EFFECTS OF FIELD TRIP METHOD ON STUDENT'S ACADEMIC ACHIEVEMENT AND RETENTION IN BASIC SCIENCE AND TECHNOLOGY.

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Abstract

This study investigated the effects of field trip method on students' achievement and retention in Basic Science and Technology among junior secondary school students in Yala, Cross River Nigeria. It also considered gender and cognitive ability levels of students as moderators. To achieve the objectives of this study three(3) research questions and three(3) null hypotheses were formulated to guide the study. A non-randomized pre-test post-test control group design was adopted for the study. The population size of the study was 3,546 while the sample size was 100 (52 males and 48 females), in two intact classes from two co-educational public secondary schools in Yala. The two classes were assigned to experimental and control groups respectively. Students in the experimental group were taught environmental hazards component using field trip method while the control group were taught using expository method. The instrument used for data collection was Basic Science and Technology Achievement Test (BSTAT) on environmental hazards. The instrument was validated and subjected to test-retest reliability. Its reliability co-efficient was 0.78, obtained using Pearson Product Moment Correlation (PPMC). The data obtained from the tests were analyzed using Analysis of Covariance (ANCOVA). All hypotheses were tested at 0.05 level of significance. The results showed that field trip had significant effect on students' achievement. Also, students taught environmental hazards using field trip retained significantly higher than those taught with expository method. Gender had no significant effect on students' achievement and retention in the concept of environmental hazards when taught using field trip method. There was significant effect of field trip method on students' cognitive ability levels. Based on the findings, it was recommended among others that Basic Science and Technology teachers should use field trip method effectively in teaching environmental hazards component of Basic Science and Technology curriculum.

Keywords: *Field Trip, retention, basic science, technology, achievement etc.*

Background of the Study

The Basic science and Technology Curriculum has environmental hazards as one of its themes titled "you and environment". An Environment naturally comprises of water, air, land and atmosphere. Environmental hazards refer to a term used for any situation or state of events which poses a threat to the surrounding environment and which adversely affect plants and animals. The contents of environmental hazards in Basic Science and Technology in Junior Secondary Schools include: flooding, deforestation, soil erosion, bush burning, pollution, desertification and ozone layer depletion. Research has indicated that the academic achievement of students in Basic Science and Technology across Yala Local government of Cross River State is on the average (Cross River State Ministry of Education (CRSME), 2015). This is traceable to poor instructional methods employed by teachers despite the efforts of government to provide the needed teaching facilities and motivation of science teachers in the state, to make lessons student-centered and practical based (Okam and Zakari, 2017).

According to Ekong (2019), students are not achieving up to expectation in Basic Science and Technology in external examinations as a result of poor teaching, which in turn results in lack of understanding of concepts among students (CRSME, 2015). Erinosho (2013) had asserted that the poor achievement of students in science subjects in recent time has not been impressive. The causes of this poor achievements is the teachers' method of teaching (Oladejo et al., 2011). One of the methods often adopted for teaching the topic by teachers of BASIC SCIENCE AND TECHNOLOGY is expository method. It is a method of teaching in the confines of the classroom using still pictures. Research has shown that students' retention in an expository-based science classroom could be weak. According to Aina and Keith (2015), an average student only retains what is learnt and forgets after a short while if he was not taken out to make observations for himself. Miles (2015) stressed that in expository method, teachers tell the students what to do instead of facilitating them to discover for themselves. This has contributed to poor achievement and retention in Basic Science and Technology as it does not arouse interest for the subject. It also creates difficulty for students understanding of concepts at the senior secondary level as a result of inadequate background at the JSS.

In another investigation of student in Basic science and Technology, Ekon et al. (2014) stated that students are not achieving up to expectation in Basic Science and Technology because of the use of inappropriate teaching method. Ezeano (2012) had reported that the poor achievement of students in Basic Science and Technology in external examination is caused by inappropriate teaching method. Furthermore, Oni (2014) stated that, students' poor achievement at the secondary school sciences (Biology, Chemistry and Physics) is as a result of improper grooming for SSS Science at the upper basic level of education. Ekong (2019) noted that most teachers tend to prefer the expository method of teaching because it is time saving, inexpensive and a lot of materials can be covered within a short period of time. The disadvantage of this method according to the scholars is that it leads to rote memorization and regurgitation of facts without much understanding of the concepts involved. The expository method uses mainly still pictures.

Still pictures are photographic representations of people, places and things. The still pictures commonly used in instruction are photographs, illustrations from textbooks, periodicals, catalogs and study prints. The category of still pictures encompasses a great variety of non-projected visual materials such as flat pictures, charts, drawings, maps, sketches and graphs. Still pictures could show realities in the classroom. Still pictures can also be used to clarify ideas, correct wrong impressions, provoke discussions and raise questions. In preparing to use pictures in the teaching learning processes, the teacher should pay attention to several considerations, such as clarity, interesting and big enough to show details. Still pictures have advantages such as: translating abstract ideas into a more realistic format. They allow instruction to move from the level of verbal symbols to more concrete level. They are readily available in books (textbooks), magazines, newspapers, catalogs and calendars. Moreso, still pictures are easy to use since they do not require any equipment. Unfortunately, still pictures have limitations.

As a medium of teaching in the learning process, still pictures have some disadvantages. These include:

Emphasis on only eye perception

Size: some photographs are simply too small for use before a group or class.

The two-dimensional nature

Inability to show motion.

Field trip method of teaching refers to a study trip taken outside the classroom to obtain direct experience of a natural environment. The trips are taken to areas that are unique and cannot be duplicated in the classrooms. Field trip offers opportunity for students to get firsthand information (Instructional strategies online, 2013). Field trip is planned for learners to experience theory in practice.

Using field trip method of teaching enhances teacher-student interaction outside the classroom. These interactions take place in new learning environment and result in a meaningful teaching and learning process. This method of teaching brings about an effective learning of concepts such as environmental hazards components in the Basic science and Technology curriculum. Although, the disadvantages of this method such as being cost effective, time effective and exposing students to hazards cannot be ruled out. Although field trip is a viable method of teaching but, unfortunately teachers hardly apply it.

Statement of the Problem

Many teachers in the Junior Secondary Schools are not paying adequate attention to the teaching of the "environmental hazards" component of the Basic Science and Technology (BASIC SCIENCE AND TECHNOLOGY) curriculum. The effect of this omission on students' achievement is that they (students) graduate from school without adequate knowledge of deforestation, soil erosion, flooding, ozone layer depletion, high farm yields among others. This students' inability to learn environmental hazards from school is further compounded with the fact that there is dearth of specialist teachers for Basic Science and Technology in schools, resulting in the deployment of teachers of physics, chemistry,

biology, geography etc. to teach Basic Science and Technology. The method of teaching used by the teacher is often not adequate. Most of the time the teachers lacked appropriate method of teaching environmental hazards such as field trip. The teachers mostly teach environmental hazards within the four corners of a classroom, the resultant effect of which is poor achievement in this aspect of the curriculum.

Purpose of the Study

The main purpose of this study is to investigate the effects of teaching environmental hazards components of Basic science and Technology using field trip method on students' achievement and retention in schools in the area of study. Specifically, the study:

i. investigated the students' academic achievement when taught environmental hazards using field trip and expository method.
ii. determined the achievement mean scores of male and female students when taught using field trip and expository methods.
iii. compared the academic achievement of high, average and low ability level students taught environmental hazards using field trip method.

Significance of the Study

The findings of this study will be relevant to students as the use of field trip method will expose students to reality of the concept taught and promote their interest in environmental hazards components of basic science, students will also retain more knowledge during field trip activities, thereby improving their achievement and retention.

Teachers will through the findings of this study see the need to adopt an innovative instructional strategy such as field trip in teaching Basic Science concepts to motivate and encourage students' active participation is learning process. The school administration will gain from the study through proper engagement of students in practical exercises during field trip and promote discipline and acquisition of knowledge in students through engagement of students in activities.

The government through the finding of this study will see the need to adopt field trip method in teaching all concepts basic science and other specialized science subjects. Parents/guidance will gain from the knowledge acquired by their children from field trip.

The empirical evidence provided by this study will help bridge any existing gap in the literature on the effects of field trip on students' academic achievement and retention in Basic Science and Technology and other science subjects.

Research Questions

This study was guided by the following research questions.

i. What is the academic achievements mean scores of students taught environmental hazards using field trip and those taught with expository method?
ii. What is the achievement mean scores of male and female students taught environmental hazards components using field trip?
iii. What is the achievement mean scores of high, average and low ability level students taught environmental hazards using field trip method?

Research Hypotheses

The following hypotheses were formulated to guide the study.

i. There is no significant difference ($p \leq .05$) between the mean achievement scores of students taught environmental hazards using field trip and expository method.
ii. There is no significant difference ($p \leq .05$) between the mean achievement scores of male and female students taught components of environmental hazards using field trip.
iii. There is no significant difference ($p \leq .05$) among the mean achievement scores of high, average and low ability level students taught environmental hazards using field trip method.

Research Method

A quasi-experimental design was employed in this study, using a non-randomized pre-test post-test control group because intact classes was used throughout the investigation.

The population size of this study is 3,546. This is consisted all of JSS 2 students in the 21 co-educational public secondary schools in Yala Local Government Area in the 2019/2020 academic session.

The sample size of the study was 100. These students were drawn from two (2) intact classes from two co-educational public secondary schools. Simple random sampling technique was used in selecting the two schools from the existing twenty-one (21) co-educational public secondary schools. The two randomly selected schools were similarly randomly assigned to experimental and control groups respectively by balloting.

A researcher-made instrument titled: Basic Science and Technology Achievement Test (BSTAT) was used for data collection. BSTAT was designed to measure the student's achievement in environmental hazards. It contained 20 multiple choice items. The items covered bush burning, flooding, soil erosion, desertification, deforestation and ozone layer depletion. The BSTAT was used for pre-test, post-test and retention test (though reshuffled each time). After each measurement, the items were re-shuffled.

The face and content validity were specifically used to ascertain the validity of the instrument.

To ascertain the reliability of the Basic Science and Technology Achievement Test (BSTAT), it was subjected to a test-retest reliability method at one week interval. The BSTAT was administered twice on thirty (30) Upper Basic two students in a school not selected for the study but part of the population.
The results of the two administrations were correlated using Pearson Product Moment Correlation (PPMC) and the reliability coefficient was realized, r = 0.78 (internal consistency.

Method of Data Collection
Preliminary Protocol
The researcher visited the two schools that were sampled for the study and obtained permission from the school authorities to use their schools for the study.
In other to determine the individual differences in aspects of knowledge of environmental hazards, the pretest was administered to all students in the study and results were used as covariant measures.
Treatment of Experimental Group
The researcher used the lesson package prepared for the experimental group to teach the components of environmental hazards with the students using the field trip method. The students were facilitated on the different components of environmental hazards such as soil erosion, flooding, bush burning, desertification, deforestation and ozone layer depletion. There the researcher only acted as a facilitator in each of the components of environmental hazards. The teaching of the concept lasted for five (5) weeks (including the 2 weeks gap for retention test).
The students were taken out on field trips six times (twice a week) by the researcher. On each trip, the students observed the various aspects of environmental hazards, discussed their possible causes and effects and suggested the preventive measures. The Basic Science and Technology teacher accompanied the students to the various sites for security reasons.
Treatment of Control Group.
The students in the control group were taught the components of environmental hazards by the researcher using expository method. Pictures showing the various concepts were brought for students to see. The teaching of the concept lasted for three (3) weeks.
Post Treatment Protocol
After the treatment protocol which lasted 3 weeks, posttest was immediately administered. Furthermore, a period of two weeks break was observed and the retention test was administered to both groups. The retention test scripts were collected and scored.
Method of Data Analysis
The data obtained from the study were analyzed using mean, standard deviation and anlaysis of covariance (ANCOVA). Mean and standard deviation were used to answer the research questions while Analysis of covariance (ANCOVA) was used to test the research hypotheses at 0.05 level of significance.

Results
Research Question One
What is the academic achievement mean scores of students taught environmental hazards using field trip and expository methods? Table 4.1 is used to answer the research question.
Table 1: Mean and Standard Deviation of Students' Achievement Scores by Method by Groups

Method	N	X	SD	Difference between groups
Field trip	50	5.002	428	0.822
Expository	50	14.180a	.410	

a. covariates appearing in the model are evaluated at pretest scores of mean 4.63.
In Table 1, the mean score for students taught environmental hazards using field trip was 15.002, while those taught using expository method was 14.180. This shows that those taught using field trip achieved higher than those taught using expository method with a mean difference of 0.822. However, the standard deviations for students in the field trip and expository are 0.428 and 0.410 respectively. The two groups of students are equally homogeneous, by the closeness of the two values.
Research Question Two
What is the achievement mean scores of male and female students taught environmental hazards using field trip? Table 4.2 is used to answer the research question.

Table 2: Mean and Standard Deviation of Students' Achievement Scores by Gender among Experimental Groups

Gender	N	X	SD	Difference between group
Male	26	14.831	.411	0.480
Female	24	14.351	.435	

a. covariates appearing in the model are evaluated at pretest scores of mean 4.63.
Table 2 indicates that the male students taught environmental hazards using field trip has a mean score of 14.831 as against the females with a mean score of 14.351. The difference between the mean scores is 0.48. This implies that the male students achieved higher than the female students using the field trip method. Also both males and females are homogenous with the standard deviations of .411 and .435 respectively. The standard deviations are close, as against being spaced.
Research Question Three

What is the achievement mean scores of high, average and low ability level students taught environmental hazards using field trip method?

Table 3: Mean and Standard Deviation of Students' Achievement Scores by Ability Levels in the Experimental Group

Ability level	N	X	SD	Differences between groups		
				A-B	A-C	B-C
A.High	14	15.264	.557			
B.Average	19	14.263	.507	1.001	1.019	0.018
C.Low	17	14.245	.485			

* covariates appearing in the model are evaluated at pretest scores of mean 4.63.

There is no significant difference ($p \leq .05$) between the mean achievement scores of students taught environmental hazards using field trip and expository methods. Table 4.7 is used to test this hypothesis.

Table 3 shows that the mean score of 14 high level ability student is 15.264 with a standard deviation of .557. On the other hand, the mean score of 19 average ability level students is 14.263 with a standard deviation of .507. Furthermore, the mean score of 17 low ability level students is 14.245 with a standard deviation of .485. In other words, the differences among means of students' ability levels are A-B is 1.001, A-C is 1.09 and B-C is 0.018.

Hypothesis One:

There is no significant difference ($p \leq .05$) between the mean achievement scores of students taught environmental hazards using field trip and expository methods.

The calculated F-value for method of teaching is 1.920 while the corresponding p-value is 1.69. With this result, the method of teaching is not significant (p.05). The null hypothesis could not be rejected. This implies that there is no significant difference between the achievement score of students taught environmental hazards using field trip and expository method. This result is a surprise thought, but that is the result.

Hypothesis Two:

There is no significant difference ($p \leq .05$) between the mean achievement scores of male and female students taught components of environmental hazards using field trip.

On gender, the computed F-value is .630 with a corresponding p-value of .429. Gender is therefore not significant (p.05). The null hypothesis could not be rejected. It therefore implies that there is no significant difference between the mean achievement score of male and female students taught components of environmental hazards using field trip.

Hypothesis Three:

There is no significant difference ($p \leq .05$) among the mean scores of high, average and low ability level students taught environmental hazards using field trip. Table 4.7 shows that the computed F-value for 1.195 with a corresponding P-value of .308. The null hypothesis could not be rejected (p.05). Therefore, there is no significant difference among the mean achievement score of high, average and low ability level students taught environmental hazards using field trip. This however, did not cover two or three way interaction effects.

Findings

The summary of the findings of this study from Tables 1 to 3 is as follows:

1. There is no significant difference between the achievement scores of students taught environmental hazards using field trip and expository methods
2. There is no significant difference between the achievement scores of male and female students taught environmental hazards using field trip
3. There is no significant difference among the achievement scores of high, average and low ability level students taught environmental hazards using field trip.

Discussion of Findings

This discussion is organized according to the order of the research questions based on the hypotheses formulated.

1. Effect of Method of Teaching on Students' Achievement by Method Groups

The findings of this study revealed that there is no significant difference between the achievement scores of students taught environmental hazards using field trip and expository methods. This is surprising though. It may be explained by the fact that the charts used for the expository group was good enough to give accurate representation of soil erosion, flooding, deforestation etc. This finding is in line with Eze and Asogwa (2016) who reported that student taught with field trip had slightly lower scores in the achievement test than those with video instruction. However, the finding of this study disagree with Ukor and Abdulbajar (2019), Aromosole and Filgona (2016) and Zumyil (2019). These studies revealed that students taught using field trip method achieved significantly higher than those taught using the conventional teaching method.

2. Effect of Field Trip Method of Teaching on Students' Achievement by Gender

The result of this study showed that there is no significant difference between the achievement scores of male and female students taught environmental hazards using field trip. This is in line with the findings of Dania (2014), Attah and Ita (2017), and Adigum et al. (2015).

3. Effect of Field Trip Method of Teaching on Students' Achievement by Ability Level

The result of the third null hypothesis shows that there is no significant difference between the achievement scores of high, average and low ability level of students taught environmental hazards using field trip. The field trip has enable the initial gaps between levels had been filled. This finding is in line with Ezeugwu et al. (2016) who reported not statistically difference in the achievement mean score of high, average and low ability.

However the study disagrees with Achor and Ejeh (2014) and Unodiaku (2013) who reported that there was a significant difference in the mean gains in cognitive and achievement scores among low, average and high cognitive ability study exposed to cognitive acceleration training programe.

Conclusion

This study has indicated that there is no significant difference between the mean achievements scores of learners taught with the two methods studied. It is a surprising result. One would have expected that the field method will bring about a difference. However, the results showed that there was a significant difference between the mean retention scores of those who were taught with the field trip and the expository methods. We therefore conclude that the field trip method is better on the long run thereby helping learners to retain knowledge for very much longer time.

Furthermore, the field trip method did not have effect on gender. Finally the study showed that the initial gaps observed between achievement of students of high, average and low ability levels were bridged. This bridging of gaps can only be attributed to the effect of the field trip method.

5.4 Recommendations

Based on the findings of the study, the following recommendations were made.

Teachers of Basic Science and Technology should use field trip method to teach environmental hazards component of the subject curriculum.

Parents and teachers should encourage both male and female students towards excellence in Science since gender is not a significant determinant of students' achievement and retention in Basic Science and Technology.

The Federal Government should in collaboration with the ministry of education include educational field trip as a method for teaching environmental hazards in Basic Science and Technology Curriculum for Junior Secondary Schools..

Seminars, workshops, and conferences should be organized more frequently for Basic Science and Technology teachers to update their knowledge of various methods of teaching, including field trip method.

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