International Journal of Advanced Scientific Research
www.allscientificjournal.com
ISSN: 2456-0421
Received: 13-08-2022; Accepted: 29-08-2022; Published: 16-09-2022
Volume 7, Issue 2, 2022, Page No. 33-43

Effects of field trip instructional strategies on students' interest and achievement in ecology in plateau central education zone, Nigeria

Christiana Fwenji Zumyil, Toma Maina Antip
Department of Biology, Federal College of Education, Plateau State, Pankshin, Nigeria

Abstract
The study investigated the effect of Field Trip and conventional Lecture instructional strategies on students' achievement and Interest in ecology in Plateau Central Education zone. The study was guided by four research questions while four research hypotheses were tested at 0.05 level of significance. The study adopted the quasi experimental design specifically the pre-test, post-test non-equivalent control group. The population of the study consisted of all the 5,207 SS1 students in all the government owned secondary schools in the study area for the 2021/2022 academic session. The sample consists of 106 respondents selected through simple random, the sample was assigned to one experimental group and one control group. Data collected were analysed using mean and standard deviation to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses. Data were collected using Ecology Achievement Test (E.A.T.) and Ecology Interest Inventory (E.I.I.). The result of the study indicated significant effect of field trip strategy over the conventional lecture strategy (P = 0.1.12< 0.05) in Ecology Achievement Test (EAT). Further findings of the study showed that there was a significant effect on the interest rating scores of students exposed to field trip over the conventional lecture strategy (P =20.63 < 0.00) in EII. Based on the findings, it was recommended amongst others that Biology Teachers should adopt the field trip to teach ecology to arouse students' interest and improve achievement across location. School authorities should endeavour to provide adequate learning environment for effective study of ecology.

Keywords: ecology achievement test, ecology interest inventory, field trip, conventional lecture strategy, interest, achievement, resources

Introduction
The interdependency of man with living and non-living things within the ecosystem is fundamental to human existence. Human beings are in constant interaction with their environment right from birth. At home, they interact with their physical environment and manipulate the resources within their environment for their benefits. Human beings have been farming crops to provide food for themselves and there are a lot of plants around them that they feed on. There are other animals in the environment that human beings feed on and other animals (carnivores) feed on man and other animals (Okoye, 2014) [16]. This therefore means that ecology as curriculum content in Biology education should be given maximum attention. This is because ecology provides students the opportunities to practically interact with their physical environment for some level of mutual benefits (Toran, 2017; Michael, 2012) [21, 7].
The relationship among living organisms with one another and their environment is an aspect of biology called ecology. Ecology is a branch of biology that deals with the study of organisms in relation to their environment. Ecology as defined by Michael (2012) [7], is the study of plants and animals in relation to their environment.A functioning ecosystem is an aspect of ecology. An ecosystem as defined by Michael (2012) [7] is a basic functioning unit in nature. An ecosystem is made up of living organisms (plants and animals) and their non-living environment. An ecosystem could be aquatic (water) or terrestrial (land).
Biology as a subject is so wide and important for course like Medicine, Pharmacy, Psychology among others in the Universities. However students' performance in Senior School Certificate Examination (SSCE) which is conducted by the West African Examination Council (WAEC) and the National Examination Council (NECO) has been below average (Njoku & Nwagbo, 2014) [9]. The rate of high failure of students in Biology has been attributed to inappropriate methods or strategies of teaching (Ezenduka & Achufusi, 2014; Njoku & Nwagbo, 2014, Zumyil, 2019) [6, 9]. Students' persistent low and under achievement in biology in SSCE has been observed much in literature (Okafor & Okeke, 2006; Ndioho, 2007; Ugbaja & Egbunonu, 2008, Samba & Eriba, 2012) [14, 8, 24]. These observations are more worrisome as the chief examiners' reports of the West African Examination Council (2010, 2011, 2012, 2015, 2016 & 2017) reported that students had poor grasp or understanding of ecological concepts in biology. This could also be due to the technical nature of some of the major and complex topics in Biology like ecology, genetics, nervous system and circulatory system (Olumide, 2013) [17].

Field trip is a strategy which involve taking students out of the four corners of the classroom to the field, garden, institutions, game reserve or park to study something that may not be brought to the class. Prem (2012) defines field trip as a visit to a place outside the regular classroom which is designed to achieve certain objectives which cannot be achieved as well by other means. Prem further stressed that field trips give opportunity for students to get out of the classroom and experience something new. The instructional places for field trip could be zoos, college, museums, wild life parks, game reserves, National parks, schools among others. Teaching and learning of Science Technology and Mathematics (STM) require intensive application of resources that would appeal to all the senses of perception to improve the effectiveness of instruction as well as maximize learning (Cirfat, Zumyil & Tongjura, 2006). These authors further stress that teaching resources help learners to learn faster and better.The use of field trip method of teaching, supplies a concrete basis for conceptual thinking and provides high degree of interest for the students in the subject by offering a reality of experience which stimulates self activity on the part of the students. This strategy also supplies necessary basis for the developmental learning to take place, making learning more permanent (Uduak & Inyang, 2008) [23]. The use of field- trip in the teaching and learning of biology provides integrated experiences which may vary from concrete to abstract in the learners as it motivates and makes learners have interest in the subject (Biology). There is need to improve students' interests and achievements in Biology especially in the functioning ecosystem through the use of appropriate teaching strategies in Biology. This is because, one primary function of Biology teaching is to help students understand its concepts, principles, theories and laws. Hence, the professional teacher is expected to give useful and meaningful instruction to his/her students so as to educate them properly for the general benefit of the nation.

Attention of scientists and science educators has been focused on how to improve science instruction in schools. Okoye (2014) [16] asserts that teaching has gone beyond the teacher standing in front of the learners to disseminate information to them without the learners' active participation. Akinbobola and Afolabi (2010) [2] stated that the challenge in teaching is to create experiences that actively involve students and support their thinking, explanation, communication and application of the scientific models needed to make sense of these experiences. There has been therefore significant shift of emphasis in science teaching from traditional content and factual acquisition of scientific knowledge to those which make students actively involved in learning science by doing. Ukpai (2014) [25] suggests that Biology which is a practical subject requires the use of practical approach to teach its concepts so as to produce students that would be able to acquire necessary knowledge, skills and competences that are needed to meet the scientific and technological demands of the society. This can be possible when practical approach such as field strategy is used for lesson delivery rather than the conventional explanatory method.

The conventional lecture methods, according to Umar (2012) and Ukpai (2014) [25], involves the presentation of concepts through talking, reading, note-taking and memorization of facts without actually involving students in activities or practical works that would stimulate their interest to perform better. Knowledge and competences acquired in school should be applied in solving problems (Ukpai, 2014) [25]. Unfortunately, biology teaching in secondary schools has not been effective due to a number of reasons such as poor instructional methods, overloaded curriculum, lack of / insufficient instructional materials, just to mention but few. For these reason, teachers do simply adopt instructional approach like the conventional lecture method which neither leads to objective reasoning nor arouse interest in students.

Agogo (2009) states that interest is a fundamental factor that is necessary for effective science education. Agogo sees interest as quality that arouses concern or curiosity that holds one's attention. Interest is a condition of wanting to know or learn about something or somebody (Agogo, 2009).

Academic achievement refers to a student's success in meeting short or long-term goals in education. Academic achievement means completing secondary school or earning a higher certificate. Academic achievement as defined by Crow and Crow in Nuthanap (2007) [10] is the extent to which a learner is profiting from instructions in a given area of learning. This is reflected by the extent to which skill or knowledge has been imparted to the learner. Academic achievement is knowledge acquired and skills developed in school subjects, which is generally indicated by marks obtained in tests in an annual examination (Sunitha, 2005) [20]. Academic achievement can be influenced by factors like parent's education, parental occupation, type of school, location of school, gender, teaching method and many other factors.

Despite all efforts, including the use of innovative teaching methods to help science students achieve higher, such a factor as school location still may pose some problems. Studies have shown that school location has significant effects on students' achievement (Ok, 2009; Okereke & Onwukwe, 2011) [13, 15]. Individual's interest is understood to develop gradually and affects one's knowledge and values over time (Onoja, 2016). Meaningful learning can only occur when students' interest are developed and sustained. A school could be located in an urban or rural area. Location of a school (rural or urban) could have effect on a child's ability to study and perform at the level expected of him/ her. In Plateau State, most schools located in the rural areas have shortage of qualified teachers, insufficient facilities and no seats in the schools. This is supported by Ok (2009) [13] who states that in Nigeria, most rural based schools lack enough qualified teachers. More often than not, they are poorly equipped and lack basic amenities. All these serve as inhibiting factors of good academic performance. Students in urban areas are often exposed to more social amenities such as electricity, radio, television, computers, mobile phones which they use to access facebook, twitter, youtube and other social media sites where they interact even with people beyond Nigeria.

The study was based on Hull's 'drive reduction theory of motivation 1942, Bruner's learning theory of constructivism in Education 1960 and Ausubel's subsumption theory of learning 1968.

Purpose of Study

The purpose of this study was to compare the effects of field-trip instructional strategies on students' achievement and interest in biology in Plateau Central Education Zone. Specifically, the objectives of the study were to:

1. Compare students' mean achievement in ecology when taught using field trip and conventional explanatory method.
2. Compare students' mean interest rating in ecology when taught using field trip and conventional explanatory method.
3. Compare the mean achievement of students from urban and rural schools in ecology when taught using field trip strategy.
4. Compare the mean interest rating of students from urban and rural schools in ecology when taught using field trip strategy.

Research Questions

The following research questions guided the study

1. What are the mean achievement scores of Biology students exposed to field trip and conventional explanatory method in ecology?
2. What are the mean interest ratings of Biology students taught ecology using field trip and conventional explanatory method?
3. What are the mean achievement scores of students from urban and rural schools taught ecology using field trip?
4. What are the mean interest ratings of students from urban and rural schools taught ecology using field trip?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant difference in the mean achievement scores of Biology students taught ecology using field trip and conventional explanatory method
2. There is no significant difference in the mean interest ratings of Biology students taught ecology using field trip and conventional explanatory method
3. There is no significant difference between the mean achievement scores of students from urban and rural schools taught ecology using field trip.
4. There is no significant difference between the mean interest ratings of students from urban and rural schools taught ecology using field trip.

Significance of the Study

It is hoped that the outcome of this study may be of great importance to Biology teachers, students, and curriculum planners. The Biology teacher may benefit from the study as it provides him/her with a better understanding of using field trip for teaching functioning ecosystem. The study may help the teachers to use the environmental resources to teach the students things that would have been abstract with ease as they are found in the environment when on a field trip. The study may sensitize the teachers on the best strategy for teaching functioning ecosystem.

The students might also benefit from the study because; they could have the opportunity to develop the skill of observation and ability to identify the different organisms in the environment. Curriculum planners may benefit from this study especially in the area of activities for each topic. The findings may help the curriculum planners to focus on the use of field trip for the teaching and learning of ecology and science related subjects. All these could lead to increase in students' achievement in biology, as well as improve their interest in ecology.

Scope of the Study

This study focused on the comparative effectiveness of using field trip and the conventional lecture strategies on students' achievement and interest in ecology. The study covered the central education zone of Plateau State. The zone comprises five local government areas of Pankshin, Mangu, Bokkos, Kanke and Kanam. The content Scope was delimited to field trip strategy and conventional lecture method. This enabled the researchers to effectively control the research conditions and manipulated the treatment and controlled aspects of the independent variables and its effect on the dependent variables. The study also focused on SS1 students located in both urban and rural areas. The preference for SS1 students was because they had just been introduced to biology as a subject. Therefore introducing the field trip strategy could help in establishing an effective foundation of teaching and learning of biology to improve and enhance interest and achievement ecology. Besides, using SS1 class gave the researcher enough time to expose them to the treatment because there was no interruption since it was not a certification class. The topics covered in the study included autotrophs, heterotrophs, decomposers, food chain, food web, pyramid of numbers, energy and energy transformation in nature and nutrient cycling in nature.

Research Design

The design employed for this study was the pre – test, post - test quasi-experimental design. Specifically, the study used the non-equivalent control-group design. This was adopted because it was not possible to randomly assign subjects to treatment groups. This design was appropriate because according to Achor and Ejigbo (2006), some classroom conditions do not allow for excessive manipulations. The study therefore used intact classes. The independent variables were field trip strategy and the conventional explanatory method. The dependent variables were achievement and interest in ecology. The design entailed all the groups took the pre-test before the treatment took place, while the post-test was also administered to all the groups. Based on this, the study employed one experimental group and one control group. The experimental group was exposed to the field trip strategy while the control group was exposed to the conventional explanatory method.
The design is represented diagrammatically as thus:

E $R0_1$ $X_1 0_2$
C $R0_1$ X 0_2

Where:
E represents the experimental group
C represents the control group
R refers to the random assignment of classes to experimental and control groups
0_1 pre-test for all groups
0_2 post-test for all group
X1 represents the treatment given to experimental group
X represents no treatment for control group
It was not possible for the researcher to randomly assign Students to groups, so as not to disrupt classes that were already in existence, especially as the experiment lasted for five weeks. The intact classes in the sampled schools were therefore used for the study.

Population

The population for this study comprised all the 5,207 SS1 students from the 107 government owned schools of the five local government areas in the Central Education Zone of Plateau State for the 2020/2021 academic session (Plateau Central Education Zone Statistics, 2020). The reason for choosing SS1 for this study was because, the students had just started offering biology as a core subject. So it is better to introduce these strategies early to these students.

Sample and Sampling

A sample size of 106 students was used for the study which comprised the number of biology students found in the intact classes used. Government owned schools were used for reason of uniformity. The schools were stratified into the five Area Directorates of Education to ensure fair coverage of the entire Education Zone and generalizability of the results. Sampling was purposively carried out in order to select co-educational schools from both rural and urban areas to reflect location of the schools. Criteria for selecting the sampled schools were: they should be Government approved schools, the school must have WAEC and NECO centres and having been presenting students for external examinations for not less than ten years. Schools selected must have a biology teacher with not less than three years post qualification experience.
The process was first to pick two schools one from urban and one from rural area from each Area Directorate of the zone by writing names of all co-educational schools of the Directorate which had presented students for SSCE for not less than 10 years one after the other in pieces of paper and poured into two hats (one containing names of urban schools and the other one containing names of rural schools) and one school was randomly picked from each hat. Ten Schools in all were picked from all the five Area Directorates made up 5 urban schools and 5 rural schools. Two schools out of the 5 urban schools were randomly picked and one school randomly assigned to experimental group which was treated using field trip strategy and one School was assigned to control group which was treated with the conventional lecture method using 'Hat' and 'Draw' method. Two Schools were also picked from the 5 rural schools repeating the same procedures of treatment assignment with the urban Schools.

Instrumentation

Two instruments were used for data collection in this study namely;
1. Ecology Achievement Test (EAT)
2. Ecology Interest Inventory (EII)

1. Ecology Achievement Test

The Ecology Achievement Test was adopted from WASSCE which is a standardised examinartion. Senior Secondary Certificate Examination (WASSCE) questions in topics in Ecology under functioning ecosystem were used to obtain data that were used to answer the research questions and to test the hypotheses. Fifty objective questions each with 4 options letters A to D were developed based on Bloom's taxonomy of educational objectives.

Ecology Interest Inventory (EII)
The researchers adopted the items of the EII developed by Abonyi (2011) which are related to ecology especially functioning ecosystem while some items which were not found in Abonyi's items were constructed by the researchers on ecology.

Method of Data Collection
The data for the study were gathered through the administration of Ecology Achievement Test (EAT) and Ecology Interest Inventory (EII). The researcher visited the Zonal Education office and the schools selected for the study to obtain permission from the Director and the school authorities to conduct the study.

Experimental Procedure

a. Training of Biology teachers as research assistants for the Study

The following procedure was followed for the experiment;
The researchers collected information such as years of experience from the Biology serving teachers who were used as research assistants.
The researchers trained the Biology teachers for four days in Government Secondary School Pankshin. The training lasted for four (4) hours daily. The training of the research assistants involved a careful explanation of the purpose or objectives of the research. All the teachers from the 4 schools were trained on the instructional strategies to be used in their various Schools. Two teachers from the two control group schools were trained on the use of the conventional lecture method of instruction and the remaining two teachers from the schools that were designated for the use of field trip strategy as were trained on how to organize and teach students with the field trip instruction by taking respondents to field/garden. The teachers were observed in a practice session after training so that necessary corrections were made. The practice was repeated until the required skills were acquired.

b. Procedures for the Treatment

1. The researchers met separately with the teachers (i.e. the research assistants) from the four schools that were involved in teaching the control and experimental groups to ensure uniformity.
2. Before the treatment, the EAT and EII were administered on the respondents as a pre-test in all the four schools before the commencement of the treatment. This was to help establish the entry behaviour of the respondents before the actual treatment.
3. The teachers in the control group classes taught the students with the conventional explanatory method of teaching using only verbal instruction.
4. The students in the field trip classes were taken to the sites designated for field trip by their teachers for instruction.
5. The experiment was carried out for a period of five weeks.
6. After five weeks of the experimentation, the items on EAT and IEI which earlier served as pre-test were reshuffled and administered to the respondents as post-test to determine the effects of the treatment.
7. The research assistants handed over the collected data to the researchers.

Method of Data Analysis
The research questions were answered using descriptive statistics of mean and standard deviations while all the hypotheses were tested at 0.05 level of significance using Analysis of Co-variance (ANCOVA) with the pre-test scores serving as a covariate. ANCOVA was used because it removes the initial differences among groups so that the groups could be considered equivalent since intact classes were used (Ali, 2006).

Data Analysis and Interpretation
In this section, analysis of data collected is interpreted and the findings are presented. The research questions are addressed alongside with the hypotheses.

Research Question 1
What are the mean achievement scores of biology students exposed to field trip and conventional explanatory method in ecology?

Table 1: Mean Achievement Scores of Biology Students Taught Ecology Using Field Trip and Conventional Explanatory Method

Method		Pre-test	Post-test	Mean Gain
Field Trip	Mean	34.095	54.786	20.59
	N	42	42	
	Std. Deviation	11.196	13.354	
Conventional Explanatory Method	Mean	38.500	43.133	4.63
	N	30	30	
	Std. Deviation	12.099	12.428	

Students in all the groups benefitted from the instruction using, field trip and conventional explanatory method. However, students taught with field trip had a mean gain of 20.59. as against those taught using conventional explanatory method which has the mean gain of 4.63. This shows that the field trip is the most effective strategy for teaching ecology.

Research Question Two
What are the mean interest ratings of biology students taught ecology using field trip and conventional explanatory method?

Table 2: Mean Interest Ratings of Biology Students Taught Ecology Using Field Trip and Conventional Explanatory Method

Method		Pre-Interest	Post-Interest	Mean Gain
Field Trip	Mean	2.273	2.985	0.71
	N	42	42	
	Std. Deviation	.630	.588	
Conventional Explanatory Method	Mean	1.972	2.198	0.23
	N	30	30	
	Std. Deviation	.548	.523	

The students in all the groups had mean gain on their interest ratings. The students taught with field trip strategy had the highest mean gain of 0.71 as against those taught with conventional explanatory method which has a mean gain of 0.23. This shows that field trip strategy arouse the students' interest most.

Research Question three
What are the mean achievement scores of students from urban and rural schools taught ecology using field trip?

Table 3: Mean Achievement Scores of Students from Urban and Rural Schools Taught Ecology Using Field Trip

Location		Pre-Test	Post-Test	Mean Gain
Urban	Mean	32.560	52.120	19.56
	N	25	25	
	Std. Deviation	9.875	11.501	
Rural	Mean	36.353	58.706	22.36
	N	17	17	
	Std. Deviation	12.879	15.202	

The students in both urban and rural schools benefitted from field trip strategy. The mean gain in the achievement score was found to be 22.36 for rural students and 19.56 for urban students. The higher mean gain of 22.36 in achievement score for rural biology students than 19.56 for their urban counterparts indicate that field trip teaching strategy is more effective for teaching ecology in the rural areas than in the urban areas.

Research Question four
What are the mean interest ratings of students from urban and rural schools taught ecology using field trip?

Table 4: Mean Interest Ratings of Students from Urban and Rural Schools Taught Ecology Using Field Trip

Location		Pre-Interest	Post-Interest	Mean Gain
Urban	Mean	2.478	3.032	0.55
	N	25	25	
	Std. Deviation	.558	.582	
Rural	Mean	1.971	2.915	0.94
	N	17	17	
	Std. Deviation	.623	.607	

The table above shows that field trip strategy increase interest ratings of both urban and rural students. The mean gain in the interest rating was found to be 0.55 for urban students and the mean gain in the interest rating was found to be 0.94 for biology students taught ecology using field trip in the rural location. The higher mean gain of 0.94 for biology students taught ecology using field trip in the rural location means that field trip enhanced higher interest among the rural area students when used to teach ecology than in the urban area that the students gained a mean interest of 0.55.

Hypotheses 1
There is no significant difference in the mean achievement scores of biology students taught ecology using field trip and the conventional explanatory method.

Table 5: Summary of ANCOVA Effect of Biology Students Taught Ecology Using Field Trip and Conventional Explanatory Method

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	19668.595[a]	3	6556.198	309.933	.000
Intercept	1970.983	1	1970.983	93.175	.000
PreTest	15864.428	1	15864.428	749.963	.000
Method	5913.996	2	2956.998	139.787	.000
Error	2157.669	102	21.154		
Total	313464.000	106			
Corrected Total	21826.264	105			

a. R Squared = .901 (Adjusted R Squared = .898)

Table 6: Pairwise Comparison of the Two Strategies of Teaching Ecology on Students' Achievement in EAT

(I) Method	(J) Method	Mean Difference (I-J)	Std. Error	Sig.[a]
Field	Field Trip	.986	1.064	.356
	Conventional Explanatory Method	17.244*	1.156	.000
Conventional	Field Trip			
	Conventional Explanatory Method	16.259*	1.112	.000

On Table 5, F value for method is 139.787, P = .000 < 0.05. Since P < 0.05, it shows that there is significant difference among the mean achievement scores of biology students taught ecology using field trip and the conventional explanatory methods. This implies that the differences among the mean scores of students exposed to field trip and a conventional explanatory method in ecology was statistically significant. The null hypothesis was therefore, rejected. This means that there was a significant difference in the mean achievement scores of the biology students in the experimental group taught ecology using field trip and those in the control group taught using conventional explanatory method.

Table 6 shows the pair wise comparison of the two methods to explain the direction of significance. The table indicates a P = .356 > 0.05 for field trip strategy. This implies a no significant difference in the mean achievement of two groups of students exposed to this strategy in teaching of ecology.

Hypotheses 2

There is no significant difference in the mean interest ratings of biology students taught ecology using, field trip and that of conventional explanatory method

Table 7: Summary of ANCOVA Effect of Interest Ratings of Biology Students Taught Ecology Using Field Trip and Conventional Explanatory Method

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	48.561[a]	3	16.187	116.936	.000
Intercept	5.191	1	5.191	37.503	.000
PreInterest	20.753	1	20.753	149.920	.000
Method	5.636	2	2.818	20.359	.000
Error	14.120	102	.138		
Total	973.970	106			
Corrected Total	62.681	105			

a. R Squared = .775 (Adjusted R Squared = .768)

Table 8: Pairwise Comparison of the Two Teaching Methods in Students' Interest

(I) Method	(J) Method	Mean Difference (I-J)	Std. Error	Sig.[a]
Field Trip	Field Trip	.042	.095	.660
	Conventional Lecture Method	.585*	.111	.000
Field Trip				
	Conventional Lecture Method	.543*	.091	.000

On Table 7, F value for method is 20.359, P = .000 < 0.05. Since P < 0.05, it shows that there is statistically significant difference in the mean interest ratings among biology students taught ecology using field trip and conventional explanatory method. This implies that the differences in means among students exposed to ecology using field trip and conventional explanatory method was statistically significant. The null hypothesis was therefore, rejected. This means that there was a significant difference in the mean interest of the biology students in the experimental group taught ecology using field trip and those in the control group taught using conventional explanatory method.

Hypotheses 3
There is no significant difference between the mean achievement scores of students from urban and rural schools taught ecology using field trip.

Table 9: ANCOVA Effect of Mean Achievement Scores of Students from Urban and Rural Schools Taught Ecology Using Field Trip

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6391.040a	2	3195.520	135.458	.000
Intercept	1206.776	1	1206.776	51.155	.000
PreTest	5952.138	1	5952.138	252.310	.000
Location	58.781	1	58.781	2.492	.123
Error	920.032	39	23.591		
Total	133373.000	42			
Corrected Total	7311.071	41			

a. R Squared = .874 (Adjusted R Squared = .868)

Table 9 presents ANCOVA test of mean achievement scores of urban and rural students taught ecology using field trip. The table shows F = 2.492 with P = .123 > 0.05. Since P > 0.05, this means that the hypothesis of no significant difference was not rejected. The implication is that there is no significant difference between the mean achievement scores of urban and rural students taught ecology using field trip. Thus the strategy enhanced the achievement of urban and rural students in ecology.

Hypotheses 4
There is no significant difference between the mean interest ratings of students from urban and rural schools taught ecology using field trip.

Table 10: ANCOVA Effect of Mean Interest Ratings of Students from Urban and Rural Schools Taught Ecology Using Field Trip

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	11.125[a]	2	5.562	71.409	.000
Intercept	2.479	1	2.479	31.821	.000
PreInterest	10.985	1	10.985	141.030	.000
Location	.969	1	.969	12.439	.001
Error	3.038	39	.078		
Total	388.272	42			
Corrected Total	14.162	41			

a. R Squared = .785 (Adjusted R Squared = .774)

Table 10 presents ANCOVA test for mean interest ratings of urban and rural students taught ecology using field trip. The table shows F = 12.439 with P = .001 < 0.05 (which was less than 0.05). This implies that the hypothesis of no significant difference was hereby rejected. It therefore means that there was significant difference in the mean interest ratings of urban and rural students taught ecology using field trip. Thus field trip used in teaching ecology to urban and rural students enhanced their interest in ecology differently.

Discussion of Findings
The discussion of findings is based on the variables examined in the study which are guided by the research questions and the hypotheses. The findings of this study revealed that the experimental instructional strategy, field trip had significant effect on the students' achievement in ecology. Students in the field trip group scored higher than those in the conventional explanatory group. This finding is in agreement with the finding of Olumide (2013); Ezeudu and Ezinwanne (2013), Nwafor and Abonyi (2016) [17, 11]. Olumide found in a study that students exposed to field trip strategy performed better than those taught biology using conventional explanatory method

Finding also shows that field trip instructional strategy was more effective than the conventional explanatory method as students exposed to the field trip strategy achieved higher mean scores in EAT. The finding may have turned out so because students exposed to the field trip strategy had a firsthand experience with the natural environment than the conventional explanatory group. This finding is in consonance with Suwopoleme, Linus and Jacob (2016) who found in a study that there was a significant difference in the achievement of students in Geography when taught with field trip strategy than those taught with the conventional explanatory strategy. In relation to this finding, Zumyil (2016) [27] affirms that if teaching and learning through field trip is properly and effectively done, it will afford students opportunity to become actively engaged in observing, collecting, classifying, studying relationship and manipulating objects as well as have the understanding of certain concepts and phenomena.

The students in both urban and rural locations benefitted from the instruction using field trip strategy. However, students in rural areas had higher mean gain in their achievement scores as compare to their counterpart in urban areas. The mean gain in the achievement score was found to be 19.56 for students in the urban locations while for students in the rural location, the mean gain was found to be 22.36. This shows that field trip was more effective for teaching ecology in the rural locations. This is in agreement with the findings of Asokoya and Akuche (2012) who researched on the effect of school location on students' academic achievement in physics. The result showed that school location had a significant effect on students' performance. The students in rural location also had higher mean gain in mean interest rating (0.94) as against their counterparts in urban location who had a mean gain of 0.55 on their mean interest rating.

Another finding showed that when tested statistically there is no significant difference between the mean interest ratings of urban and rural students taught ecology using field trip. This implies that the hypothesis of no significant difference was hereby upheld. It therefore means that there was no significant difference in the mean interest rating of urban and rural students taught ecology using field trip strategy. Thus, field trip used in teaching ecology to urban and rural students enhanced their interest in both location. The students in the rural schools developed more interest than the students in the urban schools.

Summary

The study investigated the effects of field trip instructional strategies and the conventional method on students' achievement and interest in ecology in Plateau Central Education Zone. Effect of location on the two instructional strategies were also examined. four research questions guided the study while four hypotheses where formulated and tested at 0.05 level of significance. The study was anchored on three theories. These were Hull's theory of drive reduction, Bruner's learning theory in education and Ausubel's subsumption theory of learning. The relevance of these theories to the variables of the study were stressed. Related conceptual literatures were reviewed on, field trip, environmental resources, ecosystem, school location, achievement and interest were also reviewed. Empirical studies related to the variables of the study were also reviewed.

The research design adopted for the study was the quasi-experimental, specifically, the pre-test, post-test non-equivalent control group design since intact classes were used.

The following were the findings of the study;

1. Students who were taught ecology field trip instructional strategies achieved higher in ecology than those taught using the conventional explanatory method.
2. Students who were taught using field trip strategies had higher interest rating scores in ecology than those taught using the conventional explanatory method.
3. There was no significant difference in the mean achievement scores of urban and rural students taught ecology using field trip strategy in EAT.
4. There was a significant difference in the mean interest ratings of students taught ecology in EII in favour of the rural students.

Conclusion

This study has established that both field trip instructional strategies is a practical and purposive way of improving students' achievement and interest in ecology. The students who were taught ecology using field trip strategies performed better than the students taught using conventional explanatory method. This was because students in the experimental group were given the opportunity to participate actively, and so they would remember easily what they had been taught since they were involved. field trip strategy was an efficacious and learner-centred than the conventional explanatory method which was passive and teacher-centred. Location of school is not important when good instructional strategies such as computer simulation and field trip are used in teaching ecology, however field trips strategy enhanced urban and rural student's interest in ecology differently.

The implications of the findings therefore are that field trip strategies arouse students' interest thereby improved their achievement in ecology. This study has proved that interest is an important factor that enhanced students' achievement in ecology. The study also concluded that students need exposure to simulations and the environment to arouse students' interest which could enhance their performance in ecology.

Recommendations

Based on the findings of this study, the following recommendations were made;

1. Biology teachers should employ the filed trip strategy to teach students ecology and other topics in biology in order to enhance students' achievement and interest in Biology.
2. Biology teachers should always make use of the environment to teach ecology as this will encourage students to develop interest in the subject.
3. School authorities should ensure the provision of adequate materials and conducive teaching and learning environment for teachers and students for effective study of ecology and Biology generally.
4. Curriculum developers should create a medium to inform biology teachers and other science teachers to use computer simulation strategy for teaching and learning biology and other science subjects.
5. School principals, administrators, teachers and other stakeholders in secondary schools should be trained and be updated periodically on the use of computer systems in the teaching and learning of Biological concepts especially in ecosystem functions.

Limitations

Some of the teachers used as research assistants in the sampled schools were not used to teaching ecology or biology using field trips in any significant ways. Some of them may not have paid much attention to the teaching of ecology. Their reluctance, incompetence and attitude may have affected the results of the study even though they were given some training. The researcher could not select Biology teachers based on gender since the selection was based on available teachers of the classes sampled in the various schools used for the study. Some of the female teachers were reluctant to employ the field trip instructional strategy which may have also affected the results of the study.

Acknowledgement

Special appreciation to Tertiary Trust Fund (TETFUND) for sponsoring the research. Worthy of acknowledgement are individuals and institutions without whose assistance this research would not have been possible, the Provost FCE Pankshin, the Area Director Central Zone, Plateau State Ministry of Education, Research Assistance our families who provided various forms of assistance. To God be the glory.

References

1. Agogo PO. *Topics in primary science education in Nigeria*. Makurdi: Azoba Press, 2009.
2. Akinbobola AO, Afolabi F. Constructivist practices through guided discovery approach: The effect on students' cognitive achievement in Nigerian senior secondry school Physics. Eurasian Journal of Physics & Chemistry Education,2010:2(1):16-25.
3. Asubel DP. *The psychology of meaningful verbal learning*, New York: Grune and Strattenic, 1968.
4. Brunner JS. The process of Education. Cambridge, Havward University Press, 1960.
5. Eriba JO. Strategies for teaching Integrated Science in secondary schools. The Practice of Teaching: Perspectives and Strategies. Jos: LECAPS Publishers, 2004, 153-157.
6. Ezenduka CU. Achufusi JN. Enhancing creativity in senior secondary school biology teaching through creative learning model approach. Proceedings of the 55th Annual Conference of Science Teachers Association of Nigeria, 2014, 207-214.
7. Michael MC. *Essential Biology for Senior Secondary Schools*. Onitsha:Africana first Publishers plc., 2012.
8. Ndioho OF. Effects of constructivist based instructional model on senior secondary students' achievement in Biology. Proceedings of the 49th annual conference of Science Teachers Association of Nigeria, 2007, 98-101.
9. Njoku MIA, Nwagbo C. Creativity in Biology classrooms in Nigeria: Challenges and prospects. Proceedings of 55th annual conference of Science Teachers Association Nigeria, 2014, 135-140.
10. Nuthanap G. Gender analysis of academic achievement among high school students. An unpublished master's degree thesis submitted to the University of Agricultural Sciences. Dharward, 2007.
11. Nwafor CE, Abonyi OS. Effects of instructional simulation on secondary school students' achievement in Basic Science. Journal of Science Teachers Association of Nigeria,2016:51(1):32-40.
12. Nwagbo C. Science Technology and Mathematics (STM) curriculum development: Focus on problems and prospect of Biology Curriculum delivery. Proceedings of the 49th Annual Conference of Science Teachers Association of Nigeria, 2008, 77-81.
13. OK NS. The effect of gender, socio-economic status and school location on students' Performance in Nigerian Integrated Science, 2009. Retrieved from http://www.Epa.gov/teachers/
14. Okafor EN, Okeke SOC. Concept mapping as an effective technique for teaching difficult concepts in Biology. Proceedings of the47th Annual Conference of Science Teachers Association of Nigeria, 2006, 122-127.
15. Okereke C, Onwukwe EO. Influence of gender, school location and the use of play simulation on school achievement in Chemistry. JORINDA,2011:9(1):381-387.
16. Okoye PO. E-learning utilization: An approach to dimensions of creativity for effective STEM curriculum delivery in colleges of education in Nigeria, Proceedings of the 55th Annual Conference of Science Teachers Association of Nigeria, 2014, 3-14.
17. Olumide OJ. Computer simulation package and gender as predictors of student's achievement in biology. Journal of Science and Multidisciplinary Research,2013:5(2):107-120.
18. Onoja AI. Relative effectiveness of pictorial and field trip instructional strategies on achievement and interest of secondary school students in ecology. Unpublished PhD Thesis in the Department of Curriculum and Teaching, Benue State University. Makurdi, 2016.
19. Plateau central education zone. Statistics of public schools and population of SS1 Students by gender, 2017.
20. Sunitha NH. Academic learning environment of students from aided and unaided co-educational high schools. A Master's Degree Thesis, University of Agricultura Sciences Dharwad, 2005.
21. Toran M. What is ecology? Retrieved from *study.com./academy/le*, 2017.
22. Uche DA, Abdullahi M, Asogwa EN, Ofoegbu TO. Effects of interactive computer simulation package on SSS students achievent and retention in genetic concepts Asian Journal of Technology,2016:15(14):2313-2321. Retrieved Online 26/12/2017.
23. Uduak BE, Inyang GJ. Effects of environmental resources on students achievement in Biology. Proceedings of the 49th Annual Conference of Science Teachers Association of Nigeria, 2008, 88-92.

24. Ugbaja JN, Egbunomu RN. Curriculum development and implementation: Utilizing local material resources in teaching selected ecological concepts. Proceedings of the 55th annual conference of Science Teachers Association of Nigeria, 2008, 93-96.
25. Ukpai PO. Biology education delivery: A panacea for acquiring creativity skills. Proceedings of the Science Teachers Association of Nigeria, 2014, 223-233.
26. West Africa Examination Council, (2002, 2008, 2009, 2010, 2011, 2012, 2015, 2017 & 2019). *Chief examiner's Report*. Lagos: WAEC.
27. Zumyil CF. Biology methods. Jos: Akins Press, 2016.