EFFECT OF OUTDOOR LEARNING ON SECONDARY SCHOOL BIOLOGY STUDENTS' ACADEMIC ACHIEVEMENT IN ECOLOGY IN SOUTH-EAST, NIGERIA

ENYINNAYA, VICTOR MADUABUCHI
enyinnaya.victor25@gmail.com

URSULA NGOZI AKANWA
ursulaakanwa@gmail.com
&
ANIDU, INNOCENT CHIBUZOR Ph. D
innocentanidu@gmail.com

Department of Science Education
Michael Okpara University of Agriculture, Umudike

Abstract

The study investigated the effect of outdoor learning on secondary school Biology students' academic achievement in Ecology in South-East, Nigeria. The study adopted quasi experimental design. One research question and one hypothesis guided the study. The population of the study comprised of 251, 755 senior secondary two (SS 11) students in South-East, Nigerian public secondary schools in the 2024/2025 academic session. The instruments for data collection is a 50-item multiple choice Ecology Achievement Test (EAT). Kudder-Richardson ($K\text{-}R_{20}$) was used to determine the reliability of the instrument. Reliability index of 0.77 was established for Ecology Achievement Test. Mean and standard deviation scores were used to answer the research questions while the Analysis of Covariance (ANCOVA) was used in testing the hypotheses at .05 level of significance. Result showed that secondary school students taught Ecology with outdoor learning achieved higher than students taught Ecology with lecture method and it was statistically significant. The educational implication of the findings is that poor academic achievement of students in Biology can be improved with the use of outdoor learning which enhances students' academic achievement in learning Ecology. It is recommended that Biology teachers should use outdoor learning to enhance students' academic achievement and sustain their interest in learning Ecology. Curriculum planners should, as well, plan the nation's Biology curriculum to accommodate outdoor learning which supports thinking in a systematic way, making learners feel inter-connected with the natural world, helping them to understand social, economic and environmental values of the natural system.

Key words: Outdoor learning, Biology, academic achievement, ecology, effect.

Introduction

Biology is the study of living things and their vital processes. It is a natural science subject consisting of contents from microscopic organisms to the biosphere in general, encompassing the earth's surface and all living organisms (Ibrahim, Baba & Ahmad, 2018). The sub-disciplines of Biology are defined by the scale at which organisms are studied, the kinds of organisms studied and the methods used to study them. Ecology examines how organisms interact in their environment (Celtin et al.,2018).

The objectives of the Biology curriculum for senior secondary schools as derived from the National Policy on Education (2014) are to prepare students to acquire: adequate laboratory and field skills in Biology; meaningful and relevant knowledge in Biology; ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture; and reasonable and functional scientific attitudes. These objectives explicitly reveal the indispensable nature of the subject. Furthermore, Biology curriculum covers the major themes of: organization of life; organisms at work; the organisms and its environment; and continuity of life with numerous topics and sub-topics under these themes. With these, it can be deduced that Biology as a subject is very important, not only to this nation towards nation building but also to the world at large.

In view of the importance of Biology, various science educators have expressed concern over the poor academic achievement of students in the subject in senior secondary schools for the past decades (Njoku, in Anidu & Pius, 2022). Many factors have been attributed to the poor achievement and lack of interest in Biology. Anidu and Pius (2022) presents the following as prominent factors contributing to the noticed poor performance and interest in Biology: the teaching method used by Biology teachers; learning methods adopted by students, difficult nature of the topics/concepts, lack of equipment and instructional materials for teaching Biology.

According to Ukegbu, (2019), in choosing teaching methods, teachers should consider the methods that will successfully capture and sustain students' attention and improve their academic achievement. Academic achievement, according to Steinmayr et al. (2017) represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the

focus of activities in instructional environments, specifically in school, college, and university. Therefore, academic achievement should be considered to be a multifaceted construct that comprises different domains of learning.

According to Horvath (2018), Academic achievement is the students' achievement on a standard of measurement such as achievement test, skill test, and analytical thinking test. It could also be seen as the knowledge attained or skills developed in school subjects usually designated by test scores or marks assigned by the teacher (Miller, 2017; Mirabelli, 2019). Teaching methods/strategies among other factors could help to improve the academic achievement of students in Ecology.

Teaching methods play a vital role in ensuring effective, interesting and stimulating learning and as such inappropriate teaching methods may hinder learning. There are as many methods and techniques of teaching as there are different views of the nature of science. A teacher's approach to teaching will therefore generally reflect his view of the subject or how he was taught himself (Horvath, 2018). However, for effective teaching and learning, the teacher can begin by avoiding two mistakes. The first is to stop assuming that a method of teaching is a fixed formula that should be employed rigidly for effective teaching and learning. The second is to stop assuming that a given method of teaching will be suitable to the characteristics of all his learners. Both mistakes usually lead to undesirable results, for if teaching method is mismatched with learners' characteristics, a destructive collision is inevitable (Bruce & Marsha in Ibe, 2017).

The conventional (lecture) method of teaching Biology in most Nigerian classrooms is teacher-centred. This method of teaching lays explicit emphasis on the teaching and gives lesser concern to students' input in the learning process. When constantly exposed to the lecture mode of teaching, students resort to rote memorization of concepts. The conventional (lecture) method may not be able to achieve the needed goals in Biology in this 21st century (Ibe, 2017).

Outdoor learning refers to education that occurs outside of a classroom. It is an experiential learning in an outdoor (natural) setting. This approach supports thinking in a systematic way, feeling inter-connectedness with the natural world and understanding social, economic and environmental values of the natural system and developing an intention to act for sustainability.

Outdoor learning happens in the natural environment where participants can see, hear, touch and smell the real thing, thus, making them actively use their sense organs in learning. It also happens in the arena where actions have real results and consequences, thus, helping them to make informed decisions/choices of the need to protect their environment. It helps them develop the learning skills of enquiry, experiment, feedback, reflection, review and cooperative learning (Maynard et al., 2018).

Some typical aims of outdoor education are to: learn how to overcome adversity; enhance personal and social development; develop a deeper relationship with nature; boost self-confidence when camping with classmates; raise attainment through better teaching and learning experiences. Outdoor education spans the three domains of self, others, and the natural world. The relative emphasis of these three domains varies from one program to another. An outdoor education programme can, for example, emphasize one (or more) of these aims to: provide an active, first-hand learning experience, teach outdoor survival skills, improve problem solving skills, enhance teamwork, develop leadership skills, understand natural environments, promote spirituality (Brina, 2022).

Outdoor education is often used as a means to create a deeper sense of place for people in a community. Sense of place is manifested through the understanding and connection that one has with the area in which they reside. Sense of place is an important aspect of environmentalism as well as environmental justice because it makes the importance of sustaining a particular ecosystem that is much more personal to an individual (Ernest, 2023). While outdoor learning takes place outside the classroom, the use of lecture method in teaching-learning takes place inside the classroom.

The specific objective of the study are to determine the:

1. Mean achievement scores of secondary school Biology students taught ecology with outdoor learning and lecture method

Research Question

1. What are the mean achievement scores of secondary school Biology students taught ecology with outdoor learning and lecture method?

Hypothesis

Ho_1: There is no significant difference in the mean achievement scores of secondary school students taught ecology with outdoor learning and lecture method.

Methodology

This study adopted quasi-experimental research design. Specifically, a pre-test, post-test non-equivalent control design was used. An Ecology Achievement Test (EAT) was used for the collection of data. Mean and standard deviation were used in answering the research questions while the analysis of covariance (ANCOVA) was used in testing the hypotheses at .05 level of significance. This implies that any p-value that is less than 0.05 is significant and therefore the hypothesis will be rejected. Any p-value that is equal to or greater than 0.05 is not significant and therefore the hypothesis will not be rejected. The area of study was carried out in South-East, Nigeria.

The target population of this study consists of 251, 755 senior secondary two (SS 11) students in South-East, Nigeria public secondary schools in 2024/2025 academic session. The multi-stage sampling process was used to arrive at the samples for this study. All the SS2 students in the sampled schools totaling 244 students served as sample for the study.

Results

Research Question:

What are the mean achievement scores of secondary school Biology students taught ecology with outdoor learning and lecture method?

Table 1: The Mean Achievement Scores of Students taught Ecology with Outdoor Learning and Lecture Method.

Variables	N	Pre-Test Mean	Post-Test Mean	Achievement Gain	SD of Pre-Test	SD of Post-Test
Outdoor Learning	120	13.60	43.69	**30.09**	1.835	4.390
Lecture Method	124	13.42	37.15	**23.73**	1.909	5.432

Table 1 shows the mean achievement scores of students who were taught Ecology with outdoor learning and lecture method. It also shows the difference that exist in the pre-test and post-test mean scores of the groups. It shows that the pre-test and post-test mean achievement scores of students taught with outdoor learning are 43.69 and 13.60 respectively with an achievement gain score of 30.09. This indicates that learning actually took place. Similarly, the table also presented the pre-test and post-test mean scores of students taught Ecology using Lecture method as 13.42 and 37.15 with gain score of 23.73. The pre-test mean scores of the two groups (13.60 and 13.42) revealed that the two groups appeared to have almost the same level of knowledge on what they were to learn before the experiments. The mean achievement gain of students taught with outdoor learning was higher than the mean achievement score of students taught with lecture method. The shows that students taught Ecology with outdoor learning achieved higher than students taught Ecology with lecture method.

Hypothesis

There is no significant difference in the mean achievement scores of secondary school Biology students taught ecology with outdoor learning and lecture method.

Table 2: Analysis of Covariance on the Mean Achievement Scores of Students taught Ecology with Outdoor Learning and Lecture Method

Source	Sum of Squares	Df	Mean Square	F	Sig.	Remarks
Corrected Model	2702.439[a]	2	900.813	41.128	.000	S
Intercept	8626.301	1	8626.301	393.845	.000	
Pretest	87.921	1	87.921	4.014	.046	.
Treatment	2574.768	2	1287.384	58.777	.000	
Error	7534.558	241	21.903			
Total	576275.000	244				

Corrected Total	10236.997	243

a. R Squared = .264 (Adjusted R Squared = .258)

Table 2 shows that the F-ratio is 58.777 with (2, 244) degree of freedom. However, since the p-value of .000 is less than the associated alpha level of .05 ($p < 0.05$), the null hypothesis is not upheld. This implies that there is a significant difference in the mean achievement scores of secondary school students taught Ecology with outdoor learning and lecture method.

Discussion of Findings

Results showed that secondary school students taught Ecology with outdoor learning achieved higher than students taught Ecology with lecture method and it was statistically significant. The results of this study is in agreement with the report of Avcı and Gümüş (2020) who reported that academic success of the students who took outdoor education activities and outdoor education were significantly higher than those of the control group students.

Again, the findings of this study is also in agreement with the results of Okaty (2022) who reported that the mean quiz scores of students taught with outdoor learning were higher than those taught with lecture method. The reason for the outdoor learning group achieving better than the lecture method groups could be because the students saw the real things (concepts) being discussed, they touched them, felt them and used the ecological tools as well. This perhaps, could have contributed to their higher achievement gain scores.

Conclusion

Based on the findings of this study, the following conclusions are made. The study has shown that the use of outdoor learning has significant effect on students' academic achievement in Ecology more than the use of lecture method, hence, making them feel interconnected with nature. In the use of outdoor learning, both the teachers and the learners make use of their sense organs of sight, smelling and feeling/touching the real things and nature being studied in its whole form.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Biology teachers should use outdoor learning to enhance the academic achievement of students since it has proved to be more effective than the lecture method.
2. Seminars and workshops should be organized for training and re-training of new and old teachers where they will be taught the use of outdoor learning. The seminars and workshops could be organized by Federal and States Ministries of Education; professional bodies like Science Teachers Association of Nigeria (STAN) and private individuals or organizations depending on the school ownership and involvements.
3. Future researchers should use the result of this study to investigate methods through which school administrators and teachers can effectively develop outdoor learning programmes so as to help the students learn better and then, increase the academic performance of students in secondary schools.
4. The curriculum planners should plan the nation's Biology curriculum to accommodate outdoor learning programme for the students and should allot more time to Biology in the school time table to enable the proper use of outdoor learning.

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