



Effect of Two Modes of Field Trip Method on Students' Achievement in Senior Secondary School Ecology in Nsukka Local Government Area, Enugu State

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Abstract

The study examined the effect of two modes of Field trip method on students' academic achievement in Senior Secondary School 1 Ecology in Nsukka Local Government Area, Enugu State. Three research questions and three hypotheses guided the study. This study adopted a pretest, posttest quasi-experimental non-equivalent design. Using purposive and simple random sampling techniques, a sample of 120 (67males and 53 females) students was drawn from the population of 2769 SSI students. Ecology Achievement Test Instrument with a reliability estimate of 0.71 was used for data collection. The data was analysed using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The results of the study showed that students in virtual field trip group achieved higher than those in real field trip group. Also, gender has no significant effect on the students' achievement in ecology. Therefore, the use of virtual field trip method in teaching ecology to the students was recommended.

Keywords: Academic Achievement, Ecology, Real fieldtrip and Virtual fieldtrip

Introduction

Students have been faced with the challenge of understanding the concept of Ecology. This is as a result of perceived abstractness and difficulty of the concept by the students which was documented on some research findings of Etobro and Fabinu (2017) and West African Examination Council Chief Examiner's Report (2019). Several factors like complexity, intricate ecosystem, and interdisciplinary connections, as well as limited resources and lack of hands-on-activities have contributed to the above situation (Agboghoroma & Oyovwi (2015). McBride (2011) described ecology as a dynamic and complex field, comprising of the study of a tremendous number of species and their interactions, and the spatial and temporal complexity of the physical environment within which these interactions occur. Knowledge of ecology helps the students and society at large to handle some of the environmental issues like climate change, global warming, flooding, drought, loss of biodiversity etc. by creating awareness on the effects of man's activities on the ecosystem, precautionary measures and solutions to environmental issues. Despite the importance of Ecology, several research findings like Agboghoroma and Oyovwi (2015) and Etobro and Fabinu (2017) revealed that many students find Ecology difficult to understand. This is an indication of loophole in the teaching-learning process. Moreover, the level of

understanding an individual has on a particular topic or subject greatly influences his/her success and could only be ascertained using academic achievement in form of test or examination.

Academic achievement is the sum total scores of students exposed to a particular task or series of tasks in order to check the level of accomplishment of the stated objectives of the tasks. Academic achievement according to Ricarda, Anja, Anne and Linda (2017) refers to performance results that show the level of goal accomplishment of an individual in educational environments, particularly in schools, colleges and universities. Arokoyu and Chukwu (2017) maintained that achievement is a measure of output and the main changes in knowledge, skills, and attitude of individuals as a result of experiences acquired from the school. Steinberg (2015) noted that academic achievement encompasses students' ability and performance and is associated with growth in cognitive, emotional and socio physical development.

Despite the effort put in place by the government, education practitioners and the teachers to achieve the goal of Biology education in Nigeria, the achievement of students in the subject over the years has been inconsistent (West African Examination Council, WAEC Chief Examiner's Report, 2016-2019). More so, the research findings of Akande, Mogbo,



Bello and Yaki (2018) and Joda (2019) revealed inconsistencies in students' achievement in Biology. This has become a worrisome situation to the Biology teachers, researchers and government. In a bid to find the cause of the inconsistencies in students' achievement in Biology, investigations were carried out by Agboghoroma and Oyovwi (2015); Etobro and Fabinu (2017) and the findings revealed that the observed poor achievement was as a result of abstractness and difficulty of some concepts in Biology specifically, ecology. Therefore, there is need for further research to unravel possible ways to concretize the learning of ecology in order to enhance students' academic achievement in ecology.

Ecology being a natural and environmental topic requires an outdoor learning experience to enable the learners to have first-hand knowledge of the subject and promotes social interaction, and this outdoor experience is called Field trip. Jeremiah and Alamina (2017) defined Field trip as a method of teaching which include excursions carried outside the school environment to enable learners observe a phenomenon, process or event, interact with some personalities in order to obtain some information relevant to a particular subject area or school experience. Ezechi (2018) explained that Field trip learning method will create a platform for social learning among the students, by involving the students, parents and teachers in the learning activity. Field trips involve many different goals, contents and learning environments and vary in effectiveness and learning outcomes (Puk, 2012). Accordingly, with technological advancement and application of technological gadgets in teaching, field trip could be done either outside or inside the classroom. To enhance student's achievement in Ecology, the traditional field trip called Real Field Trip (RFT) becomes the most appropriate teaching method as proven by research findings of Egwu and Okigbo (2021) and Abdul, Oyeronke and Adunni (2015).

Real Field Trip is a physical trip made by the students and teachers to the real or natural environment where they will interact physically with the components of ecosystem in their natural settings. Onah (2017) defined Real Field Trip as an outdoor learning where the teacher takes the students to sites where objects of instruction are viewed in their natural environment. The researcher explained that an organized Real Field Trip provides the students the opportunity to engage actively in viewing, collecting, categorizing, examining relationships and handling objects. According to McCauley (2017), Real Field Trips are great ways for

teachers to engage students and give them first-hand understanding of a subject.

Evidences abound on the positive impact of Real Field trip on students' achievement in science. The findings of Amosa, Ogunlade and Atobatele (2020), Mahgouband (2014) and revealed that students taught using Real field trip had a higher achievement than those taught using other methods of teaching. Regardless of its effectiveness, Anderson, Kiesd and Storksdiack (2016) during a survey on teaching and learning approaches in science education discovered that 46 % of teachers have never used Real field trip in teaching. Considering these challenges, finding suitable alternatives is unavoidable, thus, the use of virtual field trip to supplement real field trip approaches becomes logical.

Virtual Field Trip is one of the technology-based pedagogy commonly used to describe any activities on computer that a user browses to acquire information about a field site or location. Khotima, Krisnawati and Budi (2021), viewed Virtual field trip (VFT) as a collection of technology-based resources used together to give students the learning experiences gained from an actual field trip. Dutta (2018) defined Virtual Field Trip as an electronic exhibition of diverse natural and cultural phenomena that also provide digital simulations of the three-dimensional processes of surveying, observing, exploring and adventuring in some actual field sites.

The major aim of Virtual Field Trip is to salvage the effect of not going for Real Field Trip by most Biology teachers and students. The benefit of Virtual Field Trip cannot be underestimated. When used effectively, technology can open students to new experiences and places and many of the obstacles that teachers face with a traditional field trip no longer apply (Cassady, 2014). Seifan, Dada & Berenjian (2020) stated that Virtual Field Trip promotes flexibility, as students can access field opportunities at convenient times and locations without jeopardizing their ability to achieve comparable learning outcomes. This approach has been given an international dimension by the use of the internet to provide information, photographs, virtual tours, and clickable maps on a particular subject.

Several researchers (Dominguez, Miririda, Gonzalez, Oliet & Alonso, 2018; Seifan, Dada & Berenjian, 2018; Hehr, 2020) are of the view that Virtual Field Trip can be an alternative or complementary to Real Field activities because they are able to simulate the realities of the outside world in the classroom. However, it cannot not be a replacement for



a Real Field Trip, as it does provide the necessary pre-information and insight students need before visiting a real site. To establish a fact on the effectiveness of Virtual Field Trip on students' achievement, the researcher sort to determine the effect of two modes of Field trip on students' academic achievement in Ecology.

Research Questions

The following research questions guided the study;

1. What are the mean achievement scores of students taught Ecology with virtual field trip and those taught with real field trip?
2. What are the mean achievement scores of male and female students in Ecology?
3. What is the interaction effect of modes of Field trip and gender on students' achievement in Ecology?

Hypotheses

The following hypotheses were formulated and were tested at 0.05 ($\alpha = 0.05$) level of significance:

1. There is no significant difference in the mean achievement scores of students taught Ecology using virtual field trip and those taught Ecology using real field trip.
2. There is no significant difference in the mean achievement scores of male and female students in Ecology.
3. There is no significant interaction effect of modes of field trip and gender on students' achievement in Ecology.

Materials and Methods

This study adopted a pretest-posttest quasi-experimental non-equivalent group design and was carried out in Nsukka Local Government Area of Enugu State, Nigeria. The population for the study was two thousand, seven hundred and sixty-nine (2769) (1,204 male and 1,460 female) Senior Secondary School I Biology students. A sample size of 120 (67 male and 53 female) SSI Biology students from four intact classes

was drawn using purposive and simple random sampling techniques. Purposive sampling was used to select four co-educational schools on the basis of availability of computers, good network and proximity to the site of field trip. From the sampled schools, two of the schools were assigned to Virtual field trip teaching method (group I) while the other two schools were assigned to Real Field Trip teaching (group II) method using simple random sampling by balloting with replacement. Each group consisted of 52 students and 68 students respectively. The researcher developed Ecology Achievement Test (EAT) instrument for data collection. The instrument was subjected to face validation by three experts; two from Biology Education and One from Measurement and Evaluation. The researcher ensured the content validity of the instrument using a Biology curriculum and table of specification.

A reliability coefficient of 0.71 was obtained using Kuder-Richardson's formula ($K-R_{20}$). The researcher trained the research assistants for two days. The lesson plan developed by the researcher was used. Four teachers were involved in the training, two for each group. The researcher explained how the two modes of field trip (Real Field Trip and Virtual Field Trip) will be used to teach the selected topics. Prior to the commencement of treatment, all the students were given a pre-test in order to obtain the pre-test scores for the study which helped to compare the effect of the treatment on the students' achievement. The treatment exercise lasted for five weeks. The only difference is in the mode of field trip (real field trip or virtual field trip) employed in teaching the topics. Finally, at the end of the experiments, the teachers administered the Ecology Achievement Test (EAT) as post-test on the sixth week. Descriptive statistics of mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the formulated null hypotheses at 0.05 level of significance.

Results

Table One: Pretest and Posttest Mean Achievement Scores of Students Taught Ecology with Virtual Field Trip and those Taught with Real Field Trip

Modes Of Field Trip	N	Pretest		Posttest		Mean Gain
		\bar{x}	SD	\bar{x}	SD	
Virtual Field Trip	52	16.48	4.07	32.94	2.54	16.46
Real Field Trip	68	16.84	3.26	28.25	3.99	11.41



Result on Table 1 shows the pretest and posttest mean achievement scores of students taught ecology with virtual field trip and those taught with real field trip. Result shows that the students who were taught using virtual field trip had a pretest achievement mean score of ($= 16.48, SD = 4.07$) and a posttest achievement mean score of ($= 32.94, SD = 2.54$). The mean gain score was 16.46. The result also shows that

the group taught ecology using real field trip had a pretest achievement score of ($= 16.84, SD = 3.26$) and a posttest achievement score of ($= 28.25, SD = 3.99$). The mean gain score was 11.41. The results of the study show that the students taught ecology using virtual field trip achieved higher than those taught using real field trip. This result therefore shows that teaching ecology using virtual field trip proved to be more effective.

Table Two: Analysis of Covariance (ANCOVA) of the effect of Modes of Field Trip on students' academic achievement in Ecology

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	702.885 ^a	4	175.721	14.997	0.00	.343
Intercept	4058.330	1	4058.330	346.356	0.00	.751
PreTestAch	50.551	1	50.551	4.314	0.04	.036
Method	630.848	1	630.848	53.839	0.00	.319
Gender	1.276	1	1.276	.109	0.74	.001
Method * Gender	4.441	1	4.441	.379	0.53	.003
Error	1347.482	115	11.717			
Total	112100.000	120				
Corrected Total	2050.367	119				

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he result in Table 2 shows the ANCOVA of the significant difference in the mean achievement scores of students taught Ecology using virtual field trip and those taught using real field trip. Result shows that an F-ratio of ($F(1, 119) = 53.839, p = 0.00, \eta^2_p = 0.319$) was obtained. Since the associated probability value of

0.00 is less than 0.05 set as level of significance, the null hypothesis which states that there is no significant difference in the mean achievement scores of students taught ecology using virtual field trip and those taught using real field trip was rejected.

Table Three: Influence of Gender on Students' Achievement in Ecology

Variable Gender	N	Pretest		Posttest		Mean Gain
		\bar{x}	SD	\bar{x}	SD	
Male	67	17.06	3.63	29.96	4.40	12.90
Female	53	16.21	3.59	30.70	3.80	14.49

Result on Table 3 shows the influence of gender on students' achievement scores in ecology. Result shows that the male student had a pretest achievement mean score of ($17.06, SD = 3.63$) and a posttest achievement mean score of ($29.96, SD = 4.40$). The mean gain score was 12.90. The result also shows that the female students had a pretest achievement mean score of ($16.21, SD = 3.59$) and a posttest achievement mean score of ($30.70, SD = 3.80$). The mean gain score was 14.49. Mean gain score of 12.90 and 14.49 for male and female students respectively imply that the female

students achieved slightly higher than the male students.

The result in Table 2 shows the ANCOVA of the influence of gender on students' achievement in ecology. Result shows that an F-ratio of ($F(1, 138) = 0.109, p = 0.74, \eta^2_p = 0.001$) was obtained. Since the associated probability value of 0.74 is greater than 0.05 set as level of significance, the null hypothesis which states that there is no significant difference in the mean achievement score of male and female students in ecology was not rejected. This implies that gender is not

a significant factor in determining students' achievement in ecology.

Table Four: Mean and Standard Deviation of the Interaction Effects of Modes of Field Trips and Gender on Students' Achievement Scores in Ecology

Modes of Fields Trips	Gender	N	Pretest		Posttest		Mean Gain
			\bar{x}	SD	\bar{x}	SD	
Virtual Field Trip	Male	25	16.72	4.09	33.08	2.49	16.36
	Female	27	16.26	4.11	32.81	2.63	16.55
Real Field Trip	Male	42	17.26	3.36	28.10	4.25	10.84
	Female	26	16.15	3.04	28.50	3.60	12.35

The result of the study as presented in Table 4 shows the interaction effect of modes of field trip and gender on students' achievement scores in Ecology. Result shows that the male students who were taught ecology using virtual field trip had mean gain of 16.36 while the female students had mean gain of 16.55, this implies that the female students slightly achieved higher than the male students when virtual field trip was used. The result also shows that the male students who were taught using real field trip had mean gain of 10.84 while female students had mean gain of 12.35 which implies that the female students in the real field trip achieved higher than their male counterparts. To test whether the interaction between gender and modes of field trip on students' achievement in ecology is statistically significant, see hypothesis five.

The result in Table 2 shows the ANCOVA of the significant interaction effects of modes of field trip and gender on students' mean achievement scores in ecology. Result shows that an F-ratio of ($F(1, 119) = 0.379, p = 0.53$) was obtained. Since the associated probability value of 0.53 is greater than 0.05 set as level of significance, the null hypothesis which states that there is no significant interaction effects of modes of field trips and gender on students' mean achievement scores in ecology was not rejected. Inference drawn is that the interaction effects of modes field trip and gender on students' mean achievement scores in ecology was not statistically significant

Discussion

The result of the study showed that the students taught Ecology using virtual field trip achieved higher than the students taught using real field trip. This result therefore shows that virtual field trip proved to be more effective. This could be attributed to availability of materials needed for instruction. Virtual field trip gave the students the opportunity to explore all the places and

see all the animals and plants that are essential for the lesson. In addition, the students had the opportunity to explore various sites at their convenient, whereas real field trip did not give the students access to explore various sites at their convenient. The hypothesis showed that there is a significant difference in the mean achievement scores of students taught Ecology using virtual field trip and those taught using real field trip with those taught using virtual field trip having a higher mean gain. The findings of this study conform to that of Lawal (2023) who reported that virtual field trip had a significant performance than the traditional field trip group. The finding is also consistent with Haris and Osman (2015) and that of Obadiora (2016) who reported among others that virtual field trip enhances students' achievement more than real field trip. However, the result disagrees with that of Nwankwo (2020) who examined the effect of virtual field trip and physical field trip on the academic achievement of secondary school students' achievement and the result revealed that students achieved higher when physical field trip was used than when virtual field trip was used.

The results showed that the female students achieved slightly higher than the male students when taught Ecology using different modes of field trip. This suggests that the gender gap is reducing. This is in line with the report of Ogan (2015) who revealed that differences in achievement of males and females in science subjects is reducing. This reduction in gender gap might result from consistent effort by the instructor to present adequate instructional task, and recognizing that the students were engaged actively. This shows that the use of the instructional approaches did not only shrink the gender gap but also changed the gap in favour of the female gender. However, the result from the hypothesis showed that gender does not significantly influence students' achievement in Ecology when taught using different modes of field trip. This implies



that students' gender is not a significant determinant of academic achievement in Ecology. The finding of the study is consistent with Ekineh and Adophus (2019) and that of Chaochao et al (2020) who found no significant difference in the mean achievement scores of male and female students. However, the finding of this study is contrary to the findings of Adejimi, Nzabalarwa and Shivoga (2020) and that of Kisigot, Ogula, and Munyua, (2021) whose results showed a significant difference in the mean achievement scores of male and female students.

More so, the hypothesis showed that the interaction effects of modes of field trip and gender on students' mean achievement score in Ecology is not statistically significant. The finding conforms to that of Nkok (2022), who reported no significant interaction effect of gender and teaching Method on students' achievements. The result is also supported by the finding of Nwosu and Ndanwu (2020) which revealed no significant interaction between method and gender on students' achievement in electronic library. This implies that gender is not a significant determinant of the mode of field trip to be used in the classroom with respect to students' achievement in Ecology. However, the findings of this study disagree with that of Jacob and Linus (2017) who reported a significant interaction effect of gender and method on students' achievement.

Conclusions

Based on the findings of the study, it is therefore concluded that virtual field trip is more effective in enhancing students' academic achievement in ecology than real field trip; virtual field trip enhances students' achievement in Ecology.

Recommendations

From the findings of the study, the following recommendations were made:

1. Biology teachers should adopt virtual field trip strategy rather than using only real field trip in teaching ecology.
2. Regular sensitization lectures, seminars and workshops should be organized by the government in collaboration with professional associations to retrain Biology teachers on the development and use of virtual field trip teaching strategy.
3. The Ministry of Education should offer a biology virtual environment to each school in the area to help instructors overcome the challenges posed by a dearth of genuine field trips.

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