than male students taught with practical activity. This result is not in line with the work of Nwagbo and Obiekwe [9] that gender has no effect on students' achievement in biology and work of Nasr and Asghar [10] that gender plays no role in biology achievement. The findings agreed with the findings of Ezechi [11] who discovered that females achieved better than males in Biology Achievement Test.

CONCLUSION

Active participation of students in the class aids retention and makes lesson more meaningful. This is because as the students participate and manipulate equipments/materials, they apply their five senses and other skills more than when they would have learned in abstraction or remained less active in the class. Thus teachers should use practical activities while teaching biology since students learn better when they are involved.

RECOMMENDATIONS

- Government should equip the laboratories so as to make teaching of biology more comprehensive, easier, enjoyable and effective.
- Government should organize seminars and workshop for science teachers to update their knowledge.

- Biology should be taught with practical activities so that the students will do science instead of learning about science

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