EFFECT OF FIELD- STUDY ON RETENTION AND PERFORMANCE IN INTERPRETATION OF TOPOGRAPHIC MAP FEATURES AMONG SENIOR SECONDARY SCHOOL STUDENTS, BENUE STATE, NIGERIA

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BEING A DISSERTATION TO BE SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES AHMADU BELLO UNIVERSITY, ZARIA. IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER'S DEGREE IN SCIENCE EDUCATION

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DECLARATION

I declare that, this dissertation entitled **"Effect of Field-Study on Retention and Performance in Interpretation of Topographic Map Features Among Senior Secondary school students, Benue State, Nigeria"** has been carried out by me in the Department of Science Education, Faculty of Education, Ahmadu Bello University Zaria. The information derived from literature has been duly acknowledged in the text and the list of references provided. No part of this thesis was previously presented for another Degree or Diploma at any University.

CERTIFICATION

This dissertation titled "Effect of Field-study on Retention and Performance in Interpretation of Topographic Map features among Secondary School Students in Gwer-East Educational Zone, Benue State, Nigeria" by Oraduen Vincent IGBASHAR meets the regulation governing the award of masters Degree in Science Education Ahmadu Bello University, Zaria and its approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to my parents: Mr. Emmanuel Igbashar Atongo and Mrs. Cecelia Igbashar Atongo and my wife Mrs. Millicent Vincent Igbashar Atongo for their financial support to me throughout the period of this research work.

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LIST OF ABBREVIATIONS

WAEC: - West African Examinations Council

NECO - National Examination Council

SSCE - Senior School Certificate Examination

TMRPT - Topographic map reading performance test

STAN - Science Teachers Association Nigeria

UNESCO - United Nation for Education, Science and Culture

FME - Federal Ministry of Education

NERDC - Nigerian Educational Research and Development Council

ANCOVA - Analysis of Covariance

OPERATIONAL DEFINITION OF TERMS

Field-Study: Field-study is learning experience outside of the classroom or learning exercise undertaken by teachers and students in certain aspects of a subject, to give students the opportunity to acquiretheir own (primary) data, provide opportunities to extend classroom learning through direct observation and experience, and allow for scientific research through field experiments.

Academic Performance: Scores that students obtained after been subjected to tests or examinations at the end of a program or instruction.

Retention: The ability to store information in the brain for a period of time after agiven instruction.

Topographic Maps Are detailed graphic representation of features that appear on the earth surface such as Cultural, Hydrograph, and vegetation.

Topographic Maps Interpretation: simply means the use of topographic maps to extract information about the landscape, both physical and cultural features that appear on the earth surface.

Reconnaissance Survey: is an examination or survey to the general characteristics of a geographical region.

ABSTRACT

This study was carried out to investigate the effect of Field-study teaching strategy on retention and academic performance in interpretation of topographic map features among senior secondary school students, Benue State, Nigeria. Quasi-experimental research design, which utilized pretest, posttest and post-post test, was adopted. The population of the study consisted of 2,511 SS11 students from 15 public schools in Gwer- East, Benue State. Two out of 15 schools were randomly selected as a sample. one hundred and sixteen (116) senior secondary SS11 Geography students (70 males and 46 females) were selected each from the two (2) schools chosen as sample for the study. Two intact classes were selected for the study. Pretest was administered on the subjects, to determine that they are not different significantly in their ability level. The experimental group was taught using Field-study teaching strategy while the control group was taught using lecture method. The posttest was given to determine the effects of exposure to field-study teaching strategy which was for experimental. The Post-posttest was administered after two weeks from the administration of the posttest in order to determine the retention ability of the subjects in the study. Instrument used for data collection for the study was Topographical Map Reading Performance Test (TMRPT) with reliability r=0.78. Four objectives and four research questions were raised with corresponding hypotheses. One of the hypotheses include: There is no significant difference in the mean performance scores of students taught interpretation of topographic map features using field-study and those taught using lecture method. Research questions were answered descriptively using means and standard deviation and the hypotheses were tested at 0.05 level of significance. t-test statistical tool was used in analyzing the data collected. Major findings of the study revealed that interpretation of topographic map concept favored Field-study teaching strategy. The study further confirmed that field-study teaching strategy enhanced retention and academic performance of students and it is gender friendly. From the results of analysis discussed, recommendations were made one of which was that there is need for teaching and learning strategies involving student's participation such as Field-study teaching strategy which enhanced performance and retention of students in interpretation of topographic map features in geography.

CHAPTER ONE

THE PROBLEM

1.1 Introduction

Geography is an academic subject taught in senior secondary schools and tertiary institution in Nigeria. It is the study of natural features and phenomena on the earth's surface and in the atmosphere. It also focuses on locations, space relations, and changes of physical phenomena on the earth's surface. (Abdulkarim & Aderogba, 2011), stated that Geography is geared towards teaching the interrelationship among phenomenon on the earth surface and those in the atmosphere. The objectives of teaching geography in our Educational institutions were spelt out by National policy on Education of the Federal Republic of Nigeria (FRN, 2013). These objectives have been thought of in terms of what geography can contribute to the realization of the aims of education in Nigeria and include;

i. Giving students a sound knowledge of their immediate environment.
ii. Inculcate students' useful skills and outlook that will enable them to make useful contribution to their community and Nation at large.
iii. Develop in students critical thinking ability, accuracy, and objective for proper and logical investigation among others.

Interpretation of topographic map feature is fundamental in the study of geography. The ability of one to interpret a map intelligently is the basis of all geographical studies (Tanser, 2014; Schee, Dijk & Westrhennen, 2015). According to Underwood (2013) the geographers' main tool is the map. Monkhouse and Wilkinson (2012) in support of this view stated that the map is the traditional medium of the geographer. Strong emphasis has thus been placed on interpretation of topographic map features in geography education at the senior secondary school level. For instance, the map-reading section that has to do with interpretation of topographic map features is compulsory for many examination bodies such as the West African Examinations Council (WAEC); National Examinations council

(NECO); University of London General Certificate of Education. This suggests the degree of importance attached to interpretation of topographic map features in achieving the objectives of geography education.

Findings in the literature reviewed reinforce and justify the emphasis placed on interpretation of topographic map features in geography education. According to Ajaebu(2013) and Ayeni (2015), interpretation of topographic map features provides a strong and effective base to enable students develop special geographical skills and techniques. Ajaegbu (2013) stated that modern geography demands the acquisition of greater skills and techniques by geographers, such include the following: field techniques; skills of map-interpretation; air-photo-interpretation; use and construction of graphs; matrices; statistical and mathematical analysis techniques; observational techniques; Literacy expression techniques; remote sensing; basic communication skills. According to Okafor (2016) the emphasis on interpretation of topographic map features is in order because topographic map provide the essential spatial language in which many geographical problems are discussed, conclusions reached and recommendations made. Ayeni (2015) confirmed that geography does not just focus on abstract development of knowledge, but rather on identification of societal problems and articulations of viable solutions to them.

According to Abumere (2016), interpretation of topographic map features skills are highly useful in the study of specific environmental problems of a given areas (Abumere, 2016). The state of man's environment and the implications on man's sustained existence have been major concern of nations (UNESCO, 2012 &Moemeke, 2013). Topographic maps show lots of information (Wilkinson, 2012 &Monkhouse, 2014). They offer the possibility of both finding locations, spatial distributions and aerial differentiations. All these are important in achieving insight into reality and are areas of focus in geography education.

Interpretation of topographic map features is, therefore, indispensable in geography education.

Despite the significance of interpretation of topographic map features in geography studies show that interpretation of topographic map features is the most difficult section of geography for students (Obi, Nweke, Oguamanam & Okonkwo, 2013; Yau-wong & Simma, 2014; Akuma, 2015; Burke, 2016; Adetumberu, 2016). It has also been found that many students fear geography because of interpretation of topographic map features. Oyeieke(2014) in his study of Oranmiyan Local Government Area of Oyo State reported that 62% of senior secondary school students he studied, feared Geography because of interpretation of topographic map features. The "WAEC" Chief Examiners' and Moderators' reports (WAEC, 2010) revealed that the candidates would have performed better had it not been for the poor performance in the interpretation of topographic map features section of the subject. The reports stated that in spite of good performance of some candidates, they scored low marks because they were poor in map interpretation.

Some studies such as (Ezeudu, 2013, Okpala, 2015; Obi, 2015), have identify poor instructional methodology as a major reason why students fined interpretation of topographic map features difficult. The poor instructional methodology appears to be associated with the conventional lecture method of learning. In a survey of teachers' methods of teaching Interpretation of topographic map features in Nigeria secondary schools, Arowosegbe, (2015) reported that the method of teaching predominately use for teaching interpretation of topographic map features in the lesson they observed was lecture and note or text book dictation. The conventional lecture method of teaching has its advantages and disadvantages. However, it appears that the persistent poor academic performance and retention in interpretation of topographic map features can be associated with the use of lecture method of teaching. Many studies like Usman (2001) and

Bichi(2002) have criticized the monotonous use of the conventional method of teaching. On the other hand, some studies like (Adebola, Elefue, Shodipo, & Danbaba, 2015), recommended the use of conventional lecture method for teaching topics in geography that as to do with topographic maps because of the nature of most of the topics. There is thus a need to investigate and confirm the effectiveness of other methods of teaching such as Field-Study on academic performance and retention of students in map-reading.

Achino (2016) define academic performance as the level of individuals' growth in a test when compared with the scores of others of the same level. Saka, Sam and Yusuf (2014) define academic performance as what is measured regarding skills or knowledge develop through specific instruction or training with emphasis on how well instructional objectives have been attained. Decco & Crawford (2013) submitted that academic performance is the process of measuring students auxiliary and terminal performance during and at the end of instruction.

The persistent failure in interpretation of topographic map features in geography as been attributed to many factors, such as poor teaching method which involve lecture method that lays emphasis on memory and vastness of geography syllabus. According to WAEC Chief Examiner's Reports over the years (2014-2019), most students shy away from answering questions on topographic map reading. The reason could be due to the abstract nature of the map concept.

The lecture (talk-chalk), is a method that involve the teacher centered method of dissemination knowledge where ideals, concepts, generalization and facts are presented to the students who are mainly passive hearers. The students on their own part are expected to memorized the fact and principles presented to them whether they understood or not and even produce verbatim during examination. James, (2014) further stated that the term lecture method of teaching is used to described teaching in which large part or possible the

whole of the lesson is occupied by the teacher in exposition and by the students by listening or making note.

Field study, which may also be termed as instructional study, or school journey, is define by Krepel and Durral (2016) to be a school or class study with an educational intent, in which students interact with the setting, displays, and exhibits to gain experiential connection to the ideals, concepts, and subject matter. Tal and Morag (2016) described field study as students' experiences outside of the classroom at interactive locations designed for educational purposes. Field study allow students to gather their own (primary) data, provide opportunities to extend classroom learning through field experiments

According to Obeka (2010) field study is an outdoor activity or field work or learning experience undertaken by teachers and students in certain aspects of a subject, to give students the opportunity to acquire knowledge of the real world in which life exist. In addition, Aliyu (2015) observes that field study is taking students out the classroom to places where they can see concrete illustration of classroom theories. Field study takes students to locations that are unique and cannot be duplicated in the classroom. Each student observes natural settings and creates personally relevant meaning to the experience. Interactive exhibits help students play with concepts, activities often not possible in the classroom. Earlier course content suddenly becomes relevant as students assimilate and accommodate new understanding and cognition (Lei, 2010). The connection between the field study venue and the classroom links field study's experiential learning with prior experiences and learning from the classroom.

Retention in this study is the ability to remember a task, or material learnt concepts. Bichi (2012) defines retention as the ability to retain and recall information or knowledge gained after learning. Other researchers such as Mangal (2010) and Obeka (2010) investigated and define several variables that affected retention. Factors affecting retention include the

content or task to be performed, learners past experience, the interval between lesson and evaluation and instructional strategies employed. Retention takes place when learning is coded into memory; thus materials are related to the quality of the retention in their meaningfulness, familiarity, concreteness and image evolving characteristics.

The academic performance of males and females in science, technology, and mathematics has been perceived differently, where males are rated higher than females (Bello, 2012). Researchers in science education such as Bichi (2012), Linver, Davis-kean and Eccles (2013), have expressed concerned on gender related issues with the view to improving science teaching and learning.

Jimoh (2013) reported that the position of females in science, mathematics and vocational education is below average when compared to males. Fanstosterling (2014) opined that the differences is in socialization and not biological. Ibe (2015) believed that gender discrimination in science in Nigeria is the practice of the day, because people always think that science is only for males while languages are for females. Habeeb (2015) also believed that quite a number of factors are responsible for the low achievement of females in sciences. Oluwatoyin (2016) observed that women perform better when they are exposed to science. The finding of Adams, (2016), reported no significant difference between maleand female achievement in science, but Ifamuyiwa (2017) stressed females are intellectually incapable of competing in science and mathematics and difficult task with the males. Some parents discourage their girls from science and technological careers saying that they are abnormal and may not be capable of managing marital home. The girls themselves feel discourage by the attitude of teacher and parents and often suffer from self esteem. (Ogwuazor, 2015), in his research findings have shown that female students have less positive attitude to mathematics than the males and also demonstrated less superiority at secondary school level. This probably ought to be the result of stereo typing of tasks that

takes place with more attention given to the training of and education of males in science area.

This study will therefore, investigate the effect of field study on retention and performance in interpretation of topographic map features among senior secondary school students, in Benue State.

1.1.1 Theoretical Framework

Field-study Teaching Strategy was embedded in inductivism learning theories which emphasized the active role of learner in the learning process. This active role allows learners to interact with one another and construct their own knowledge. Inductivism was very paramount theory in research, teaching and learning of education that allows individual to construct their own knowledge. Inductivism learning theory has an important place in Geography. Inductivism was a theory of knowledge that argues that human beings generate knowledge and meaning from an interaction between their experiences and ideals. It has influence a number of disciplines, including psychology, sociology, education and history of science. Inductivism was a kind of learning strategy that laid emphasis on active role of learners in the process of constructing their own knowledge. Field-study Teaching strategy has overwhelming theoretical supports which justify its wide prevalence and acceptance in different subject areas. Modern theories of learning emphasize the important role played by the learners in the learning process. One of such theories was inductivism theory proposed by Bacon (1972). Inductivism is a learning theory founded on the idea that students construct knowledge in the process of learning through interaction with the phenomenon, as they develop shared-meaning of the phenomenon within social context. According to constructivism Novak (1997) learning is an active process in which learners are active sense-makers who seek to build coherent and organized knowledge. Learning become meaningful only after the few materials are well connected with existing related

knowledge or schema. Inductivism as a theory of scientific knowledge placed emphasis on the role of observation and experience as a secure basis from which scientific knowledge was derived. The process was consider to begin with observation of natural phenomena using senses which lead to the formation of relevant observation statements from which universal statement were derived by inductive reasoning. This type of reasoning began form scientific to generalization. Bacon created methods, like the scientific method, because he believed in a research based learning system. His revolutionary ideas being that students need to learn dynamically rather than scholastically.

Therefore, this study is hinged on the theory of inductivism which placed emphasis on the role of observation and experience as a secure basis from which scientific knowledge can be derived.

1.2 Statement to the Problem

The acquisition and interpretation of Topographic map features skills is fundamental in the undertaking of all geographical studies. However, several reports indicated that students perform poorly in interpretation of topographic map features in geography examination (Aderogba 2010, WAEC examiners report, 2013). The persistent failure in interpretation of topographic map features in geography has been attributed to many factors, such as poor teaching method which involve over emphasis on memory and vastness of geography syllabus, a need therefore, arose to seek ways of making the teaching and learning of interpretation of topographic map features in geography more effective in order to enhance students' performance and retention as well as gender in topographic map features in geography. The mastery of the world interpretation of topographic map features as a topic in senior secondary school geography syllabus requires a thorough knowledge and understanding of topographic map concept Okafor (2016).

According to WAEC Chief Examiner's Reports over the years (2014-2019), most students shy away from answering questions on topographic map-reading. The reason could be due to the abstract nature of the map work concept. (Abdulkarim, 2010;Aerogba, 2012; Aminu 2014) also observed that as a result, students find it difficult to understand some of the geographical concepts that are abstract in nature: interpretation of topo-features, contours representation, map scales, relating relief to settlement. The West African Examination Council (WAEC) Zonal Coordinator reported that 57% of candidates that sat for West African Senior Secondary School Examination (WASSCE) in the year 2014-2019 failed geography. According to Chief Examiner's Report (2019), WAEC has been recording mass failure for the past six years. Results showed that about 60-75 percent of the candidates who sat for the examination failed to get credit passes in five subjects including Geography. This failure in Geography is clearly seen in table 1.

Table 1: **WAEC (SSCE) Examination Result for Geography Students from 2014-2019**

Years	Total	Total No. of Students with Credits	% Credit	Total no. of Students with Pass	% Pass	Total no. of Students with Fail	% fail
2014	1,357,275	338504	24.94	306446	30.08	712325	69.20
2015	1,476,138	575399	38.98	188975	20.98	711764	79.02
2016	1,597,421	619959	38.81	393722	40.28	583740	59.72
2017	1,619,362	592201	36.57	160956	15.67	866205	84.33
2018	1,628,146	509284	31.28	514677	46.00	604185	54.00
2019	1,632,215	578294	35.43	208676	19.80	845245	80.20

Source: West African Examinations Council Annual Report (2019)

The use of field-study as an instructional strategy is particularly helpful when presenting highly abstract or dynamic processes particularly in geography, because field-study which is learning experience outside the classroom gives students the opportunity to acquire their own (primary) data, through direct observation of natural phenomenon in the environment and experience.Rieber (2017) posited that field-study assist students to understand abstract and invisible processes and can improve students' learning performance and retention. Interpretation of topographic map features is a concept that students find problem

assimilating particularly due to its nature of abstract and numerous confusing letters. This study therefore, investigated the effect of field study on retention and academic performance of students in the teaching and learning of interpretation of topographic map features.

1.3 Objectives of the Study

The study was guided by the following objectives, to:

i. examine the effect of Field-study on performance of students taught interpretation of topographic map features, and those taught same concept using lecture method.

ii. determine the effect of Field- study on the retention ability of students taught interpretation of topographic map features, and those taught same concept using lecture method.

iii. compare the academic performance of male and female students taught interpretation oftopographic map features using Field-study, and those taught using lecture method.

iv. compare the retention ability of male and female students taught interpretation oftopographic map features using Field-study, and those taught using lecture method.

1.4 ResearchQuestions

The following research questions were formulated to achieve the stated objectives

i. What is the mean difference between the academic performance scores of students taught interpretation of topographic map features using Field-study and those taught same concept using Lecture Method?.

ii. What is the mean difference between the retention ability of students taught interpretation of topographic map features using Field-study and those taught same concept using Lecture Method?.

iii. What are the differences between academic performance of male and female students taught interpretation of topographic map features using Field-study and Lecture Method?.

iv. What are the differences between retention ability of male and female students taught interpretation of topographic map features using Field-study and Lecture Method?.

1.5 Null Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance [$p<0.05$]:

$H0_1$: There is no significant difference between the mean academic performance scores of students taught interpretation of topographic map features using Field- study with those taught same concepts using lecture method.

$H0_2$: There is no significant difference betweenthe retention ability of geography students taught interpretation of topographic map features using Field- study method with those taught using lecture method.

$H0_3$: There is no significant difference between the mean scores of male and female geography students taught interpretation of topographic map features using Field-study with those taught same concepts using Lecture Method.

H4: There is no significant difference between the mean in the retention ability of male and female geography students taught interpretation of topographic map features using Field-study with those taught same concepts using Lecture Method

1.6 Significance of the Study

The finding of this study would hopefully be useful to the following:

Geography Students. It is hoped that the finding of this study would build a proper link between students' performance in interpretation of topographic map features and the quality needed for teachers' effectiveness in handling the subject across the state**.**

Science Teachers:would benefit from the study by adopting the strategy used in teaching interpretation of topographic map features, this may make the lesson interesting to the students.

Fellow researchers: may use the outcome of the study to replicate it in other study areas, improve on it or adapt it for similar studies and also add information to the existing literature. It will hopefully extend the frontiers of learning for further researcher on the teaching and learning of interpretation of topographic map features in geography at the senior secondary schools.

Curriculum Planners: may see the positive outcome of the study as enough evidence to boost their attention towards solid recommendation and enforcement of using field-study instructional strategy for full usage in the whole institution of learning.

Text Book Publishers and Media Outlets:(print and electronic)could design activities that involve the use of field-study teaching strategy to aid meaningful learning among students after seeing the outcome of the study.

The Association of Nigerian Geographers (ANG): will hopefully use this teaching strategies to teach geography in schools, workshops, seminars and conferences.

The findings will also serve as a fountain of knowledge on the existing literature

1.7 Scope of the Study

This study is delimited to Senior Secondary Schools (SSS) students in Gwer-East Education Zone, Benue state, Nigeria. The study area coveredGwer-East Local

Government Area in Benue state. Two (2) schools in the study area were the sample subjects and from different background, they also cut across gender. These schools include GSSTaraku, and GSSAliade. SS 2 students offering geography as a subject were used. This is because the concept of interpretation of topographic map features is part of their syllabus, and they were considered matured and stable for this research exercise since they can assume roles associated with field-study instructional strategy and can easily relate and interpret topographic map features using field-study strategy. The experimental group were taken specifically to the following sites in Gwer-East Local Government Area, Mbachin district, Mbalav and Ijiriv basins. The main concept taught was Interpretation of Topographic Map Features (under the topics Contour representation, Highland relief features, Lowland relief features, and Relating relief to settlement) which is one of the major concepts in Map-Work in Senior Secondary (SS11) geography curriculum and the topic is more of field-study in which the students can see the relief features in the natural environment.

1.8 Basic Assumptions

The study has the following basic assumption:

i. The schools selected for the study are true representatives of all schools in Gwer-East Education Zone
ii. The selected topics in the interpretation of topographic map features are appropriate to the level of the subject used for the study.
iii. Senior secondary school geography students are aware of topographic map features before the study.
iv. Gender may not have any significant effect on academic performance of senior secondary school geography students.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This study examined the Effect of Field-Study on academic Retention and Performance in Interpretation of Topographic Map Features among senior secondary schools, Benue state, Nigeria. This chapter will review some literatures related to this study under the following subheadings:

2.2 Concept ofGeography as a school science

2.3 Students' performance in Geography

2.3.1 Science Teaching Methods

2.3.2 Lecture methods

2.3.3 Field Study Learning Experience

2.3.4 Types of Field-Study

2.4 Field Study Teaching Strategy

2.5 Field-study and Retention in Geography

2.6 Field-study and Gender in Geography

2.7 Overview of Similar Studies

2.8 Implications of Literature Reviewed on the Present Study

2.2 Geography as a Subject

Science is a core subject in the school curriculum and comprises science for primary, science for secondary, physics, biology, chemistry and additional science. The science curriculum is developed centrally. At the primary and lower secondary levels, science is a compulsory for all while at the upper secondary level, students either take core science or choose science electives. Science education, therefore, is aimed at developing potentials of individual in an overall and integrated manner so as to produce citizens who are

scientifically and technologically literate, competent in scientific skills, practice good moral values, capable of coping with the changes of scientific and technological advances and be able to manage nature with wisdom and responsibility for the betterment of mankind studies (Confrey, 2018).

Geography is an academic subject which focuses on the evolution and organization of earths features and processes, it also focuses on locations, relations, and changes of physical phenomena on the earth's surface (Ajayi, 2016, &Aderogba, 2012). Geographers focus on the interactions of people and social groups with their environment, planet Earth and with each other. In studying the concept of geography and environment, one is faced with three related field of study namely; the realm of nature (physical environment), the realm of Man (human environment), and man environment relationship were the handiwork of both agents are manifested (Obaka, 2010).

Geography is much more than a place, names and locations; it is the study of spatial variation, and how and why things differ from place to place on the surface of the earth. It is further the study of how observable pattern evolved through time (Getis, Getis, Bjelland, &Fellman, 2011). Geography therefore is about space and the content of that space. It is known as spatial science, that is, it is concerned with the spatial distributions of phenomena, with the spatial extents of regions, spatial behaviors of people, spatial relationship between places on the earth surfaces and the spatial process that those underline behaviors and relationships. It is the use of spatial data to identify spatial patterns and analyze spatial systems, spatial interactions, spatial diffusion and spatial variation from place to place (Getis et al, 2011). Geography alone has no unique claim to environmental competence; it's main concern nevertheless is the understanding of interrelationship between man and his environment. Geography in schools has been usually taught using the conventional lecture method. This therefore inform the need for a review of literature in the

subject area and other possible teaching strategies toward better academic in the future (Obeka, 2010).

According to Atere, (2016), the objectives of teaching geography was linked to what geography can contribute to the realization of the aims of secondary education in Nigeria. In line with the National Policy of Education (FGN, 2014) and the broad objectives of teaching geography, the WAEC as one of the examination bodies at secondary school level in Nigeria further clarifies these aims and objectives of teaching geography at secondary school level:

i. Understand the concepts of differential character and the spatial relationship of the surface features of the earth.
ii. Understanding the concept of man-environment relations (ie. to examine the life of man within his physical and cultural environment and to explain their interactions).
iii. iii Appreciate and develop a sense of responsibility towards one's own society and an intelligentinterest in the formulation of National goals policies, especially as they influence thedifferent resources and regions of the area.
iv. Develop sympathetic understanding of the people of other lands, based upon the recognition and that they may have different assemblies of resources, different goals and different problems from that of their home area.
v. To develop skills and techniques for accurate, orderly, objective Geographical investigation to be carried out both in the classroom and in the immediate environment.

The scope of geography globally was described as eclectic in nature. That is to say Geography is an interdisciplinary subject which branch out to other disciplines such as Biology- (Biogeography), Physics- (Geophysics), Medicine- (Medical Geography), Economics- (Economical Geography), Agricultural Science- (Agricultural Geography),

Computer Science- (Geography Information Science) among others. These characteristics of geography make it a unique subject of study according to Atere, (2016).

Geography is divided into two major subfields, human geography and physical geography. Human component of geography according to scholars Strahler, 2016, and Abdulkarim, 2010, focus on the socio-economic, population and settlement, patterns of locations. Physical geography examines patterns of the natural processes occurring at earth's surface that provides natural setting for human activities namely; the study of climate, landforms, coastal island and marine waters, vegetation, risks and hazard of soils. As a result of the study of physical environment, geographers have become sensitive to the varieties of forces affecting a place and the interactions among them. For instance, climatic forces or elements affecting and influencing weather and climate on the earth surface and how these go a long way to influence man's decisions in every aspect of life from his culture, shelter and even to what he eats.

In line with this, National Education Research and Development Centre (NERDC, 2010) categorized the scope of geography at senior secondary schools level into seven themes (Local Geography, The earth and the solar system, environment and its resources, regional geography of Nigeria, map reading and interpretation, economic and human geography and introductory geographic information system). In SS1 level, students were exposed to all the seven themes. However, the themes reduced to six at SS2 level and to five at SS3 level. The West African Examinations Council and National Examination Council (2013) detailed of Geography at secondary schools levels into physical, human, regional and practical geography to facilitates students' assessment.

The strength of Geography as a subject in Senior Secondary School lies in the background training and opportunity it can provide to students who want to pursue different types of professions. Boechim (2015) and Aderogba (2012) attested that geography provides trained

students with a wide range of career opportunities. Among these are careers in self-employment, professional establishment, paid employment in Government and industries and specialized professions. This study, therefore focuses on Topographic map concept of senior secondary school geography. The concept though, can be found at SS1, SS2 and SS3 level, however, SS2 level is used for this research.

2.3 Students' Performance in Geography

Performance of students in a particular subject or course is determine by short or long term goals acquired. Achievement in Geography goes to emphasized the effort or skill put in to acquire or achieve success in Geography as a science subject.

Most research findings in achievement in science are also applicable to Geography as a science subject. The teaching of Geography as a science subject requires laboratory strategy and different pedagogical methods that will enhance meaningful learning of the subject. A lot of factors militating against the teaching and learning of science in which Geography is included have been discussed. The factors range from instructional materials, teaching strategy, gender disparity, ignorance and attitude of teachers, provision of instructional materials, and student's behavior toward learning to facilities provided to mention but some of the factors. James (2014) opined that Geography stands out easy to teach and learn among other science subjects. This was due to the availability of materials and teaching aid that are available in open fields. According to James (2014) one major reason why Geography has an advantage over other science subjects is the fact that Geography could be taught and verify within the wall of the school environment or even the open field. It was also reported that a popular method of teaching Geography was to exposed students to practical field study, and observation of topographic features and other Geographic phenomena in the atmosphere and on the earth surface. This instructional strategy does not allow active participation of students and thus does not contribute to

scientific attitude of students. The field study method of teaching was advocated for students were they solve problems by themselves. The indiscrimination use of lecture method by science teachers which is attributed to teachers' academic level, contributes to seventy percent of the scientific information received by the pupil (Bichi, 2012).

There is much failure in WAEC result in recent times, for example, for the past four years 2010-2014, the WAEC result have been reported to be poor, 39% pass in 2013 according to the director of WAEC. Some of the factors for the failure mentioned were lack of adequate facilities and unqualified number of teachers unable to apply positive teaching strategies. Martin (1994) and Oyedokum (2010) as in the Bichi (2012) investigated the effect of lecture method and inquiry method and concluded that the lecture method was inferior to inquiry in term of enhancing student's achievement. James (2014) suggested, Geography station as a teaching strategy and could motivate students.

It is an indication from modern findings that indoor and outdoor facilities and improvisation of materials are mere proposals which have fully implemented. Recent research findings have shown that most teachers of science do not use instructional materials properly either as a result of ignorance or negative attitude of teachers towards improvisation and use of instructional materials. Olarinye (2013) pointed out that mere use of the materials do not guarantee effective communication or teaching but proper use of it, careful selection and skillful handling by the teacher render its usefulness in facilitating teaching and learning.

2.3.1 Science Teaching Methods

Knowledge of the nature of science can enable individual to make more informed decision with respect to scientifically based issues: promote students in depth understanding traditional subject matter and help them distinguish science from other ways of knowing.Science teaching generally and teaching Geography in particular cannot be

effectively done unless effective instructional methods are employed. There are various methods of teaching Geography, some of which are lecture method, demonstration, Field Study and laboratory methods among others. James (2000) viewed lecture method as one of the most popular method of instruction commonly used for science teaching. He described lecture method as that traditional approach which is referred to as didactic approach, and thus can defined as a teaching technique in which one person usually the teacher presents a spoken discourse on a particular subject. Lecture method of teaching emphasize "Talk and Chalk" in the teaching of science subjects. More than 80% of the scientific information and principles are delivered as lecture Usman (2000). Teachers embraced this method for easy coverage of school syllabus. It is characterized by one way flow of information from the teacher who is always active. to the students who are always passive. The method saves time and energy. It allows easy handling of large classes without much stress and is not expensive as only the chalkboard is required.

Lecture method is not effective for science teaching, James (2000) argued that lecture method does not promote meaningful learning of science, because difference in student's ability is not consider and it cannot satisfy the individual learning modes. Students easily become restless and disruptive since their attention span is very limited, the researchers added.

Demonstration is another method in science teaching which Anaso (2015) simply described as "to display something". This approach involves showing a particular procedure or skill to the learners who after careful teaching and learning and interaction repeat and practice the same process shown to them. Demonstration method can be used when the available resource, equipment cannot go around for all the students in the class. The teacher or some groups of students usually carry it out. The method is less costly in term of materials and it can be use to teach certain techniques or skills, theory and practice. It allows teachers to

handle activities that could be harmful to students if carried out by them. However, demonstration does not allow students to develop their skills or manipulate and therefore do not satisfy their entire psychomotor domain. Students always have problems in seeing the details of the objects or activities being carried out during demonstration (Obeka,2010&Anaso, 2015).

2.3.2 Lecture Method

The lecture (talk-chalk), is a method that involve the teacher centered method of dissemination knowledge where ideals, concepts, generalization and facts are presented to the students who are mainly passive hearers. The students on their own part are expected to memorized the fact and principles presented to the whether they understood or not and even produce verbatim during examination. James, (2014) further stated that the term lecture method of teaching is used to described teaching in which large part or possible the whole of the lesson is occupied by the teacher in exposition and by the students in listening or making note.

This method has come under the sledge hammer of many science educators and researchers as being deficient in training of qualitative and even quantitative students with commitment for science and technology (Usman, 2000). In this method the pupils centered activities for developing scientific reasoning and skills are lacking. This therefore creates lack of interest in science (Bichi, 2012). Unfortunately, the traditional lecture method dominated the teaching of science in our secondary schools, this therefore, result in a general low level performance in science subjects (James, 2014).

Science educators having identified method of teaching as one of the factors that contributes poor achievement of students in science as well as to the difference of the achievement level of students in science, has therefore called for a change in the teaching methods in our schools. Lakpini (2006) has called for a change from conventional lecture

method to individual instructional category. In her view, this will enable pupil carryout higher cognitive operation if analysis, synthesis and evaluation which do not occur in the lecture method. Jibrin andNuru, (2017) has also called for a change from lecture method to experimental method in teaching science.

Notwithstanding, the numerous criticism associated with lecture method in teaching science, other science educators are strongly of the view that lecture method is still very good in teaching science. Ausubel (1971), a strong advocate lecture method which he called reception teaching describe it as more effective method of teaching science. In his view, meaningful learning occurs if the knowledge is linked to the relevant existing concepts in the learners' cognitive structure and this learning takes place when new knowledge are arbitrarily incorporated into cognitive structure. He further stated reception learning of concepts is the foundation upon which higher learning build and without traditional lecture method there can be no laboratory discovery or inquiry learning. Olarioye, (2012) also found no significant difference between lecture, enquiry role approach and inquiring method of teaching science in Nigeria schools.

2.3.3 Field-Study learning experience.

Field-study which may also be termed as an instructional study, or school journey, is defined by Krepel and Durrall (2016) to be a school or class study with an educational intent, in which students interact with the setting, displays, and exhibits to gain an experiential connection to the ideas, concepts, and subject matter. Tal and Morag (2016) described Field study as student's experiences outside of the classroom at interactive locations designed for educational purposes.Field studies allow students to gather their own (primary) data, provide opportunities to extend classroom learning through direct observation and experience, and allow for scientific research through field

experiments.Field study trips can range from short walks in the schoolyard or nearby neighborhood to vehicle excursions over some distance for several hours to a full day.

Whatever the destination, the purpose of the field study trip should be to address specific outcomes in the curriculum. Field studies should be designed as learning experiences that are integral parts of a unit or theme being studied in the classroom Aliyu (2016). According to Aliyu, field-Study may be planned for five purposes: namely to:

i. provide firsthand experience,
ii. stimulate interest and motivation in science,
iii. add relevance to learning and interrelationships,
iv. strengthen observation and perception skills, and
v. promote personal (social) development.

Field-Study take students to locations that are unique and cannot be duplicated in the classroom. Each students observes natural settings and creates personally relevant meaning to the experience. Interactive exhibits help students play with concepts, activities often not possible in the classroom. Earlier course content suddenly becomes relevant as students assimilate and accommodate new understanding and cognition (Lei, 2010). The connection between the Field study venue and the classroom links the Field study's experiential learning with prior experiences and learning from the classroom (Lei, 2010). Students who directly participate during a field experiences generate a more positive attitude about the subject. Many researchers have investigated knowledge gain and learning that occurred during Field study (Scarce, 1997; Mawdsley, 2013; Hudak, 2013; Kisiel, 2013; Michie, 2014; Scribner-MacLean & Kennedy, 2017; Nadelson& Jordan, 2017). Research by Wilson (2011) suggested that eighth grade students with an interest in science were significantly more likely to acquire science related careers than students with no interest in science. Yet, science is often limited in elementary school curricula despite the recognized

importance of early development of science concepts and skills. Teachers are in position to motivate and capture students' interest in the sciences. Effective methods to develop student's interest include experiential activities and Field study, which create authentic learning opportunity for students, regardless of the content area.

However, experiential activities and Field-study do not simply happen, teachers need to understand that such activities requires organization, planning, and student reflection to maximize the learning experience. the same as classroom-based experiential learning. The purpose of this paper is to examine literature concerning experiential learning activities and Field study, focusing on science -related Field study and the role of the classroom teacher prior to, during and after the Field experience.

To save money and time from preparation and traveling, some instructors choose to simply use the school computers and take digital Field-study. Options are plentiful and students no doubt learn from the digital experience, but students only experience what the media thinks is important, and the students do not encounter a multidimensional activity in which all their sense are fully involved (National Research Council (NRC, 2009). In contrast, Field-study are experiential, authentic social events that create a new way of knowing an object, concept, or operation. Quality experiences lead to deeper learning and interest development (NRC, 2009).

2.3.4 Types of Field-Study

Formal Field-study consist of planned, well-orchestrated experiences where students follow a documented format. Government agencies, museums, and business offer excellent formal experiential learning activities and programs, which are usually run by the venue's staff. One student's experience is essentially the same as any other student's experience. Teachers find such programs comfortable because the students are bound to a choreographed agenda.

However, there are minimal opportunities for students to personally interact and connect to the experience (Rennie, 2015).

Informal Field-study are less structured and offer students some control and choice concerning their activities or environment. When observing students interacting in an informal education setting such as a science center or field station, teachers are often amazed by how much students know and which students possess the most knowledge (Rennie, 2017). Informal education is a legitimate cognitive learning model. "Informal science experiences- in school-based Field study, student projects, community-based science youth programs, casual visits to informal learning settings, and press and electronic media can be effectively used to advance science learning" (Hofstein& Rosenfeld, 2013, p. 106). Students feel at ease in an informal learning environment. The focus may be individualized. Activities are not competitive or assessed, interaction is voluntary and unforced, and social interaction is encouraged. Together, these qualities create an intrinsically motivated students (Rennie, 2017) that encourages students to examine their connection to the local and national communities, as well as their connection to the local and global ecosystems (Krepel& Dural, 2016).

Non-school related informal Field-study such as family activities, also contribute significantly to children's science knowledge (Rennie &McClafferty. 2017) although science knowledge and interest acquired at home may be compromised if majority of experience occurs through the media such as television and the internet, in which the children may have difficulty determining reality from entertainment.

Field-study offer a unique opportunity for students to create connections, which will help them gain understanding and develop an enjoyment of learning. Students on Field-study sharpen their skills of observation and perception by utilizing all their senses (Nabors et al, 2017). Students develop a positive attitude for learning, motivating them to develop

connections between the theoretical concepts in the classroom and what has been experienced (Falk, Martin, & Balling, 2013). Outdoor Field-study provide an opportunity for students to develop increase perception, a greater vocabulary, and an increased interest in the outdoors (Hoisington, Savleski, &DecCosta, 2010). Developed interest stimulates curiosity, empowering students to ask questions, discuss observations, consider past experience, or simply ponder the topic (NRC, 2010Farmer, Knapp, & Benton, 2017). When on Field study, the venue is not the only location that affects students; they also gain knowledge and understanding about their neighborhoods and communities as they travel from the school to the Field-study venue (Nabors et al, 2017). Therefore, this study used informal field study to instigate the Effect of Field-Study on academic Retention and performance in Interpretation of Topographic map features among Senior Secondary school, Benue State Nigeria.

2.4 Field Study Teaching Strategy

Teachers have little training or pedagogical knowledge relating to the process of Field-study planning and preparation (Tal and Morag, 2016). Pre-service teachers experience a Field-study during each clinical classroom observation visit, and it is not unusual if the pre-service teacher went on a Field-study during clinical classroom observations or student teaching. In spite of these many field experience, pre-service teachers generally are not taught the pedagogy or methods necessary to plan and orchestrated a Field-study (Kisiel, 2016; Tal, 2016). Anderson, Lawson, and Mayer-Smith (2016) illustrated that pre-service teachers who gain filed experience at a non-school venue gain a more functional, applicable view of constructivist education and teaching skills. For this reason, teacher education program should include experiential education, and Field-study preparation and implementation for all pre-service teachers, who need to understand their responsibilities

and role before, during and after a Field-study (Tal & Morag, 2016). According to Tal and Steiner (2016), teachers tend to fall into one of three patterns while on a Field-study:

i. Teachers are involved and participate in all the preparation and Field-study activities;

ii. If the Field-study is one that has occurred regularly over the years, school tradition may dictate that teachers follow an established routine, which may not be participatory;

iii. Passive teachers do not participate with the students during the experience.

For example, a teacher may rely completely on the school administration to set up a Field-study, the teacher may not personally communicate with or visit the venue, or during the Field-study, the teacher disassociates from the Field-study activities. Just as professional development focusing upon Field-study would help teachers understand the necessity of pre-planning, participation, and student reflection (Dori &Herscovitz, 2015). Experience in planning and attending Field-study is important for both teachers and students. The teachers needs understanding how to prepare and teach the students to learn out of the classroom, because the novelty of informal learning is a distraction to students who are unaccustomed to attending Field study or non-classroom settings.

Before the Field-Study

The teacher should visit the venue prior to the Field-study, to learn the layout of the venue and determine whether the venue is suitable for the students. Religious beliefs for example, may require a realignment of the activities or developmentof a differentiated plan for the concerned students. During the students' orientation prior to the Field-study, the teacher should prepare students by describing the venue and its layout. The students should understand the focus or purpose of the experience, through a lesson designed to prepare a conceptual foundation on which the students may connect their experiences (Pace, Tesi,

2014). Orion and Hofstein (2013) cited three variables that prepare students for Field-study: understanding the venue layout, the focus of the activities, and being prepared to be in an open informal venue, what the authors call "novelty space". Reduction of the novelty space would enhance learning during the Field study, prepared students know behavior expectations, increase interaction with the exhibits and look for the connections between the exhibits and classroom concepts. The school's science curriculum should connect to the venue and its focus. There is little question that a Field-study is a valuable experience for the students, but it is important that the teacher connect the students' experiences on the study with concepts and lesson taught in the classroom**.** The Field-study should not be a stand-alone experience (Kisel, 2016).

During the Field-Study

As the Field-study begins, the teacher may need to help some students become comfortable in the new environment. As activities begin, the teacher should be prepared to interpret the venue's program leader's commentary to any unfocused or confused students (Rennie &McClafferty, 2017). During the Field study, students experience learning in an authentic, informal, natural setting. each student's prior knowledge gained both from the classroom and from their personal out-of-school experiences, is used to make connections to the Field-study experience (Pasquier&Narguizian, 2016). The teacher should keep the students engaged. The venue's staff should work in concert with the teacher to help the students make connections between the experience and the concepts involved. Generally, it is the venue's staff's duty to keep the activities interesting.

Teachers often utilize worksheets to help students focus on exploring and learning the targeted concepts. Worksheets are quite effective when one worksheet is given to a small groups, in which the students are better observers, interact more frequently, discuss the concepts, and ultimately develop more connections between the concepts and the

experience (Kisel, 20016). Simple fill-in -the -blank task completion worksheet are not effective, when every students is responsible for his or her own data, where the focus is solely to fill in the data and not to explore or participate in activities (Kisel, 2016).

Students respond to Field-study in a variety of ways. Average students may suddenly reveal a never seen before level of excitement, focus, and inquiry (Hefferan, Heywood, &Ritte, 2012). Conversely, some students known for strong classroom performances might be less proficient in the field and may or may not enjoy the challenge to succeed in the new informal environment. Each student is unique and each field experience is unique, so that every field experience will result in many different academic, cognitive, and social gains (Rennie, 2017). Students' prior knowledge and experience define the cognitive foundation onto which new connections can be made (NRC, 2009). If done properly, students will build long term memories of the Field-study experiences, especially among high school and college students (Wilson, 2011).

After the Field Study

The teacher's actions after the Field-study are very important. The students' experiences need to be reinforced through discussion, activities, reading, a television show or movie (Falk & Dierking, 2012; Orion &Hofstein, 2013; Pace &Tesi, 2014; Kisiel, 2016; Tal & Steiner, 2106). Students need to solidify their new ideas and observations which have not yet made connections. Reflection will help build those connections, as well as reinforce the successful connections already made on the study. Students generate greater understanding as teachers develop potential connections through reflection (Kisiel, 2016). Students should discuss their observations and experiences, and in the case of elementary grades, create presentations to share with their classmates. During the remainder of the school year, the teacher should connect new classroom concepts to the students' Field-study experiences (Rennie &McClafferty, 2017). In Tal & Steiner's (2016) examination of teachers' roles

during field-study to museums, neither elementary nor secondary school grade level teachers carried out quality post-visit activities. Teachers must recognized the importance of post Field-study reflection and debriefing to maximize student's interest and learning.

Safety Roles for a Field Study

Field study is an interactive and engaging method of learning in environment outside the classroom. Whether planning a zoo expedition with elementary school children or an ecological field study research with a college student, these rules are excellent guidelines for maintaining a safe atmosphere.

i. Safety waivers and permission slips

Most schools program safety waivers or permission slip. Students under eighteen years must have a parents or guidance sign a legal permission slip stating that the accept the child's permission in the Field-study. Students eighteen years and above must sign a waiver stating they accept full responsibility for their action and legal implication in the Field study.

ii. Attendance checklist

Make an attendance list of each participant. This is helpful to check at period throughout the study, specifically getting on or off transportation and in the middle of the trip. There is nothing worth than realizing you forgot a kid at the field when arriving to school greeted by questioning parents.

iii. Closing

Rain in the Field-study can ruin the day and jeopardize the safety of participants, but not if you planned ahead and required them to bring umbrella and raincoat or winter closing. Most Field study location requires long pant and sleeves and close-toed shoes.

iv. Chaperones

Chaperones help maintain safety of the group and control the chaos that a large group of kids can course. A good role is to have one adult for every three or five kids. The

chaperone should be a school employee or parents who all participants will respect and follow. If you are planning an extensive or overnight trip, have references of background check conducted for each chaperone.

v. Cancelling a Field-study

You may have to cancel Field-Study trip depending on weather. If there is flash-flooding, storm or lightening reschedules the trip. Most location reschedule the trip for free or even offer to send a representative to your school.

vi. Bring a first aid kit

Have a basic first aid kit can save hours of stress and potential injury. A complete kit includes bandage gauze and antiseptic, tape, scissors and home-made splint material. While you can prevent an accident, having a first aid kit in each group can limit the potential for disaster in an emergency.

vii. Group

Participants can be divided into groups and assign to an adult. If students are less than ten years, consider various techniques to keep the group cohesion. For example, sing a colored rope that each group most hold on to while walking through a museum or ask each chaperone to hold a painted sign so high so that school kit can identify their group while walking through the field.

viii. Rules

Most students need a structure of rule spelled out for them. Before embarking on a Field-study, make a copy of rules and regulation for each participant. To ensure each student will follow the guideline have each kid sign the rule 'contract' promising to act respective. Rules include; don't run, stay with the group, complete all field course work in a timely manner, obey all traffic laws, listening to the chaperone, and don't talk to strangers few to be mentioned.

ix. Stranger Danger

The safety and security of each child is in your hand. Talking and interacting with strangers can be dangerous. Younger kid especiallygets confused in large public places and may lose track of their chaperone. Be sure to stress to participants that they are only to talk to field study trip chaperone or staff in marked uniform. If the safety rules enlisted above are maintained and properly followed, the pupils or students could best enjoy, benefit and retained knowledge gained from seeing real objects in their natural environment during the field study trip.

Merits and Demerits of Field-study

Adullahi (2009) and Obeka (2010) outline some of the merits and demerits of Field-study.

Demerits

i. Expensive to undertake

ii. Interrupt time program

iii. Exposes participants to danger.

Merits of Field-Study

i. It enables students to have first-hand experiences of real things. Thus, it is considered as providing learning experiences which cannot be brought into the classroom practically.

ii. It tends to relate things studied in the classroom with actual activities outside the classroom that is the society and community. This makes class work or subject matter and instruction more meaningful and enhanced students understanding of the subject matter.

iii. It affords valuable opportunity to develop interest in some subject area and career opportunities.

iv. It helps to arouse students' interest and increase their motivation to learn a subject and related subject.

v. It makes the students to be more imaginative and inquest live observers. Hence, they acquire skills for careful observation and objective report.

vi. It creates opportunities for the students to interact with the experts, and enhances effective learning and teaching.

Most Field-Study experiences make demand of all senses. This makes the students to gain a complete picture of the concepts than from any other mode of teaching. Teacher-students relationship becomes more cordial and develops more intimately during Field-study trip. In the light of the above, the study investigated the Effect of Field-study on academic Retention and Performance in Interpretation of Topographic map features among Senior Secondary School Students, Benue State, Nigeria.

2.5 Field-study and Retention in Geography

Nussbauma, (2012) examine differences in retention in learned material using lecture based and small-group based teaching method in a continuing medical education course. The result demonstrated that all though both groups had a significant decline on three month follow up examination. The group who attended lecture class retained information better than the group who attended small group class. In another study,Okoli, (2016) separated second year gastrointestinal medical students into two, group one attended teacher-centered based classes and the other student-center classes. They concluded that small group based classes lead to greater learning and retention compare to lecture-based classes. Lei, (20) stated that Geography field study trip has long being recognized as a teaching device since it presents the concept being studied in its natural environment. In addition, Maikano, (2010) made comparison between outside school and inside school teaching strategies on secondary school students' academic achievement and retention in ecology. The result shows that, the experimental taught ecological concept using outdoor teaching approach achieved significantly higher than the control group taught the same concept using the

indoor teaching approach. In addition, Obeka (2010), study on the effect of inquiry and demonstration methods on students' achievement and retention in some environmental education concept of geography. It founds that there was a significant effect due to the effect of Field-study on academic performance and retention in interpretation of Topographic map features among Senior Secondary School, Benue State, Nigeria.

2.6 Field-study and Gender in Geography

The concept 'gender' could be discussed in terms of masculinity and feminist observed in an individual. The academic achievement of boys and girls in science, technology and mathematics has been perceived differently, where boys are rated higher than girls. Some researchers in science education such as Bichi (2012), Bello (2012), Linver, Davis-kean and Eccles (2013), have expressed concern on gender related issues with the view of improving science teaching and learning. Jimoh (2015) observed that the position of females in science, mathematics and vocational education is below average when compare to male. Fanstosterling (2015) opined that the difference is in socialization and not geography. Ibe (2016) believed that greater discrimination in science in Nigeria is the practice of the day, because people always think that science is only for male while languages are for female. Habeeb (2015) also believed that quite a number of factors are responsible for the low achievement of female in science. Oluwatoyin (2017) observed that women perform better when they are exposed to science. The result of some studies also showed no significant difference between the achievement of boys and girls in science before they enter primary or secondary school (Lassa, 2010). The finding of Bichi (2012) and Aweriale (2016) showed no significant difference between male and female achievement in science. Some teachers and women are of view that girls are intellectually incapable of competing in science and mathematics and difficult task with the boys (Joseph 2016). Some parents discourage their girls from science and technology careers saying that

they are abnormal and may not be capable of managing marital home (Ifamuyiwa 2015). The girls themselves feel discouraged by the attitude of teacher and parents and often suffer from self-esteem. Research findings have shown that female students have less positive attitude to mathematics than the male and also demonstrated less superiority at secondary school level. This probably ought to be the result of stereo typing of task that takes place with more attention given to the training and education of males in science area (Ogwuazor 2015).

Despite the fact that certain measures have been taken to bridge the gap between boys and girls, gender inequality is still a limiting factor to the achievement of desired learning outcome and developments in science enrolment and performance and results in unequal access to education, health and employment (Agholar 2014).

For the teaching and learning of science in schools to progress, and especially bridge the gap in gender inequality, certain factors have to be considered; household factors, social-cultural factors and policy related factors, school related factors, school curriculum (gender based) and environmental factors (Fansto-sterling, 2015). Gender concept has actually attracted different world bodies and NGOs such as UNESCO. The study tends to investigate the effect of Field study on academic Retention and Performance in Interpretation of Topographic map features among Senior Secondary School Students, Benue State, Nigeria.

2.7 Overview of Similar Studies (Empirical Studies)

A number of studies were conducted on the effect of Field-study in teaching and learning of interpretation of Topographic map features.

Lealey and Michael (2015) investigated the effect of field-study on students' performance and attitude; a comparison of physical verses virtual field study to Indian River lagoon. A total of 847 students were used as a population for the sample size of 413 students, t-test

and analysis of variance (ANOVA) were used to analyze the data. The finding of the study showed that there is no significance different between learning style of students' ability to answer at different level. The result also implies that both field-study promote learning. The study reviewed was carried out in India while the present study was carried out in Nigeria. The studies of Lealey and Michael (2015) are similar with the present study both studies used field-study as an instructional strategy to investigate its effect on learning outcome. However, both studies differ in terms of tools used for data analysis as Lealey Michael (2015) used t-test and analysis of variance (ANOVA) for data analysis while the present study used t-test for data analysis and the location of both studies differ.

Duran and Bilgili (2011)carried out a research work on the effect of teaching the unit space puzzle by using field-study observation method in science technology course on the seventh grade students' achievement, retention and attitude. The study consists of sixty-two students from Milas District of Magla city. The instrument used for data collection was motivation and learning strategies questionnaire (MLSQ). Multiple analyses of variance were used to analyze the result. The results reveal that field study observation method was influential on students' motivation in relation to internal target regulation and perception of self-efficacy for learning and performance. The study of Duran and Bilgili (2011) is different from the present study considering the fact that they used seventh grade students while the present study used senior secondary (SS11) students. The two studies also differ in the instrument used for data collection, Duran and Bigili used motivation and learning strategies questionnaire (MLSQ) while the present study used Topographic Map-reading Performance test (TMRPT) for data collection. Both studies are similar in the fact that they used same method of instructional strategy Field-Study.

James, (2015) investigated learner's cognitive understanding of map and interpretation. A total of 1503 was used as the population for the sample size of 513. The instrument used

was cognitive map interpretation test (CMIT). t-test statistical tool were used to analyzed the data. The finding of the study showed that learners could use their cognitive map to draw and make simple maps and interpret. The study also find out that with an idea of scale, students can communicate distances, draw projections for communicating directions and a set of abstract symbols for interpreting landscape features. His studies with students in junior grades showed that children have some skills on map-reading even before they get to higher classes. they can read aerial photographs, trace and draw simple maps, read abstract signs and configurations. He however cautioned that map reading is a notorious limiting factor in early geography learning. In one of his findings, he recorded errors of spatial arrangement and proportion on map reading exercises he gave the students. The maps they draw had distortions in the spacing of features. Buildings were shown as cylindrical elevations, rivers were drawn with fish and boats in them, tree with birds on top and exposed roots etc. These distorted presentations were associated with the mental maturity of the learners which he asserted can change as they grow older. A study conducted by Abdu (2014) up held this assertion. The present study is similar with that of James, (2015), in the fact that both studies were based on finding improve method of teaching interpretation of topographic map concept. James (2015), used students in junior grades while the present study used senior secondary school students. James, (2015) was silent on the location of his study.

Ahmad, (2014) investigated the effects of field-study on academic achievement and retention in Geography among senior secondary school students of rural and urban location in Zaria Education Zone, Kaduna State. The research design used was an experimental design. The population of study consists of 2934 SS1 students. 200 students were sampled. The instrument used was ecology achievement test (EAT) and ecology retention test. T-test statistical tool were used to analyzed the data. The finding of the study showed that field study teaching strategies favored the experimental group in ecology concept. The study

further confirmed that field study teaching favored urban experimental group. The study of Ahmad (2014) is similar to the present study as both researches used senior secondary school students and quasi-experimental research design. The two research differ in the sense that Ahmad (2014) used the concept of ecology while the present study used Topographic map concept to access the level of academic performance and retention of senior secondary school students. Both research works differ in location.

Abdul, (2014), administered series of map reading exercise to a group of Senior Secondary School SSS 111 students in G.G.S.S. Kankanra, Katsina State. The population consisted of 987, sample size of 420 students. t-test statistical tool was used to analyzed the data. Given an atlas map of the world, they were assigned to identify and differentiate between continents and countries, major towns from small settlements, different major oceans bodies, North pole from south pole etc. The outcome of the exercise was error free. On a second assignment they were given the topographic map of Katsina S.E (1:50,000) to identify lakes, ponds, v-shaped valley, an escarpment, calculate the length of River Ririwa and its general direction of flow, the total area of kankanra Forest Reserve and describe features of interest on the map. He observed range of errors that included a mixed up in the direction of flow of river Ririwa and reference positions of some ponds. Conical hills were labeled as escarpments; spurs asv-shape valleys. t-test statistical tool was used for data Analysis. Wrong use of scale resulted in erroneous measurement of RiverRiriwa and in calculating the total area coverage of Kankanra Forest reserve measurement of scale. 20% returned the map without attempting any of the questions. Description of communication and drainage networks on the map was done with several grammatical errors. Abdul, (2014), used students in SSIII students while the present study used SS II students. The location of the two studies also differ.

Study conducted by Wiegand, (2014) on perceptual and conceptual difference among senior secondary school students in Garhwal UK in reading and drawing maps. The population consists of 485 students. He derived that concept acquisition and concept growth form the base of understanding topographic map abstract among learners. Entities like stream, highlands, lowlands, settlements were describes and drawn by young learners between 7-12 years with ease. When features like this are symbolically represented on maps using contours lines, bench marks, trigonometric stations, longitudes, latitudes, grid etc, only older students 13-18 years understood these representations. Students were found to make errors in organizing spatial areas, associations, location and spatial interactions like settlement patterns, drainage networks, relief, transport and communications patterns etc. Subject for this study are within 16-18 age range and may likely encounter similar challenges. The present study is similar with that of Wiegand, (2014), but differ in terms of locations. Wiegand, (2014), was silent on the instrument and the statistical tool used for his study.

Richard and Rowling, (2015), investigated the perceptual abilities and space development as a major developmental characteristic that facilitates the study of maps. But Sstterly, (2016) observed that when students were given topographic maps of areas, the topographic model developed in this study took considerations of the differences among student's mental maturity.

Samuel(2013), carried out a research with a sample of 24 out of the population of 400 group of high school students to determine the relationship between their mental abilities and the nature of spatial errors they make in map reading and map drawing. He recorded significant relationships among the psychological variables measured, the types of error generated and their performance in map reading tasks. He also observed that their perceptual speed determined the speed with which they were able to identify features on a

map. Fewer errors were recorded among the older students. He inferred that students' embedded perception determined their visualization and separation of features from the matrix features of a topographic map. His conclusion stated that testing the perception of features/shapes among students was the best indicator of error generation in reading and presentation of features of a topographic map. The present study is similar with that of Samuel, (2013), in the fact that both were carried out to find out better methods of teaching and learning of map-reading. However, Samuel (2013), was silent on the location of his study as well as the instrument and the statistical tool he used for data collection.

Andrew, (2013), investigated perceptual problem inducing errors among learners using SS III geography students of G.M.SS Udi Enugu State. A total of 847 were used as the population for the sample size of 413 students. According to Andrew, (2013), find out that, it is the unfamiliarity with the configuration of a topographic region when it is represented in black or white or represented by two contrasting colors only. Some students had no clue as to what the land or what the sea looked like, neither did they know whether the map is conventionally positioned with north at the top. He recorded fewer errors when several color symbols and shading intensities were used in presenting the topographic features. when the scale of the map was changed from small-scale (1:500,000) to a large (1:150,000), he observed more error with the use of the small-scaled map because of its complexity. He concluded that a map with too much information is liable to be misread because of greater interference with perception. Features can stand out clearly and easily perceive on large-scale maps. The same features are often discretely 'hidden' and obscured on small-scale maps and more difficult to be perceived and comprehended by learners.The present study is similar with that of Andrew, (2013,) but differ in the fact that, Andrew used SS III geography students while the present study used SS II students, the locations of the two studies also differ. Andrew, (2013), was silent on the instrument used for data collection and the statistical tool used for data analysis.

According to Bartz (2010), learner concentrate on limited aspects of a map information that appear fascinating to their mental images. She extended that instruction given during map lessons do not automatically ensure that students can scan a map to identify and establish broad distributions and pattern with ease. Students tend to examine only limited micro-patterns associated with incomplete identification of features. She concluded that interpreting the effects of broad patterns of relief on the distribution of man-made features is a difficult task for students to perform. In addition, she explained that small-scale maps present skeletal picture of reality and to interpret them requires additional information that learners may not have.

Okpala (2015) carried out a research, to ascertain whether adopting realityoriented problem solving questions in West African School Certificate Examination in interpretation of topographic map features would lead to an improvement in the attitude of students towards interpretation of topographic map features in Nigerian secondary schools. It was a quasi-experimental study. The research involved sixty-two teachers of map-work; ninety-one examiners and cohorts of two hundred and eleven as well as sample one hundred and forty five school certificate Geography students. A total of eight secondary schools were used for the study. The instrument used for data collection include: two sets of map-work test on the proposed "Rops" question type and existing WAEC type question; aptitude test of numerical and verbal abilities and the "EFT" embedded figure test. The data were analyzed using the quantitative t-score; Analysis of variance; Z-test and the chi-square as well as the Aschner-Gallagher system. The results obtained showed that; the clients generally, had significantly more positive attitude towards the "Rops". Reality oriented problem-solving types than the WAEC type questions. The findings also revealed that the attitude of the students towards the WAEC questions type correlate positively and significantly with the numerical Aptitude and "EFT", while for the "Rops", it was the contrary. The two studies are similar because both work on interpretation of Topographic map features however,

differ in terms of population as Okpala (2015) used 8 secondary schools while the present study used 2 secondary schools. Both studies differ considering the instrument used for data analysis as Okpala (2015) used quantitative t-score, Analysis of variance, Z-test and the chi-square as well as the Aschner-Gallagher system for data analysis while the present study used t-test for data analysis.

Research work on environmental and location perceptions of map features by Graves, (2015), showed that observable concepts like settlements, streams, and roads were easily identified and described by students with fewer errors than non-observable concepts like latitudes, longitudes, meridian and slopes. His study was supported by Standford, (2016).Standford reported a 74% success among students in identifying topographic feature of areas they were familiar with. The success level dropped to 66% when a 'foreign map was used. He inferred that there is a close relationship between students' physical environment (location) and their conceptualization of features from a map. Students from rural areas have identified farmlands, forest, lakes, and rivers faster than students from urban locations.

Adesoji, (2016), conducted a research on the attitudes of secondary school students to the learning of map reading. quasi-experimental design which utilized pre-test, posttest and post-posttest was adopted with the population of 943 out of which 488 as sample for the study. His findings showed a high percentage of dislike towards map reading. Students express that they prefer essay questions to map reading questions, map-reading consumes time, map-reading should not be part of their geography examination and prayed to get it deleted from the syllabus. To some, map-reading is boring and teachers confused them due to bad teaching and no field-studies.

Adesoji, (2016), further administered a simple map reading test using a topographic map of Zaria North West where their school is located, 92% of the students failed the test. The

errors he observed on the students' answer scripts were to a large extent deliberate. Apart from copying each other's answers, some scripts were returned either dirty or unanswered. A few that attempted giving correct bearings of points and locating prominent man-made and physical features mixed up directions on the map.

Babalola, (2015), investigated impact of errors that accounted for students' poor performance in map reading. The population consists of 148 students. The students he examine were able to identify land features properly, shade features they drew, measure distance between points and interpret relationships among features. They were errors of design, direction and distance in map-reading. In addition to the errors which Babalola (2015) associated to students' poor performance in map-reading. The present study is similar to the work of Babalola, (2015), as both studies were geared towards finding better teaching methodology in map-reading. However, Babalola (2015), was silent on the location, instrument used for data collection as well as the statistical tool used for data analysis.

Anikweze, (2012), administered topographic exercise to students on the use of slopes to determine visibility, converting one aspect of scale to another, contour representation of relief features, calculating vertical interval between contours. More than 60% of the students failed the exercises and many errors were observed. Although, Adesoji, Babalola and Anikweze's findings are relevant to this study, the data to be generated will not lay emphasis on the attitude of students towards learning topographic maps. The study of Anikweze, (2012), is similar to the present study in the fact that both studies worked on interpretation of topographic map features. The difference between the two studies is that, Anikweze, (2012), was concerned more of the errors committed in the course of interpreting topographic map features while the present study focused on interpretation of

topographic map features and pays little attention on errors committed.Anikweze (2012), was also silent on the instrumentation, statistical tool used and location of the study.

Majason, (2010), investigated persistent errors with map reading among Senior Secondary School Students. A total of 847 were used as the population for the sample size of 413 SS11 students. He noted that, persistent errors with map reading among students were attributed to teachers' wrong methods of instruction and non-commitment to teaching. In support of this statement, Oguntoyinbo, (2011), stated that the use of hardware models and field-studies can foster a better map understanding and skills development among learners. The necessary equipment and instruments for map study are lacking in nearly all senior secondary schools in Nigeria according to Oguntoyinbo, (2011), and have rendered the teaching and learning of topographic maps ineffective. By virtue of limited training and the difficulty in teaching topographic map concepts. Majason, (2010), found in his study that teachers contributed in making students commit errors in map-reading. The studies of Majason,(2010), and Oguntoyinbo, (2011), is similar with the present study in the fact that both study were on interpretation of topographic map features. The difference between the two studies is that, Majason, (2010), and Oguntoyinbo, (2011), were critical of the teacher factor which contribute in making students commit errors in map- reading while the present study lay emphasis on wrong instructional strategy which hinders students understanding of interpretation of topographic map features. Majason, (2010), and Oguntoyinbo, (2011), were silent on the instrument used for data collection, statistical tool for data analysis, as well as location of their studies.

Anikweze, (2014), carryout a research work to determine topographic map concepts that teachers found very difficult to teach were namely; drawing of profiles, determining slope types, valley forms, spurs, gradients, grid system and feature interpretations. A comparison between teachers' difficulties with instructions on topographic maps and the errors students

commit with topographic map task was recorded as 87.5%. The generated errors among students should be of significance to a teacher because he/she is part of the problem.The present study is similar with that of Anikweze, (2014), in the fact that , they were both involved in finding better teaching strategy on how to interpret features on topo-maps. The difference between the two studies is that, Anikweze, (2014), was concern of the topographic map concepts that teachers found it difficult to teach while the present study was concern of better teaching strategy that would enhancing interpretation of topographic map features in geography.Anikweze, (2014), was silent on the instrument used for data collection, statistical tool used for data analysis as well as the location.

Miller (2015:51) carried out a research entitled "Improving the design of classroom maps: the experimental comparison of alternative formats" the objective of the research is to identify the source of difficulties in the American topo-map interpretation, particularly the design of the maps and work to improve those over which have some control. (96) students randomly selected for the study, were stratified by social-economic status as well as grade-levels. The instrument used for data collection was interviews. The analysis of variance was applied for the data analysis. The results showed that some types of Topo-maps task seem inherently more difficult than others. The most difficult task appears to be associated with the interpretation of Topo-map features, as well as grid-systems, estimating and measuring distance, the interpretation of features, system and symbols. From the findings of some of these researches, the researcher can infer that there are specific topics that make map-work difficult to students. It is also observed that the methods of the teaching the subject contribute to the difficulty. This creates a need to try some innovative methods for teaching this section of Geography. The present study is similar with that of Miller (2015) considering the fact that both studies aimed at improving map work understanding as regards to identification and interpretation of topographic map features. Both studies differ in the used of instrument as Miller (2015) used interviews as instrument for data collection

while the present study used Topographic Map-reading Performance Test (TMRPT) for data collection. The two studies also differ in their locations.

In conclusion, most studies reviewed were carried out in different subjects at secondary school levels. even those conducted in geography did not consider the area of interpretation of Topographic map features. Therefore, this work will fill the gap of using Field-Study teaching strategy on Retention and Performance in Interpretation of Topographic map features among geography secondary school students, Benue State, Nigeria.

2.8 Implication of Literature Reviewed on the Present Study

From the literature examined, some significant observations that have implication to this study were made thus:

Field Study has been found to be veritable tool for making learning result oriented. Studies have shown the effectiveness of this teaching strategy on student's performance and retention in sciences. However, other studies showed otherwise. Most researchers devoted to the use of Field study on students' academic performance for teaching topographic map concept, Lagoke(2012) concluded that students and teachers showed negative attitude to topographic Field work. However, it was also established from the studies that Field work could have a strong motivating effect on the students because what is seen, touched and felt usually facilitates permanency of learning. This research therefore, will differ from those reviewed in the sense that it will investigate the effect of Field Study on academic retention and performance in relatively new location and using different concept. Also, the study was conducted in Gwer- East Education Zone which is relatively new area. The present study also filled the gap of determining the effect of field-study on retention and academic performance as well as gender in interpretation of topographic map concept. Some instructional strategies suggested by some researchers for teaching geography may not yield the desired result of low or poor performance syndrome. Evidence abounds which

shows that lecture method of teaching is inadequate for improving students' performance towards Geography.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This study investigated the Effect of Field- study on Retention and Performance in Interpretation of Topographic map Features, Among Senior Secondary SchoolStudents in Gwer-East Education Zone, Benue State, Nigeria. This chapter is concerned with the general procedure for executing the study. Specifically, this chapter is presented under the following sub-headings:

3.2 Research Design

This study adoptedpre-test, posttest and post-posttest control group quasi-experimental research design. The rational for adopting the quasi-experimental design is as follows: The research used intact classes. Quasi-experimental design does not involve randomization of participating units as applied in true experimental designs. Such random selection in true experimental designs is hardly permitted by the school authorities, as it would likely

disrupt normal school programmes. The design thus suits the use of intact classes which can easily fit into the normal school timetable and programmes. This will ultimately smoothen the conduct of the experiment.

Pre-test was administered to both the experimental and control groups. The reason for the pretest is to determine the equivalence of the two groups in their ability level. The treatment which is the use of Field- study teaching strategy (X_1) was administered to the Experimental Group (EG). The control (CG) was taught using lecture method (X_O). The posttest (O_{2AP}) was administered after the treatment to determine if there is any significant difference in the mean performance of students in Interpretation of Topographic Map-Features taught. Post-posttest (O3R) was administered after two weeks from the administration of the Posttest as recommended by Tuckman (1975) in order to determine the retention ability of the subjects in the study. The illustration of the design is presented in figure1:

EG $\longrightarrow$ 01_{AP} $\longrightarrow$ X1 $\longrightarrow$ 02_{AP} $\longrightarrow$ 03_R

CG $\longrightarrow$ 01_{AP} $\longrightarrow$ XO $\longrightarrow$ $O2_{AP}$ $\longrightarrow$ $O3_R$

Figure 1: Research Design
Source: (Adapted from Kerlinger, 2000, and Sambo, 2008)

EG- Experimental Group (Field-Study group)

CG- Control Group (Lecture Method group)

X1- Treatment 1 (Field-Study Teaching Strategy)

X0- (Lecture method)

O1- Pretest

O2- Posttest

O3- Post -post test

AP: Academic performance

R: Retention

3.3 Population for the Study

The population for this study covered all Public Senior Secondary School (SS11)geography students inGwer-East Education Zone Benue State. The size of the population is Two Thousand Five Hundred and Eleven students (2,511) with total number of male students 1421 and female students 1090 of average age of 17 years plus.SSIII students were busy preparing for West African Examination Council (WAEC). For the purpose of this study, SS11 Students of Public Secondary Schools were chosen. The reason behind using public school students is because they relatively enjoy the same funding, same standard quality of teaching staff, laboratory equipment and same criteria for admitting students and the same syllabi. The details of the population are presented in Table 2.

Table 2: Population of the Study

S/No	Names of schools	Number of students		
		Male	Female	Total
1.	Govt. Sec, Sch, Taraku	35	21	56
2.	Govt. Girls Sec, Sch, Aliade-	-	300	300
3.	Govt. Sec, Sch, Ikpayongo	80	60	140
4.	Govt. Day Sec, Sch, Aliade	35	25	60
5.	Yonov Comm, Sec, Sch, Ikpayongo	160	80	240
6.	Masav Comm, Sec, Sch, Taraku	60	70	130
7.	SSCE. Aliade	104	76	180
8.	N K S T. Sec, Sch, Taraku	63	165	228
9.	ST, Mich, Sec, Sch, Aliade	400	-	400
10.	JatoAnchaver Mem, Sec, Sch, Mase	135	66	201
11.	Foster Model Sec, Sch, Aliade	6	45	105
12.	ST, John Bosco Sec, Sch, Aliade	70	37	107
13.	Divine Trinity Sec, School Aliade	101	67	168
14.	Igba Commercial Sec, Sch, Aliade	37	42	79
15.	Site of Wisdom Sec, Sch, Aliade	81	36	117
Total		1421	1090	2511

Source: Ministry of Science and Technology Makurdi (2019)

3.4 Sample and Sampling Technique

Purposive sampling technique was used to select two schools out of the 15 schools. Purposive sampling is a sampling technique done best on laid down criteria. The criteria set for the selection were:

i. The schools were co-educational in nature

ii. School have qualified geography teachers

iii. Schools have adequate science teaching facilities

iv. security challenges to access some of the schools

However, a sample population of one hundred and sixteen (116) senior secondary two (SS11) geography students from two co-educational schools in Gwer-East Educational Zone were chosen as the samples.

Intact classes were used in conducting this research, because most of the schools do not allow their students to be randomized and assigned into different class for research work. The intact classes selected in each of the schools chosen served as either the experimental and control group.

Table 3: Sample for the Study

S/N	groups	Male	Female	Total
1	**Experimental**	35	21	56
2	**Control**	35	25	60
	Total	70	46	116

3.5 Instrumentation

The instrument for the study tagged Topographical Map Reading Performance Test (TMRPT) was used for data collection. TMRPT consists of 30 items, 4-options multiple choice objectives tests developed by the researcher. Therefore, students choose correct answer from the option letter A-D respectively. The instrument was developed from the Topographic Map-concepts of senior secondary school geography curriculum. The instrument is based on the four content areas of Topographic-Map-work chosen for the study. Measures were taken to ensure that the necessary psychometric properties were built into the instrument.

The instrument Topographical Map Reading Performance Test (TMRPT) use in the study were adapted from Benue State ministry of geo-planning (2016) and (2017) and Federal Survey Department (2017) and modified by the researcher to suit the needs of the study.

Table 4: Table of specification based on Bloom Taxonomy of Cognitive Domain

TOPIC	%	K	C	A	AN	SYN	EVA	TOTAL
Contours representation	30	2	1	2	1	2	1	9
Highland relief features	26	1	2	1	1	1	2	8
Lowland relief features	22	1	1	1	2	1	1	7
Relating relief to settlement	22	1	1	1	1	2	1	7
Total	**100**	**5**	**5**	**5**	**5**	**5**	**5**	**30**

Source: Adopted from Sambo, (2008) &Obeka, (2011)

Key: Knowledge (K): recognition or recall of specific materials

Comprehension (C): grasping the meaning of materials

Application (A): using information in concrete situation

Analysis (AN): breaking down material in parts

Synthesis (S): putting together parts to form the whole and

Evaluation (E): judging the value of material and method for a given purpose.

The four content areas identified for this study are analyzed on the table of specification, in line with the objectives of teaching Topo-Map interpretation. This is in line with the objective of teaching each of the chosen topics in the Senior Secondary School Geography Curriculum.

3.6 Validation of the Instrument

The instrument were validated for both face and content validity by experts who are PhD holders with minimum rank of Senior Lecturer in the Department of Science Education and Department of Geography Ahmadu Bello University Zaria. They were requested to among other things address specific issues such as: suitability of the alternative answers provided,

repetitions, time allocation, suitability of each of the items, ensuring that clues to answers were not given, modifying and/or replacement of unsuitable items among others. The imputes from the experts such as corrections, modifications, restructuring of items etc, help in improving the quality of the instrument.

The content validity of the instrument was ensured by applying a table of specification on the instrument, based on the Blooms Taxonomy of education objectives. This ensures an appropriate distribution of the test items with respect to the relevant content areas chosen as well as the cognitive objective levels desired (see table of specification). Based on the table of specification the TMRPT test items were written out. The test items are now re-organized in line with the distribution of the items in terms of content area, objective level and proportions in the table of specifications.

3.6.1 Pilot Testing

The researcher pilot tested the instrument using a school sampled out from the schools within the area of study but not selected for the study. The researcher pilot-tested the instrument topographic map reading performance test (TMRPT) on a sample of thirty-six Geography students of Gboko high school (a mixed school). A mixed school was used in order to avoid sex variability, which may affect the external validity of the study. The thirty-six Geography students in SS II class were used for experimental and control groups for the period of two weeks in which experimental group received treatment (Field-Study) while control group received lecture. The pilot test was used to test the effectiveness of the instruments as well as identify the problems which may affect administration of the instrument during the actual experiment.

Reconnaissance Survey

Gwer-East Education Zone has land mass of 3054 square kilometers and falls in the north-west senatorial zone of Benue State. According to National Population Commission (2015). Gwer-East Education Zone has a total population of 498119. The area lies between

latitude 11 N and 13 N and longitude 8 E 10 35 E with a tropical climate. The temperature varied at different times, high temperature are normally recorded between the months of April and September. Maximum temperature range are 15 C and 35 C. Rain season lasts from May to October with average rainfall of 800 to 1000mm. The area is situated within the sudan savanna vegetation zone. The dominant plant species in the area include the following: Termarindis indica, Cassia albidder, Adonsonia digitata, Acasia specie few to be mentioned (Babandi, 2010). The topographic features observed during the Reconnaissance Survey relevant to this studyare: Cultural Features:roads, buildings, Forest reserves, and administrative boundaries. Hydrographic Features: stream, swamps and coastal flats. Relief Features: mountains, valleys, cliffs, and depressions. Vegetation Features: wooded and clear areas, vineyard and orchards.

3.6.2 Reliability of the Instrument

In order to establish the reliability of the Topographical Map Reading performance Test (TMRPT) instrument, an estimate of internal consistency was applied using the test-retest method as Pearson Product-Moment Correlation Coefficient statistics which gives an estimate of the degree of internal consistency of the test instrument. The internal consistency estimates give a measure of the homogeneity of the items of the test instrument. Test-retest was administered in two weeks intervals as recommended by Tuckman (1975) that students forget after two weeks. The scores from the two administrations correlated as an estimate of reliability of the test Sambo (2008). The reliability of the TMRPT after correlation is 0.78 which shows the instrument is reliable for data collection in this study.

Facility and Discrimination Index

3.6.3 Items analysis of TMRPT

Items analysis was carried out on the scores obtained from the pilot study to determine the facility and difficulty indices of the items in the TMRPT the facility index (FI) according to

Wood (2008) is the percentage of students that gets an item right, it is determine by using formula

$$FI = \frac{R}{T} X100$$

Where R= Number of correct responses

T= Total Number of students.

Usman (2008) recommended values within the range of 0.3 to 0.7 for good test items value in assessing achievement for this study 0.3 to 0.7 chose.

Discrimination index:indicates the desire power of each of the test items or is the ability to sort between high and low ranking students in the whole test. The score was done using the scores of the top 27% and bottom twenty score (27%) of the total respondents. This was calculated using formula given by (Furst in Olorukooba, 2001)

$$D.I = \frac{Ru-Ri}{1/2N}$$

Where D = Discriminating index

Ru = Number any upper 27% of respondent

Ri = Number any lower 27% of respondent

N = Total Number of respondents

The D.I, which from 0.3 to 0.7 is regarded as moderately positive and is selecting the found items of the TMPT.

3.7.1 Administration of Treatment

The treatment has three major stages namely, before the field-study, during the field-study and after the field-study which are separated into six distinct steps. .

Before the Field-Study

The teacher visits the venue prior to the Field-study trip, to learn the layout of the venue and determine whether the venue is suitable for all the students. Religious beliefs, for example, may require a realignment of the activities or development of a differentiated plan

for the concerned students. During the student orientation prior to the Field-study trip, the teacher prepare students by describing the venue and its layout.

During the Field-Study

As the Field-study begins, teacher divided the students into two groups each with a group leader and interpreted the venue's program to any unfocused or confused students. Here, students experience learning in an authentic, informal, and natural environment or setting. As activities continues. Students work in group, observe, and ask question where possible, each student's prior knowledge gained both from the classroom and from their personal out-of-school experiences, is used to make connections to the Field-study experience.

After the Field-Study

At this stage, teacher's action is very important. teacher reinforced the student's experiences through discussion. Students solidify their new ideals and observations which have not yet made connections through reflection to help build those connections, as well as reinforced the successful connections already made on the trip. Students generate greater understanding as teachers develop potential connections through reflection. Teacher create presentations for students to share their observations and discuss their experiences with their classmates. Teacher evaluates the students by making comments, observation and constructive criticism on the presentation made, teacher concludes the lesson by summarizing all the topics learnt.

The treatment administration can be summarized as follows:

Step 1: The researcher a research assistant took experimental group to the following habitats located in Gwer-east Local Government Area in Benue State Nigeria.

i. Mbachin District

ii. Mbalav Basin

iii. Agbana Basin

Step 2: Students were divided into two groups each with a group leader and one assistant/ instructor.

Step 3: Students were instructed to use work sheet and record what they observe in accordance with lesson plan (Appendix F).

Step 4: Here students build up their experiences as they discussed with the teacher.Students were also given a checklist which will serve as field-study guide.

Step 5: General revision and administration of posttest: The lesson last for the period of six weeks after which a posttest was administered to the students at the end of the lesson.

Step 6: After a period of two weeks post-posttest was also given to measure the students' retention level.

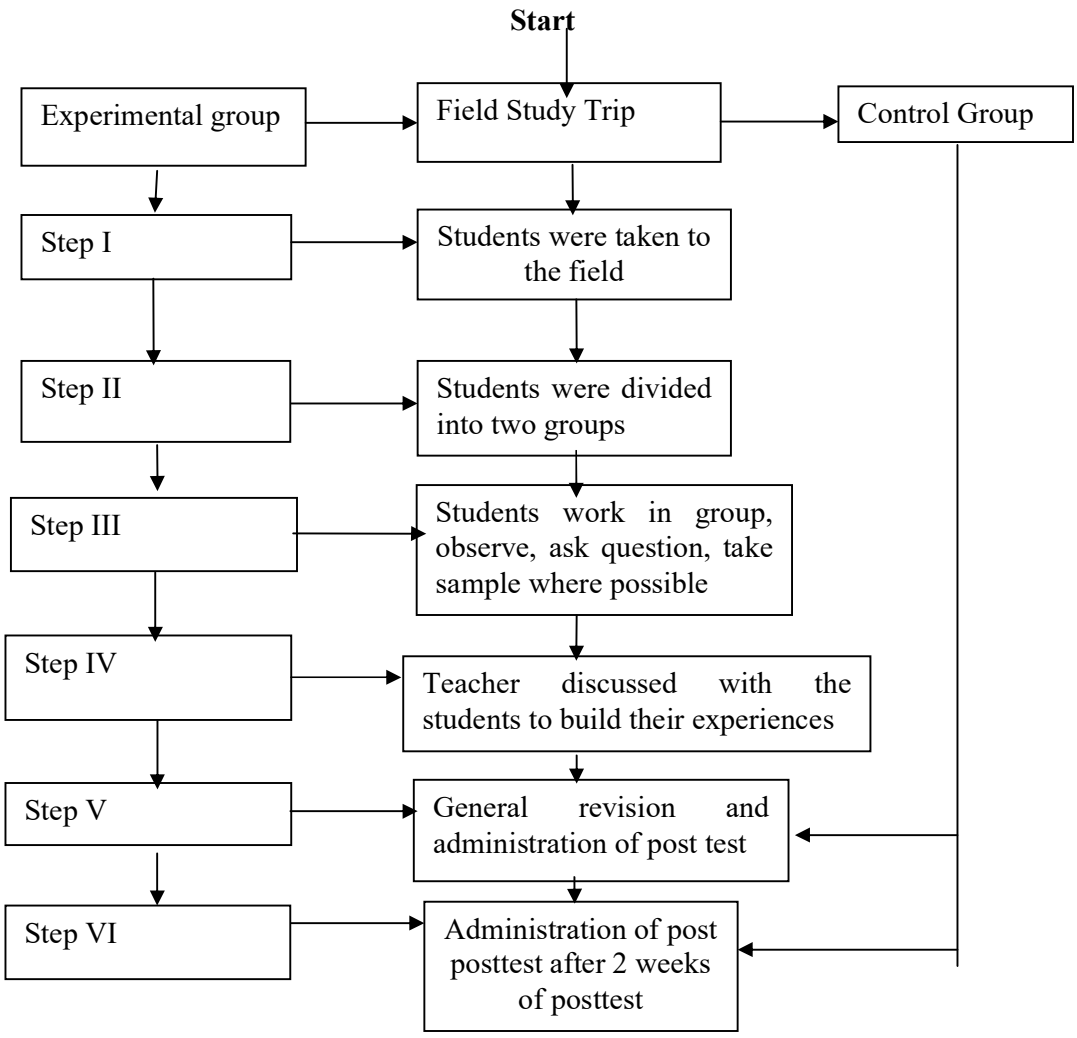

Figure 2: Flow Chart Showing Field Study Steps

Flow Chart: Adapted from Fred (2017) Illustrating steps in Field-study Teaching Strategy

3.7.2 Control Group Teaching

The control group were Interpretation of Topographic-Map features using only lecture method for the period of six weeks. They were denied treatment as in experimental group after which they were subjected to posttest and post-posttest

3.8 Procedure for Data Collection

Topographical Map Reading Performance Test (TMRPT) was administered at the begging of the exercise as pretest to determine the entry level of the students and the same instrument was also used to collect data after the administration of treatment as posttest.

Post-posttest was given after a period of three weeks. The achievement scores were divided into experimental and control groups and recorded respectively.

3.9 Procedure for Data Analysis

The research questions were answered using descriptive statistics. t-test, was used for research hypotheses. Data generated were analyzed at $p< 0.05$ level of significance. The following are the Research questions:

i. what is the difference between the mean score of students taught interpretation of topographic map features using field-study method?

ii. what is the difference between retention ability of students taught interpretation of topographic map features using field- study method and those taught using lecture method?

iii. what is the difference between performance of male and female students taught interpretation of topographic map features using field-study method?

iv. What is the difference between retention ability of male and female students taught interpretation of topographic map features using field-study, and those taught using

Hypotheses Testing

The following Hypotheses were tested at 0.05 level of significance:

i. There is no significant difference in the mean scores of students taught interpretationof topographic map features using field-study and those taught using lecturemethod. This hypothesis was analyzed using t-test.

ii. There is no significant difference in the retention level of students taught interpretation of topographic map features using field-study and lecture method of teaching.This hypothesis was analyzed using t-test

iii. There is no significant difference in the mean scores of male and female students taught interpretation of topographic map features using field-study method.

iv. There is no significant difference in the mean retention ability of male and female students taught interpretation of topographic map features using Field-Study methods

v. This hypothesis was tested using t-test.

CHAPTER FOUR

ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents analysis, result and discussions. The results were presented according to the sequence of the research questions and hypotheses, which guided the study. The level of significance adopted for retaining or rejecting each of the null hypotheses is $p \leq 0.05$. The procedure for analysis and results were presented.

4.2 Results

Research question 1. what is the difference between the mean score of students taught interpretation of topographic map features using field-study method?

Descriptive statistics of mean and standard deviation were used to answered this research question and the summary of the result is presented in Table 5.

Table 5: Mean and Standard Deviation of the Experimental (Field-study) and ControlGroups (Lecture) in Interpretation of Topographic Map features

Group	N	Mean	S.D	MD
Experimental	56	24.28	4.18	11.77
Control Group	60	12.51	2.12	

Result in Table 5. shows the mean score of the experimental group was 24.28 and a standard deviation of 4.18 while the mean score of the control group was 12.51 and a standard deviation was 2.12. The mean difference of the experimental and control group was 11.77 in favor of the experimental group. This shows that the experimental group had mean score than the control group. This implied that the effect of the treatment had impact on the experimental group.

Research Question 2:what is the difference between retention ability of students taught interpretation of topographic map features using field-study and those taught using lecture method?

Descriptive statistics of mean and standard were used to answered this research question and the summary of the result is presented in Table 4.2

Table 6: Mean and Standard Deviation of the Retention Ability of Experimental (Field study) and Control group

Group	**N**	**Mean**	**S.D**	MD
Experimental	56	23.74	4.71	13.64
Control Group	60	10.60	2.21	

Result in Table 6. shows the mean score of the experimental group was 23.74 and a standard deviation of 4.71 while the mean score for the control group was 10.60 and a standard deviation was 2.21. The mean difference of the experimental and control group was 13.64 in favor of the experimental group. This proved that the experimental group had mean score than the control group. This implied that the effect of the treatment had impact on the experimental group.

Research Question 3:what is the difference between performance of male and female studentstaught interpretation of topographic map features using field-study strategy?

Descriptive statistics of mean and standard deviation were used to answered this research question and the summary of the result is presented in Table 7.

Table 7: Mean and Standard Deviation of Academic Performance Scores of Male and Female Students in Experimental Group

Group	N	Mean	S.D
Male	35	38.72	8.15
Female	21	39.54	7.51

Result in Table 7. above shows that the mean academic performance score of male students in experimental group is 38.72, and standard deviation of 8.15 is observed. Female students in the same group have a mean score of 39.54 with standard deviation of 7.51. This shows that both male and females students taught interpretation of topographic map concepts

using field-study instructional strategy have almost similar mean academic score in their post test.

Research question 4: What is the difference between retention ability of male and female students taught interpretation of topographic map features using field- study strategy?.

Descriptive statistics of mean and standard deviation were used to answered this research questions and the summary of the result is presented in Table 8.

Table 8. Mean and Standard Deviation of Retention Ability Scores of Male and FemaleStudents in Experimental Group

Group	N	Mean	SD
Male	35	24.72	4.38
Female	21	23.84	5.55

Result in Table 8. shows that the mean academic retention ability scores of male students in experimental group is 24.72, and standard deviation of 4.38 is observed. Female students in the same group have a mean score of 23.84 with standard deviation of 5.55. This shows that both male and female taught interpretation of topographic map features using field-study instructional strategy have almost similar mean academic score in their posttest.

HO1: There is no significant difference between the mean scores of students taught interpretation of topographic map features using Field- study and those taught using lecture method. This hypothesis was analyzed using t-test.

The t-test was used to test this hypothesis, and a summary of the result is presented in Table 9.

Table 9: t-test analysis of posttest mean score of the Experiment and Control groups inInterpretation of Topographic Map Features

Group	N	Mean	SD	Df	t	P Remark
Experimental	39	24.28	4.18	Sig		
.	.	.	.	1.22	19.86	0.00
Control	41	12.51	2.12			

Significant at p< 0.05 level

The result in Table 9. shows that the t-test= 19.86 and p-value = 0.00 at degree of freedom (df) 122. Since the p-value =0.00 a = 0.05. It means that there is significant difference in the mean scores of the experimental and control groups. The significant difference is in favor of the experimental group exposed to field study teaching strategy with this result, therefore null hypothesis one was rejected.

H02: There is no significant difference between the retention level of students taught interpretation of topographic map features using field method and lecture method of teaching. This hypothesis was analyzed using t-test.

The t-test was used to test this hypothesis, and a summary of the result is presented in Table10.

Table 10.t-test Analysis ofpost posttestmean score of the experimental and Control groups in Interpretation of Topographic Map Features.

Group	N	Mean	SD	df	t	P	Remark
Experimental	39	23.71	4.71				
				122	20.84	0.001	Sig
Control	41	10.06	2.21				

Significant at P < 0.05

The result in Table 10. shows that the t = 20.84 and p =0.001 at degree of freedom (df) 122. Since the p=0.00. It indicates that there is significant difference in the mean score of the experimental and control groups. The significant difference is in favor of the experimental group exposed to field study teaching strategy as indicated by the mean scores. With this result, null hypothesis two was therefore rejected.

H03: There is no significant difference in the mean scores of male and female students taught interpretation of topographic map features using field-study instructional strategy.

Table 11: t-test Analysis of posttest performance Scores of the Male and Female Students in the Experimental Group.

Group	N	Mean	SD	Df	t	P	Remark
Male	35	38.72	8.15				
				54	3.25	0.21	Not Sig
Female	21	39.54	7.51				

Not Significant at P > 0.05

From the result in table 11. it is observed that in the experimental group, the t-value of 3.25 is obtained and the p-value observed is 0.21 at degree of freedom of 54. The critical p-value of 0.21 is greater than the alpha value of 0.05. This shows that there is no significant difference. A no significant difference implies retaining of null hypothesis and rejecting alternate hypothesis. Accordingly, null hypothesis that stated that there is no significant difference in the academic performance of male and female students exposed to field-study instructional strategy in interpretation of topographic map features was retained.

H04: There is no significant difference in the retention mean scores of male and female students taught interpretation of topographic map features using field-study instructional strategy.

Table 12: t-test Analysis of Post-posttest Retention Ability Scores of the Male and Female Students in the Experimental Group

Group	N	Mean	SD	DF	T	P	Remark
Male	35	25.14	3.21				
				59	1.546	0.127	Not sig
Female	21	24.50	4.82				

Not Significant at P > 0.05

Table 12. shows that the P is 0.127 which is greater than the alpha a=0.005 with degree of freedom (df) = 59. This means that, there is no significant difference between the retention ability scores of male and female students exposed to field-study teaching strategy. This implies that the performance level of male exposed to field study teaching strategy and their female counter parts were at par. Therefore, null hypothesis four was retained.

4.3 Summary of Major Finding

Based on the data analyzed in this study, the following findings were obtained.

i. There was significant difference between students exposed to field-study experiences andthose who were taught the concept interpretation of topographic map features using lecture method.

ii. There was significance difference between the mean scores of retention level betweenexperimental and control groups in interpretation of topographic map features in favor of experimental group.

iii. There was no significant difference between the mean scores of male and female students exposed to field-study teaching strategy. This implies that the performance level of male exposed to field-study teaching strategy is almost the same with their female counter parts.

iv. There was no significant difference between the mean retention ability scores of male and female students exposed to field-study teaching strategy. This implies that they almost have similar retention ability.

4.4 Discussion of the Results

The objectives of this study was to investigate the Effect of Field-study on Retention and academic performance in Interpretation of Topographic Map Features among secondary school students, Benue state, Nigeria. To achieved this, two groups of students were formed namely, Government Secondary School Taraku as the experimental group and Government Secondary School Aliade as the control group were sampled out of the 15 public schools in Gwer-East Education Zone. Students in experimental group were exposed to Field-study teaching strategy while those in control group were exposed to lecture method. The two groups of students were taught same concept (Interpretation of Topographic Map Features). The data for this study were based on performance of students

in Topographical Map Reading Performance Test (TMRPT). The results of posttest and post posttest was used to compare their performance according to the variable being measured which were analyzed according to research hypotheses developed for the study. This unit presented explanation of results obtained from the hypotheses tested and acknowledge the published works of other authors to be stated herein after.

Table 4.4 revealed that the Field-study teaching strategy enhanced academic performance of experimental group. This confirmed the findings of Baliiel, Duran, Bilgili (2011), Michie (2007) and Ajaja (2010) which stated that knowledge gains were found to be significant with experimental group using Field-study teaching strategy more than their counter part that were strictly taught in the class using lecture method.

Table 4.5 showed that there was a significant difference between mean score of experimental and control group. Students taught using Field-study retained more interpretation of topographic map features concept than those taught using traditional lecture method. This agrees with the study ofLealey and Michael, (2005). Thomas and Stocton (2010) who recommended that, Field-study teaching strategy should be adopted as a teaching strategy in science because of its influence on retention more than their counterpart that were strictly taught in the class using lecture method. This agrees with the work of Bichi (2012). Aweriale (2016) which showed no significant difference between male and female achievement in science. This result shows that Field-study teaching strategy is gender friendly.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter was discussed under the following headings:

5.2 Summary

5.3 Conclusion

5.4 Recommendations

5.5 Contributions to knowledge

5.6 Limitations of the study

5.7 Suggestion for further study

5.2 Summary

The purpose of this study was to find out the effect of Field-study on retention and academic performance in interpretation of topographic map features among secondary school students, Benue State, Nigeria. The design of the study was quasi-experimental involving pre-test posttest and post posttest. The sample for the study consists of 116 SS11 Geography students. Three research questions were raised and three null hypotheses were formulated. The research questions were answered using descriptive statistics such as mean and standard deviation. The null hypotheses were analyzed using t-test.

From the result of analysis discussed in Table 4.2. Field-study teaching strategy favored the experimental group in interpretation of topographic map features concept. The study shows that there is significant difference in performance of students taught interpretation of topographic map features using Field-study teaching strategy and those taught by lecture method. The study further confirmed that Field-study teaching strategy is a good tool in teaching interpretation of topographic map features at secondary school level.

5.3 Conclusion

i. Generally, it was confirmed that there was high significant between the mean scores of experimental and control groups in interpretation of topographic map features concept.

ii. In addition, there was high significant difference between experimental and control groups on retention ability.

iii. There is no significant difference between performance of male and female students in learning interpretation of topographic map features using field-study teaching strategy

iv. There is no significant difference between retention ability of male and female students inlearning interpretation of topographic map features using field-study teaching strategy.

v. However, it was statistically shown that Field-study teaching strategy favored experimental group in learning interpretation of topographic map features concept.

5.4 Recommendations

Based on the findings of the study the following recommendations were made:

i. teaching and learning strategy involving student's participation such as Field-study to been encouraged at secondary schools where this is often neglected.

ii. The use of Field-study should be encouraged in secondary schools, hence it enhanced betterretention.

iii. Field-study is gender friendly, it should be encouraged among Male and Female students at secondary school level.

iv. All materials needed for carrying out Field-study should be provided by the Government because it motivates students to learn effectively.

5.5 Contributions to Knowledge

The finding of the research adds new idea to the existing body of knowledge as:

i. A package of checklist was developed to serve as a Field-study guide for easy identification of topographic features.

ii. Interpretation of Topographic performance Test and a Flow Chart were adopted and modified by the researcher.

iii. Different Topographic land features were discovered during Reconnaissance survey and will be useful to other researchers.

iv. Field-study teaching strategy was used on interpretation of topographic map features in Gwer-East Education Zone, which is relatively new area.

5.6 Limitation of the Study

i. Security challenges: there was serious concern about security due to the fact that north-central states especially Benue State, were under Fulani/ Farmers herders' threat, so taking group of students outside caused a lot of distraction.

ii. language barrier: It was observed that some students do not understand simple geographicalterms or even English grammar. Therefore, a means was developed through student-to-student relationship to explain such terms.

iii. Lack of motivation by the parents: It was observed that some parents do not support orencourage their children to go out for Field-study.

iv. Lateness on the part of the students.

5.7 Suggestions for Further Studies

This research intended to promote and encourage further finding in the related studies; hence, the following research areas were suggested:

i. Effect of Field-study on students' academic performance attitude and school location in interpretation of topographic map features at secondary school level.

ii. Effect of Field-study on student performance and interest among senior secondary school students.

iii. Effect of teacher factor on Field-study teaching strategy in interpretation of topographic map features at senior secondary school level.

iv. Effect of administrator factor on Field-study on academic performance in map-readingconcept at senior secondary school level.

The study can be repeated in other educational zones.

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Appendix A
Topographical Map Reading Performance Test (TMRPT)
Subject: Geography

Class:.....

Name of School:.....

Name of Student:.....

Gender Male[ ] Female[ ]

INSTRUCTION:

Attempt all the questions using the Map extract provided. Choose the correct answers from the alternatives lettered A-D. Circle the letter that bears the option you have chosen.

1. The areas above 1000 meters above sea-level lie in the: (A) North-East (B) East (C) North-west (D) South.

2. The highest point on the mapped area is in the: (A) North (B) South (C) East (D) West.

3. The vertical interval of the map is: (A) 100 (B) 50 (C) 150 (D) 200.

4. A steep slope on the map is: (A) V to H (B) X to Y (C) D to X (D) C to D.

5. A convex slope on the map is? (A) A-C (B) X-C (C) D-X (D) D-Y.

6. The feature marked "B" in the West of Owu is (A) a spur (B) a col (C) a ridge (D) a plateau.

7. Which of the following statements is NOT TRUE of the relief of the mapped area? a. The area generally consists of a huge plateau. b. The main highland runs from east to west. C. The Northern section of the area is generally low-lying. d. There is a main Ridge that runs from the South-east to the South-west.

8. The feature marked "C" on the map is a: (A) Col (B) Pass (C) Gorge (D) Ridge.

9. The highest point on the mapped area is about: (A) 517m (B) 1100m (C) 650m (D) 850m.

10. The feature marked 'A' on the map can best be described as a: (A) Spur (B) Plateau (C) Valley (D) Conical Hill.

11. The main River in the mapped area has its main tributaries from: (A) Lowlands in the East (B) Highlands in the South (C) Highlands in the North-West (D) Highlands in the North-East.

12. The feature marked "K" in the map is a (A) Plateau (B) Valley (C) Conical Hills (D) Trigonometric station.

13. There are no settlements in the North-West part of the mapped area probably because: (A) It has a rugged relief (B) It is not a ridge (C) It is located on a swamp (D) It is in a valley.

14. The feature marked "W" on the map is a: (A) Ridge (B) Knoll (C) Pass (D) Conical Hill.

15. Which of these is NOT a significant lowland feature in the mapped area? (A) A plain (B) Spur (C) Valley (D) Sandbars.

16. Which of these are not common features of lowland in the mapped area? (A) They are flood plains (b) They are mainly Rivers Basins (C) They are coastal plains (D) They are undulating.

17. The lowest point on the mapped area is about: (A) 400m (B) 500m (C) 300m (D) 250m.

18. Which of these are not dominant lowland features associated with the mapped area? (A) Valleys (B) Flood plains (C) Undulating plains (D) Dissected plains.

19. Which of these is NOT true of the lowlands in the mapped area? (A) They have many dry valleys (B) They are River valleys (C) They are undulating (D) Most settlements are located there.

20. The Southern parts of the mapped area have few settlements because: (A) It is mainly a forest reserved (B) Because of their infertile soil (C) High incidence of river borne diseases (D) Of the ridge in the area.

21. The largest number of settlements in the mapped area located in: (A) Low-lands areas (B) On the ridge (C) Plateau in the area (D) High relief area.

22. The distribution of settlements in the area is mostly influenced by: (A) Relief (B) Drainage (C) Vegetation (D) Climate

23. There are no settlements immediately south of Owu because (A) The area is a plateau (B) The area is flat (C) Nobody wants to live there (D) The area has steep slopes.

24. The largest settlement in the mapped area is located on a height approximately (A) 750m (B) 300m (C) 380m (D) 500m.

25. Which of these reasons does not represent why the area around South-west are uninhabited? (A) High relief area (B) Rugged relief (C) Area liable to flooding (D) Steep slope.

26. Settlements in the mapped area tends to avoid the Ridges in the area because (A) The ridges are not habitable (B) The area experiences volcanic eruption (C) Rivers take-off from the Ridges (D) None of the above.

27. The likely reasons why "Olodu" village has more means of transportation than "Aku" village is (A) Olodu is nearer a river than Aku (B) Olodu is a bigger settlement than Aku (C) Olodu is located on a pass (D) Olodu is on lowland area why Aku is on highland area.

28. Which of these is NOT TRUE of the relationship between relief and transportation in the mapped area? (A) The main road passes at the foot of the Ridge (B) Roads tend to avoid High relief area in the south (C) Major transportation routes are dominant in the lowland areas (D) Transportation routes are not influenced by relief in the mapped area.

29. The pattern of transportation in the mapped area is mostly influenced by relief because (A) There are rivers on the lowland areas (B) A ridge runs from east to west (C) Most transportation routes located on the lowland areas. (D) There are more transport route in the high relief areas.

30. A remarkable feature in transport in the mapped area included the following, except: (A) There is no difference in the distribution of transport routes in the Low and High areas. (B) Transport routes are concentrated more on the lowland than on highland areas (C) There are more transport routes in High land areas compared to lowland areas (D) The main road in the mapped area tends to avoid rugged relief areas.

Appendix B
Marking Scheme for the Instrument (TMRPT)

1. D. 2. B. 3. B. 4. C. 5. A. 6. D. 7. D. 8. D. 9. D. 10.D.11.D12. B. 13. C.14. B. 15. D. 16.C.17. C 18. D. 19. A 20. A 21. A 22. A23. A 24. B25. C. 26. D27. D 28.D 29. C 30. C.

Appendix C
Checklist for the Identification of Topo-features

The following procedure were used as field guide.

Tick appropriately what you observe.

Characteristics of topographic features

a. Water bodies

b. Highland

c. Lowland

d. Undulating surfaces

e. Slope orientation

f. Transport routes

g. Plantation

h. Settlement

i. Farmland

LESSON PLAN 1

Experimental Group (Field-Study Teaching Strategy)

Subject: Geography

Topic: Contours and Vertical Interval

Class: SS11

Duration: 40 minutes

Instructional Material: map-extracts, landscape features, rulers, pins, thread, essential Geography textbook.

Objectives: By the end of the lesson students should be able to:

i. Explain the term contour lines

ii. Identify contour lines of specific maps given.

iii. Shade areas within given contour lines

Previous knowledge: Students have been taught about maps and map scales

Introduction: The teacher introduces the lesson by asking students some question from the previous knowledge. Example what are Topo-maps?

Presentation: Lesson starts by given every student a copy of checklist as a guide

Step 1. Students visit the environment to see how contour lines are derived in the natural environment.

Step 2. Students see different relief features in the natural environment

Step 3. Students observe different characteristics of relief features in the natural environment

Step 4. Teacher discussed with the students about contour lines representation

Evaluation: The teacher evaluates the lesson by asking the students questions based on the activity done.

i. Explain the term contour lines

ii. Identify contour lines of specific maps given.

Conclusion: The teacher concludes the lesson by summarizing the topic learnt.

LESSON PLAN2

Experimental Group (Field-Study Teaching Strategy)

Subject: Geography

Topic: Contour Representation of Highland Relief Features.

Class:SS11

Duration: 40 minutes

Instructional Materials: map extract, topographic map sheets, essential Geography text book

Objectives: By the end of the lesson students should be able to:

i. Identify the following highland relief features on a topographic map: gentle slope, steep slope, concave and convex slopes, ridge, plateau, conical hill
ii. Represent the above relief features correctly using contour lines
iii. Described correctly, the highland relief features on a given topographic map

Previous knowledge: Students have been taught about contour lines and vertical interval

Introduction: The teacher introduces the lesson by asking students some question from the previous knowledge. Example what are contour lines?

Presentation: Lesson starts by given every student a copy of checklist as a guide

Step 1. Students visit a nearby highland to see the highland relief features in the natural environment.

Step 2. Students see different highland relief features from the natural environment

Step 3. Student observe the different highland relief features in the natural environment

Step 4. Teacher discussed with the students about highland relief features in the class room

Evaluation: The teacher evaluates the lesson by asking students questions based on the activity done.eg Explain highland relief features.

Conclusion: The teacher concludes by summarizing the topic learnt

LESSON PLAN 3

Experimental Group (Field-Study Teaching Strategy)

Subject: Geography

Topic: Contour Representation of Lowland Relief Features

Class: SS11

Duration: 40 minutes

Instructional Materials: Topographic map extract, essential Geography.

Objectives: By the end of the lesson the students should be able to:

i. Identify the following lowland relief forms, valleys, spurs, undulating plains, knolls on a given topographical map

ii. Use contour lines to represent each features correctly.

iii. Interpret a given topographical map correctly with regards to lowland relief features.

Previous Knowledge: Students have been taught about contour representation of highland relief features.

Introduction: The teacher introduces the lesson by asking students some question from the previous knowledge. Example, Describe highland relief features.

Presentation: Lesson starts by given every student a copy of checklist as a guide

Step 1. Students visit an area with relatively lowland relief features.

Step 2. Studentssee different lowland features from the natural environment

Step 3. Students observe the different characteristics relief features of lowland areas.

Step 4. Teacher discussed with the students about contour representation of lowland relief features.

Evaluation: The teacher evaluates the lesson by asking students question based on the activity done.eg Explain lowland relief feature ii. List four characteristics of lowland relief features.

Conclusion: Teacher concludes the lesson by summarizing the topic learnt.

LESSON PLAN 4

Experimental Group (Field-Study Teaching Strategy)

Subject: Geography

Topic: Relating Relief to Settlement.

Class: SS11

Duration: 40 minutes

Instructional Materials: Topographic map sheets, essential Geography.

Objectives: Bythe end of the lesson students should be able to:

i. Identify the settlements pattern in the map.

ii. Explain the effects of high relief on settlements.

iii. Explain the effects of low relief on settlements.

Previous Knowledge: Students have been taught about low land relief features.

Introduction: Lesson will be introduced by asking students some questions from the previous knowledge. Describe lowland relief features. ii. List characteristics of lowland relief features.

Presentation: Lesson starts by given every student a copy of checklist as a guide.

Step 1. Students visit an area with settlement in the study area.

Step 2. Students see the settlement pattern in the study area.

Step 3. Students observe characteristics of the settlements.

Step 4. Teacher discussed with the students on how to relate relief to settlement.

Evaluation: Teacher evaluates the lesson by asking students questions based on the activity done.eg Describe the effects of relief (highland and lowland) on settlements.

Conclusion: Teacher concludes by summarizing the topic learnt.

LESSON PLAN 5

Experimental Group (Field-Study Teaching Strategy)

Subject: Geography

Topic: Presentation of Group Work

Class: SS11

Duration: 40 minutes.

Instructional Material:

Objectives: By the end of the lesson students should be able to:

i. Share ideas

ii. Ask themselves questions

iii. Find out relevant solution to problems raised.

Previous Knowledge: Students have been taught about interpretation of topographic map features.

Introduction:

Presentation: Lesson starts by given every student a copy of checklist as a guide.

Step 1. Group 1 will present their finding on contour representation

Step 2. Group 2 present their finding on highland relief features.

Step 3. Group 3 present their finding on lowland relief features.

Step 4. Group 4 present their finding on relating relief to settlement.

Evaluation: The teacher evaluates the students by making comment, observation, and constructive criticism on the presentation made.

Conclusion: Teacher concludes the lesson by summarizing all the topics learnt.

Appendix E
Lesson Plan for Control Group Using Lecture Method

Control Group (Lecture Method)

Subject: Geography

Topic: Contours and vertical intervals

Class: SS11

Duration: 40 minutes

Instructional Materials: Photographs of relief features, essential Geography.

Objectives: By the end of the lesson students should be able to:

i. Explain the term "Contour Line"

ii. Explain the term vertical interval

iii. shade areas within given contour lines correctly.

Previous Knowledge: Students have been taught about map-work

Introduction: Teacher introduces the lesson by asking students some question from the previous knowledge. What is a map? Mention some types of map you know.

Presentation: Lesson will be presented in the following steps.

Step 1. Teacher defined topographic maps i.e. topographic maps are graphic representation of features that appear on the earth surface.

Step 2. Teacher explained to the students how to interpret features on topographic maps.

Step 3. Teacher mentioned some characteristics features of topographic maps.

i. Contour lines

ii. Highland relief features, Lowland relief features.

iii. Water bodies and vegetation cover etc.

Evaluation: Teacher evaluates the lesson by asking students some questions. e.g

i. Explain the term contour lines

ii. What is vertical interval?

iii. Shade areas within given contour lines.

Conclusion: Teacher concludes by summarizing the topic learnt e.g brief explanation about contour lines and vertical interval of a given topographic map.

LESSON PLAN 2

Subject: Geography

Topic: Contour Representation of Highland Relief Features

Class: SS11

Duration: 40 minutes

Instructional Materials: Photographs of relief features, topographic map sheets, essential Geography.

Objectives: By the end of the lesson students should be able to:

i. Sketch contour lines that represent highland relief features such as gentle and steep slopes; convex and concave slopes; conical hills; plateaux.
ii. Identify specific highland relief features on topographic maps.
iii. Describe highland relief features on a given topographic map.

Previous Knowledge: Students have been taught about contours and vertical interval.

Introduction: Teacher introduces the lesson by asking students some question from the previous knowledge. What are contour lines? Explain the term vertical interval.

Presentation: lesson will be presented in the following steps:

Step 1. Teacher explained highland relief features ie highland relief features are any mountainous region or elevated mountainous plateau.

Step 2. Teacher showed the students photographs of highland relief features

Step 3. Teacher mentioned some various types of highland relief features

i. Escarpment
ii. Plateaux
iii. Mountains etc.

Evaluation: Teacher evaluates by asking students some question.eg

i. Sketch contour lines of highland relief features.
ii. Identify various types of highland relief features.

Conclusion: Teacher concludes by summarizing the topic learnt e.g brief explanation about highland relief features and various types of highland relief features

LESSON 3

Subject: Geography

Topic: Contour Representation of Lowland Relief Features

Class:SS11

Duration: 40 minutes

Instructional Materials: Photographs of relief features, topographic map sheet, essential Geography.

Objectives: By the end of the lesson students should be able to:

i. identify the following lowland relief features: Valleys, Spurs, Undulating plains, Knolls, on a given topographical map.

ii. use contour lines to represent such features.

iii. interpret a given topographic map with regards to lowland relief features.

Previous knowledge: Students have been taught about highland relief features

Introduction: Teacher introduces the lesson by asking students some question from the previous knowledge. Sketch highland relief features and mention various types of highland relief features.

Presentation: Lesson will be presented in the following steps:

Step 1. Teacher explained lowland relief features i.e . lowland relief features are areas not very high above sea level.

Step 2. Teacher mentioned some characteristics of lowland areas, they are often flat, they are form of sedimentary rocks like sandstones and clay,

Step 3. Teacher mentioned the various types of lowland relief features:

i. valleys

ii. spurs

iii. plains etc.

Evaluation: Teacher evaluates the lesson by asking some question.eg

i. sketch lowland relief features

ii. mention various types of lowland relief features.

Conclusion: Teacher concludes by summarizing the topic learnt e.g brief explanation about lowland relief features and types of lowland relief features.

LESSON PLAN 4

Subject: Geography

Topic: Relating Relief to Settlement

Class:SS11

Duration: 40 minutes

Instructional Materials: Photographs of relief features showing settlements, topographic map, essential Geography.

Objectives: By the end of the lesson students should be able to:

i. identify the settlement pattern on a map

ii. explain the effects of highland relief on settlement

iii. explain the effects of lowland relief on settlement

Previous Knowledge: Students have been taught about lowland relief features

Introduction: Teacher introduces the lesson by asking students some question from the previous knowledge. Describe lowland relief features and mention types of lowland relief feature

Presentation: Lesson will be presented in the following steps.

Step 1. Teacher defined settlement i.e. settlement is a colony or any small community of people.

Step 2. Teacher mentioned forms of settlements e.g compact, semi-compact, and dispersed settlements

Step 3. Teacher mentioned different purposes of settlement, farming, industries, schools, home-stead etc.

Evaluation: Teacher evaluates the lesson by asking students question based on the activity done e.g

i. Define settlement

ii. Mention forms of settlements

Conclusion: Teacher concludes by summarizing the topic learnt e.g. brief explanation about settlement and their forms.

LESSON PLAN 5

Subject: Geography

Topic: General revision

Class: SS11

Duration: 40 minutes

Instructional Materials: Topographical map sheet, essential Geography.

Objectives: By the end of the lesson students should be able to:

i. use contours to represent specific relief features

ii. identify vertical intervals of given maps

iii. relate settlement of given topographical maps to relief

Previous Knowledge: Students have been taught about interpretation of topographical map features.

Introduction: Teacher introduces the lesson by asking students some question from the previous knowledge.

Presentation: Lesson will be presented in the following steps.

Step 1. Teacher explained contour lines representation

Step 2. Teacher explained highland relief features.

Step 3. Teacher described lowland relief features

Step 4. Teacherexplained how to relate relief to settlement.

Evaluation: Teacher evaluates the lesson by asking students question based on the activity done.

i. Explain contours representation, highland relief feature, lowland relief feature, and how to relate relief to settlement

ii. Sketch contours lines of highland, lowland relief features.

Conclusion: Teacher concludes by summarizing the topic learnt.

Appendix F

Scores of Pretest, Posttest and Post posttest of both Experimental and Control Groups for TMRPT

Note: TMRPT contained 30 items, so it is marked over 30

Pretest

S/no.	Experimental group	Control group.
1.	06	07
2.	07	10
3.	07	05
4.	04	11
5.	02	06
6.	09	02
7.	09	08
8.	02	05
9.	11	12
10.	07	07
11.	05	07
12.	05	07
13.	05	04
14.	08	07
15.	05	07
16.	07	02
17.	06	05
18.	07	07
19.	04	08
20	06	06
21.	07	06
22.	06	07
23.	08	05
24.	09	02
25.	06	06
26.	07	13
27.	08	13
28.	10	06
29.	07	07
30.	11	07
31.	05	04
32.	02	04
33.	06	02
34.	05	09
35.	08	09
36.	07	02
37.	12	11
38.	07	07
39.	07	05
40.	04	05
41.	05	05
42.	07	08
43.	07	05
44.	05	06

45.	02	07
46.	08	04
47.	07	07
48.	06	06
49.	06	08
50.	05	06
51.	07	06
52.	06	09
53.	02	08
54.	13	07
55.	11	07
56.	10	08
57.	-	05
58.	-	10
59.	-	11
60.	-	08

Scores of posttest of both experimental and control groups for TMRPT.

S/no.	Experimental group	Control group
1.	21	13
2.	21	13
3.	27	14
4.	26	15
5.	14	13
6.	25	14
7.	24	10
8.	27	10
9.	27	19
10.	26	14
11.	25	14
12.	24	13
13.	23	11
14.	23	11
15.	23	13
16.	29	12
17.	21	10
18.	22	15
19.	26	11
20.	26	10
21.	26	13
22.	26	13
23.	13	13
24.	28	14
25.	24	12
26.	25	12
27.	25	12
28.	27	13
29.	26	21
30.	26	10
31.	26	11
32.	25	11
33.	27	14
34.	27	13
35.	28	13
36.	21	13
37.	14	13
38.	17	13
39.	20	10
40.	29	11
41.	29	13
42.	24	14
43.	25	12
44.	25	11
45.	25	13
46.	27	10
47.	27	13
48.	27	14
49.	27	14
50.	26	13
51.	27	14
52.	25	13

53.	24	09
54.	26	11
55.	12	12
56.	11	10
57.	-	13
58.	-	13
59.	-	08
60.	-	08

Scores of post post-test of both experimental and control groups for TMRPT

S/no.	Experimental group	Control group
1.	22	09
2.	21	08sss
3.	27	11
4.	26	12
5.	13	10
6.	15	11
7.	24	08
8.	27	09
9.	27	15
10.	25	10
11.	25	11
12.	23	09
13.	23	08
14.	23	10
15.	23	10
16.	29	10
17.	20	09
18.	22	12
19.	26	09
20.	25	09
21.	25	11
22.	36	11
23.	12	11
24.	27	10
25.	24	10
26.	25	10
27.	24	10
28.	25	19
29.	26	05
30.	25	07
31.	26	10
32.	26	10
33.	25	11
34.	27	12
35.	27	13
36.	27	12
37.	20	12
38.	13	11
39.	17	09
40.	20	09
41.	28	09
42.	28	10
43.	24	10
44.	24	11
45.	24	11
46.	25	09
47.	26	10
48.	27	10
49.	27	10
50.	20	10
51.	25	10
52.	25	11

53.	25	05
54.	23	09
55.	26	11
56.	11	09
57	-	11
58	-	12
59	-	05
60	-	04