



Effects of Out-Door Engagement Strategy on Secondary School Students' Attitude and Achievement on Animal Adaptations in Kano State, Nigeria

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ABSTRACT

The research aimed to investigate the effects of the Outdoor Engagement Strategy (ODES) on the attitudes and achievements of Secondary School II students regarding animal adaptations in Kano State. The study employed a pretest-posttest quasi-experimental design and was guided by two research questions and two hypotheses. The study population comprised all SS II students in Gaya metropolis, totaling 1,470. From this, a sample of 130 students was randomly selected from four secondary schools in the emirate. The research instruments, namely the Students' Animal Adaptation Achievement Test (SAAAT) and the Students' Attitudes towards Animal Adaptation Scale (SATAAS), were validated and tested for reliability. The reliability coefficients of these instruments were determined using Kuder-Richardson's and Cronbach's alpha statistics, yielding scores of 0.82 and 0.79, respectively, affirming their reliability. To address the research questions and test the hypotheses, mean, standard deviation, and Analysis of Covariance (ANCOVA) were employed. The study revealed that the average achievement and attitude scores of students instructed with ODES were significantly higher than those taught through the traditional approach. These findings established that the experimental group outperformed the control group significantly. In light of these results, the study recommends that secondary school science instructors integrate ODES into their lessons. Additionally, the government is encouraged to ensure that students are exposed to safe and stimulating outdoor classrooms.

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INTRODUCTION

The National Policy on Education (Federal Government of Nigeria, 2013) provides a clear foundation for the goals of the Biology curriculum in Nigeria. This policy states that students should be able to acquire laboratory and field skills in Biology, apply scientific knowledge in real-world situations, and form reasonable and functional attitudes toward science. Biology is the study of life and its processes, including the evolution of organisms and their interactions with

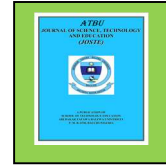
one another and their surroundings (Umar, 2012). It is a foundational study for a wide range of disciplines and makes significant contributions to a country's technological development. The much-needed and vouched-for technical breakthrough may not be reached without solid understanding and a moral approach to biology (Osuafor and Okoro, 2013). Hence, teaching biology for utility, the ability to apply scientific knowledge to everyday life, establishing reasonable and functioning scientific attitude, are among the goals

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of science education. Therefore, it is highly undesirable for students to go through years of Biology instruction and still lack the basic skills necessary to solve even the most basic problems in their own environments, primarily because of the improper use of instructional materials and pedagogy.

When concepts that are better learned in the outdoors are taught inside, the child's brain isn't able to fully utilize its capabilities, and the youngster may experience de-contextualization (Agbo, Ahmed, Alhaji, & Auta, 2017). Students' low performance and negative attitudes about Biology suggest a need to abandon the conventional method of science education in favor of more creative approaches like the utilization of out-door engagement strategy (ODES). By acting as a facilitator of learning and leading students through a series of tasks and a problem-solving approach, teachers using ODES hope to improve their students' academic performance. They found that "direct experience with real objects and processes can give form and meaning to primary concepts" (Eromosele & Ekholuenetale, 2016).

The teachers' tasks in ODES include involving students to participate in outside the classroom activities. This includes educational field trips and any organized walk to study nature and also obtaining some specific information to be used in improving the learner's skill in identifying a problem, linking the problem to previous knowledge, developing work plan and being able to solve the identified problem. By so doing, the teacher will be able to identify students' weaknesses and give prompt solutions where possible, this will improve the students' achievements and foster positive attitude in biology. Also Students' positive attitudes to science correlate highly with their science achievement. Such students show more positive attitudes after been exposed to self-learning strategy.

Attitudes come through learning and can be altered via influences using variety of techniques. Iheanacho (2016) describes attitude as predisposition to respond favorably and unfavorably to an object, person or event.

Similarly, Adewale, Nzewuihe and Ogunsola (2016) stated that biology is regarded as the most simple to understand among all the science subjects that usually attracts the widest enrollment among Nigerian students. The attitude of students' towards biology is mostly positive, but the results and academic achievements in public examinations such as NECO and WAEC by secondary school students, is not in any way encouraging.

Statement of the Problem

Despite, attempts at solving the problem of poor achievement in Biology and especially in ecology, the problem still persists as indicated by the WASCE and WAEC results over the past ten years. The consequences of allowing poor achievements in biology at Senior Secondary school level are that sooner or later Nigeria may lack manpower resources that could attain its aspiration as one of the advanced nation in the continent as contained in the National Policy on Education (FRN, 2014). This could in turn affect the promotion of technological development of the nation, hinders the exploitation of the natural resources and improve the standard of living and quality of life of its citizens (Mbajjorgu, 2015). Ideally, teaching and learning is most effective when it is activity based, where the learners are exposed to real life situations, where they can explore the environment.

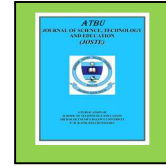
A student centred approach to learning would therefore, be most appropriate in the teaching and learning of topics in Biology such as in ecology. An outdoor instructional strategy could therefore solve the problem of low achievement in Biology. Indeed, several studies are bound on the efficacy of ODES in teaching in Nigeria. Such studies include those of Usman, (2010), Ahmed (2014), Achor, Ogbeba and Samuel (2014), Eromosele and Ekholuenetale (2016). The findings of these studies revealed that the outdoor strategies seemed to be more effective than the conventional method. This situation demand for a different approach to teaching and learning of Biology such as the ODES for teaching of ecological concepts. The problem of the study

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therefore, is the non-adoption of other methods in teaching Biology especially in ecology which many students are under performing.

Research Questions

The following research questions were set to guide the study:

1. What are the pre-test and post-test mean scores of SS II students in experimental and control groups?
2. What are the attitude mean scores of SS II students in experimental and control groups before and after exposure to out-door engagement strategy?

Hypotheses

The following null hypotheses were formulated and tested at 5% significance level:

- HO¹**- There is no significant difference between the post-test achievements mean scores of SS II students taught using out-door engagement strategy and those taught using the lecture method.
- HO²**. There is no significance difference in the post-test attitude means scores of SS II students in the experimental and control groups.

METHODOLOGY

The study adopted the quasi-experimental design and specifically, the separate sample pre-test-post-test design. This is because it was difficult to randomize the students effectively given the length of the treatment (6 weeks) which is capable of altering regular school programs. Therefore, intact classes were used for the study. The quasi experimental design requires 2 groups; one is assigned treatment group and another control group. Both the experimental group and the control group were pre-tested before treatment, but only the experimental group was exposed to treatment condition while the control was not, and both groups were post-tested after the conduct of the lessons.

The schools in the area of the study are separate sex schools, hence no room for having an intact class of both gender. The population for this study includes all the 1474 public senior

secondary two (SSII) students who were offering Biology in the districts of Gaya Metropolis, during the 2022 / 2023 academic session. There are thirty four (34) senior secondary schools, comprising of 21 males and 13 female schools. A total of 130 students were used for the study. The study employed purposive sampling technique to select the four schools used for the study. The selected schools were randomly assigned to experimental and control groups. The choice for purposive sampling is because it lays emphasis on the individuals or groups selected at the convenience of the researcher or primarily because they will be available at a convenient time/or place for the conduct of the research.

The Students' Animal Adaptation Achievement Test (SAAAT) and the Students' Attitude towards Animal Adaptation Scale (SATAAS) were utilized to collect data for the study. SAAAT was divided into two halves, A and B. Section A, required basic information on the respondents; like their name, school, gender, and grade. Section B, consisted of 40-item multiple-choice (ecology topic) test with four answer choices (A-D). The SATAAS was divided into two parts: Part A and Part B. Students' school codes and genders were the primary emphasis of Section A, while Section B featured 25 items scored on a five-point Likert scale. Each of the five possible positive responses (Strongly Agree [SA], Agree [A], Undecided [U], and Disagree [SD] and each of the four possible negative responses (1, 2, 3, 4, and 5 points) were assigned a corresponding score. Similarly, students' SATAAS replies were sorted into three groups: positive, neutral, and negative. Students' responses were sorted into attitude-specific categories using statistical measures of central tendency like mean and standard deviation.

The researcher delivered the SAAAT and SATAAS lesson plans developed for validation to three professionals in the field of scientific education and one professional in the field of research testing and measurement. The validators were given access to the instruments and were tasked with determining the accuracy of the measurements. Based on the West African

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School Certificate Syllabus in biology and the most up-to-date ordinary-level biology textbook, the designated experts determined whether or not the exam items were adequate. Both the SAAAT and SATAAS lesson plans were revised based on their comments and suggestions. The instrument was pilot-tested in two schools different from the sampled schools of the study area. School outdoor activities were used as a teaching tactic at one of the schools, while traditional methods were used at the other. Using Kuder-Richardson's K-R21 reliability coefficient formula, we found that SAAAT is extremely reliable, with a value of 0.82.

Four instructors with at least three years of experience in the classroom were hired to serve as research assistants and were tasked with instructing the experimental and control groups. Before beginning the trial, the researcher spent three days training such assistants. In order to collect reliable data from the students, the research assistants were briefed on the goals of the SAAAT and SATAAS and how to administer the instruments. Over the course of six weeks, two research assistants taught using the ODES strategy in the experimental class, while the other two taught using the lecture method. The researcher did not do the teaching himself, but provides guidance and supervision to both the research assistance and to the conduct of the work. In order to administer the attitude scale items (SATAAS) the face to face method was adopted. The instruments were administered on both the experimental and control groups, after its administration, the items were collected immediately and scored by the researcher.

The administration of treatment started two days after the administration of the pre-test for each of the experimental groups. Students were divided into groups of 5 members each. This is

with a view to sharing experiences of collaboration among members. Activities sheets (KWL) containing questions were given to each student, and research assistants supervised or guided the students while outdoor activities were on. Student were made to keep on talking and interacting, brainstorming and exchanging relevant ideas among themselves, so that a monotonous atmosphere will not get developed in the field of lesson. The students, for instance, went on walks around the school grounds, the surrounding Gachi pond, the slaughterhouse, and the school farm in preparation for outdoor activities. From the answers or responses given, the teacher guided the students to observe the types of beaks, feet and other structures common to those animals in that study area, which were used as adaptive structures for feeding.

While the students assigned to the control groups received instructions and directives from the research assistants through the usual lecture method. They were not given any special treatment, but taught with the method which was utilized by most of the secondary school teachers in the study area.

The two research questions raised in the study were answered using descriptive statistical tools using means and standard deviation, while Analysis of Covariance (ANCOVA) was used to test the three stated hypotheses at 5% level of significance. The ANCOVA was used in order to take care of the error of initial differences in achievement between the experimental and control groups.

RESULTS

Research Question One: What are the pre-test and post-test achievement mean scores of SS II students in experimental and control groups?

Table 1: Pre-test and post-test Achievement of Students in the Experimental and Control Groups

Group	N	Pre-test		Post-test		Mean Gain	\bar{x} - difference
		Mean	SD	Mean	SD		
Experimental	65	32.69	11.63	56.74	7.96	24.05	10.76
Control	65	36.11	6.589	49.40	9.521	13.29	

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The result of the tests for research question one is presented in Table 1. In the experimental group, the post-test mean score for achievement was 56.74, with a standard deviation of 7.96. This was a significant increase from the pre-test mean score of 32.69, with a mean gain of 24.05, showing that there was an improvement in the academic performance of students following treatment. In addition, the mean score for the control group in the pre-test was 36.11 and the standard deviation was 6.59. The data indicated that respondents in the experimental group were given therapy in the form of an outdoor engagement strategy, and as a result, their mean achievement score increased to 56.74. There was a mean difference of 10.76 points greater than the

mean achievement score of students in the control group, which was 49.40. This indicates that the students in both groups performed poorly on the pre-test; however, after receiving the intervention, the experimental group performed significantly better than the control group did. It may be deduced from this that the students in the experimental group experienced a greater mean gain difference than the students in the control group. It is possible to draw the conclusion that the outdoor engagement technique does, in fact, raise the level of achievement among students.

Research Question two: What is the pre-test and post-test attitude mean scores of SS II students in the experimental and control groups in Ecology?

Table 2: Pre-test and post-test Attitude Mean Scores of Students in the Experimental and Control Groups

Group	N	Pre-test		Post-test		Mean Gain	\bar{x} - difference
		Mean	SD	Mean	SD		
Experimental	65	63.12	10.70	93.34	6.47	30.22	18.16
Control	65	49.40	9.52	61.46	10.81	12.06	

Table 2 reveals the pre-test and post-test attitude mean score of students in the experimental and control groups. In the experimental group the post-test attitude mean score was 93.34 and standard deviation of 6.47, higher than the pre-test mean score of 63.12 and standard deviation of 10.70 with a mean gain of 30.22, indicating that there was a change in the attitude of students after treatment. Also, for the control group the mean score was 49.40 and a standard deviation of 9.52 at the pretest. The post-test mean score of students rose to 61.46 and a standard deviation of 10.81. The findings show that students in the experimental group had a higher attitude mean score (93.34) after treatment

using out-door engagement strategy, and control group (61.46) who were not given treatment with a mean difference of 18.16. This means that at the pre-test of the students in both groups had more of a negative attitude, but after the intervention, the experimental group had a more positive attitude than the control group. It can be deduced that out-door engagement strategy does increase students' attitude towards Ecology.

Hypothesis One: There is no significant difference between the post-test achievements mean scores of SS II students taught using ODES and those taught using the lecture method.

Table 3: ANCOVA Result on Posttest Achievement of Experimental and Control Groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	13884.157 ^a	2	6942.078	130.044	.000	.672
Intercept	21021.527	1	21021.527	393.791	.000	.756
Pre-attitude	51.226	1	51.226	.960	.329	.007
Group	12591.962	1	12591.962	235.882	.000	.650

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Error	6779.574	127	53.382
Total	300827.000	130	
Corrected Total	20663.731	129	

a. R Squared = .672 (Adjusted R Squared = .667)

Analysis of Covariance (ANCOVA) was undertaken to assess if a significant difference exists in the posttest achievement of respondents exposed to out-door engagement strategy and those not exposed. A substantial effect of outdoor engagement method on student accomplishment in Ecology was found, as shown in Table 3; the null hypothesis was rejected because the p-value of 0.000 is less than the 0.05 level of significance. An adjusted R² value of 0.67 indicates that differences in the implementation of ODES account for 67% of the variance in the dependent

variable, which in this case is ecological achievement; the remaining variance is attributable to other factors not included in our model. It suggests that an approach centered on getting learners outside can boost their Ecology grades.

Hypothesis Two: There is no significance difference in the post-test attitude mean scores of SS II students in the experimental and control groups.

Table 4: ANCOVA Result on Post-test Attitude of Students towards Ecology in the Experimental and Control Groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	33024.895 ^a	2	16512.448	206.440	.000	.765
Intercept	24266.130	1	24266.130	303.377	.000	.705
Pre-attitude	.403	1	.403	.005	.944	.000
Group	22629.315	1	22629.315	282.914	.000	.690
Error	10158.305	127	79.987			
Total	821982.000	130				
Corrected Total	43183.200	129				

a. R Squared = .765 (Adjusted R Squared = .761)

Analysis of Covariance (ANCOVA) was used to compare the post-test attitudes of students who were exposed to the outdoor engagement technique with those who were not. Table 4 reveals that there was a significant influence of outdoor engagement approach on students' attitude towards Ecology. This is because the p-value of 0.000 is less than the 0.05 level of significance, which means the null hypothesis was rejected. Further analysis of the data reveals an adjusted R squared value of .761, indicating that differences in the treatment of ODES account for 76.1% of the variance in the dependent variable, attitude to Ecology, with the remaining 2.9% attributable to other factors. It

implies that out-door interaction technique can help boost kids' attitude towards Ecology.

DISCUSSION

The study discovered substantial variations in achievement mean scores between kids exposed to outdoor activities and those subjected to the traditional way. This large difference favors outside activities, which have a mean score of 24.05, whereas traditional approaches have a score of 13.29. This finding was in agreement with that of Antwi., Hanson., Sam., Savelsbergh and Eijkelhof (2011)., Anchor (2014) and Ayodele (2016) who have shown the uses of out-door engagement approaches in science teaching and learning. The finding

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suggests that exposing students to out-door engagement strategy skills enhanced problem solving, attitudinal changes and biology achievement. This finding could be accounted from the fact that the experimental group was exposed to a number of activities and therefore the learners were active. In an active-learning classroom students are active learners not the passive receivers, hence the need for the use of ODES in the teaching of ecological concepts.

Furthermore, there is a significant difference between the level of attitude of senior secondary II students' in the control and experimental groups after exposure to ODES. This finding is in line with the findings of Festus & Ekpete (2012) who reported that students' positive attitudes to science correlate highly with their science achievement. Similar reports were recorded by Popoola, (2010) which indicated that students show more positive attitudes after been exposed to self-learning strategy. The method used (out-door engagement strategy) had promoted students' attitude in the subject as well as aids interaction, satisfies students' curiosity and eliminates boredom that characterizes lecture method. But the study contradicts the study of Yamtinah., Masykuri., Ashadi., and Shidiq, (2017) who supported that different gender and class level showed different attitude toward science. However, Owoeye and Agbaje (2016) maintain the opposing position, arguing that students' attitudes about biology are neutral and that increasing students' enthusiasm in studying biology will improve their performance in the subject.

CONCLUSION

In conclusion, out-door engagement strategy is an effective teaching and learning strategy that improved secondary school students' achievements and improve their attitude in ecology. It was also discovered that outdoor engagement strategy is a gender friendly method of teaching.

RECOMMENDATIONS

Following are the recommendations that were developed on the basis of the findings of the study:

1. There should be funding available to send biology instructors in secondary schools to workshops, conferences and seminars.
2. Educational stakeholders such as curriculum planners, STAN, FME, PTA should emphasize the use of ODES in teaching and learning some Biology concepts particularly animal adaptations.
3. In order to promote productive learning outcomes, the government ought to offer vital outdoor learning environments in schools.

REFERENCES

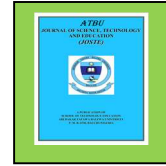
- Achor, E., Ogbaba, J., & Samuel, A. O. (2014). Effects of school outdoor activities on senior secondary two (SS II) students' retention in ecology in Jalingo Metropolis, Taraba, Nigeria. *Nigeria Educational Forum*, 22(2), 83-95.
- Adewale, A.M., Nzewuihe, G. & Ogunsola, F. (2016). Academic performance in Biology at Secondary School Certificate Examinations and the influencing factors among students in Owerri, Nigeria. *International Journal of Education and Evaluation*, 2(1), 1-10. Retrieved from www.liardpub.org.
- Agbo, F. O., Ahmed, U., Alhaji, I.M., & Auta, A. (2017). *Assessing the relevance of practical activities in the teaching and learning of basic science in upper basic schools in Gombe metropolis of Gombe State*. A Book of Reading in Honour of Professor. C.T.O. Akinmade. 79- 99.
- Ahmad, Y. (2014). *Effects of field- trip on retention and academic achievement in Ecology among Secondary School Students in Zaria, Nigeria*. An unpublished M.Sc. Ed, Thesis of faculty of Education, Ahmadu Bello University Zaria.

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- Eromosele, O. E., & Ekholuenetale, M. (2016). Effect of field-based instructions on students' understanding of ecological concepts in public secondary schools, Benin City, Nigeria: An Experimental Study. *IOSR Journal of Research & Method in Education*, 6(4), 47-58. Retrieved from- www.iosrjournals.org DOI: 10.9790/7388-
- Federal Republic of Nigeria, (2013). National policy on Education. Lagos; NERDC, Publishers.
- Iheanacho, N. (2016). Intercultural Communication and Public Policy. Retrieved from <https://books.google.com.ng/books?isbn=978541647X>
- Mbajjorgu, N. (2016). Nigeria Vision 2020 Economic Transformation Plan: Addressing Nigerian development and the structure of the economy through Education. Retrieved from <https://www.researchgate.net/publication/301732170> Nigeria_VISION_2020_Economic_Transf.
- Osoafor, A., & Okoro, O. (2013). *The strategies for effective teaching of Biology in the secondary schools*. Retrieved from <https://samphina.com.ng/strategies-effective-teaching-Biology-secondary-schools>.
- Umar, A. A. (2012). Effects of Biology practical activities on students' process skill acquisition in Minna Niger State, Nigeria. *Journal of Science, Technology and Mathematics Education. (JOSTMED)*, 7(2), 118-126.
- Usman, I. A. (2010). The effects of indoor and outdoor laboratory instructional methods on academic achievements of junior secondary school integrated science students in Zaria Local government Area of Kaduna State. *Journal of Studies in Science and Mathematics Education*, 1(1), 66-72.

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