EFFECTS OF FIELD- TRIP ON RETENTION AND ACADEMIC ACHIEVEMENT IN ECOLOGY AMONG SECONDARY SCHOOL STUDENTS IN ZARIA, NIGERIA.

BY

Yau AHMAD
BSC.ED.BIOLOGY, UJ (1997)
MED/EDU/1523/2009-2010

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DECLARATION

I hereby declare that this thesis entitled Effects of field- trip on Retention and Academic Achievement in Ecology among Secondary School Students in Zaria, Nigeria, has been carried out by me and in the department of science education. The information derived from the literature has been duly acknowledged in the text and list of references provided. No part of this thesis was previously presented for another degree or diploma at this or any other institution.

Ya'u AHMAD

_____	_____	_____
Name of Students	Signature	Date

DEDICATION

This work is dedicated to my parents Malam Ahmad Abdullahi and Aisha Abdullahi, and my family Malama Bilkisu Alhasan (wife}, Sumayya, Aliyu, Aisha, Abdullahi, Usman, Fatima (Children) and all those who have contributed immensely towards the success of this thesis and my Education.

CERTIFICATION

This thesis entitled "Effects of field- trip on Retention and Academic Achievement in Ecology among Secondary School Students in Zaria, Nigeria" by Ya'u AHMAD meets the regulations governing the Award of the degree of Master of Science Education of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

Dr (Mrs) J. O. Olajide	_____	_____
(Chairman Supervisory Committee)	Signature	Date
Dr (Mrs). T. E. Lawal	_____	_____
(Member Supervisory Committee)	Signature	Date
Dr Mamman Musa	_____	_____
(Head of Department)	Signature	Date
Professor A. A. Joshua	_____	_____
(Dean School of Post Graduate Studies)	Signature	Date

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ABBREVIATIONS

NECO National Examination Council

WAEC West African Examination Council

NERDC National Education Resources Development Centre

SSCE Senior Secondary Certificate Examination

WASSCE West African Senior Secondary Certificate Examination

ICT Information Communication Technology

GSS Government Secondary School

EAT Ecology Achievement Test

ERT Ecology Retention Test

GGSS Government Girls Secondary School

FME Federal Ministry of Education

KWL Chart - k- Column representing what the students already know.

W- Column displaying what they want to learn,

L- Column for ideas they learned on the field trip

OPERATIONAL DEFINITION OF TERMS

Teaching Strategy: Is defined as a process oriented model that allows teachers to present ideas and concept at many different levels to meet the needs of a variety of learner.

Ecology Achievement Test: A test designed by the researcher which was administered to both experimental and control groups after the teaching of ecology concept and by using field trip only to experimental group.

Ecology Retention Test: A Test designed by the researcher which was administered to both experimental and control group after 3 weeks of Ecology Achievement Test was administered.

Urban Areas: Rural settlement is an area characterized by higher population density and vast human features in comparison to the area surrounding it.

Rural Areas: Rural area is an area that has low population density and small settlement.

Abstract
The study investigated the Effects of field- trip on Retention and Academic Achievement in Ecology among Secondary School Students in Zaria, Nigeria. An experimental design which utilized Pre-test-Post-test Control Group design was adopted. The population of the study consisted of 2934 SS1 students from nineteen (19) public schools in Zaria Educational Zone of Kaduna State. Four (4) out of nineteen schools were randomly selected from both urban and rural areas where two schools each were used as experimental and control groups respectively. The experimental group was taught using field trip teaching strategy while the control group was taught by lecture method. A stratified random sampling technique was employed to select the sample from the four schools and a total of 200 students were selected as sample size from both urban and rural areas. The instruments used for this study were Ecology Achievement Test (EAT) with reliability value 0.83 and Ecology Retention Test (ERT) with reliability value 0.85 aimed at determining the achievement and retention of the students. Four research questions were stated such as what is the effect of field trip teaching strategy on students' academic achievement in ecology concept in Zaria educational Zone? And four corresponding hypotheses such as there is no significant difference between the mean scores of the students taught ecology concept using field trip and those taught using lecture method were formulated and tested at 0.05 level of significance. After the data were collected; the research questions were tested with descriptive statistics such as mean and standard deviation and the hypotheses were tested using inferential statistics i.e independent sample test (t-test). The finding of the study showed that the field trip teaching strategy favoured the experimental group in ecology concept. The study further confirmed that field trip teaching strategy favoured urban experimental group. One of the major recommendations made is that Government should make the use of field trip teaching strategy compulsory particularly in the teaching and learning of ecology concept at senior secondary school level.

CHAPTER ONE
THE PROBLEM

1.1 Introduction

Science, from its linguistic origin derived from the Latin word "Scienta" which means "Knowledge" (Eneh 2000). Science as a branch of knowledge is the systematic study of things around us. The totality of Knowledge obtained from such studies constitutes scientific knowledge. In addition science deals with nature, by observing it and later to experimental investigation (Anaso, 2007 and Kalu 2007).

In science education, students are exposed to several methods/ strategies of teaching and learning of science. These include lecture method, demonstration, discovery, discussion, laboratory activities, co-operative learning etc, depending on the aspect one wants to teach. Usman, (2008), defines science as to consist of specific branch of a general body of knowledge such as Biology, Chemistry,, Physics, Geology or Astronomy to mention but a few.

Biology as a branch of the general body of knowledge (science), has been defined by different scientists according to perception and understanding of the subject. Okwo and Tawtiyas, (2000) define biology as a science which involves systematic study of living things and interaction with each other and their environment. Kalu, (2007) simply defines biology as the science of life. Biology as a science of life is concerned with the characteristics of living things, their forms, functions and relationship with one another and with their environment among others.

However, for effective biology teaching, the use of method/strategy which would make the use of the environment would achieve much and bring home the actual meaning of the concepts. Among science subjects (chemistry, physics and biology), biology is the most popular (Ibrahim 2008). It is a core (compulsory) subject for almost all Senior Secondary

Schools Students in Nigeria. Also, the basic knowledge of biology is a prerequisite for studying a number of disciplines such as medicine, agriculture, pharmacy, microbiology, biochemistry and psychology among others (Bichi, 2003, Kalu and Ndokwo, 2006). So, the use of strategy that will ground the students in biology concept should be used. The present study investigates the effects of field trip on students' academic achievement and retention in ecology concept at senior secondary school level.

Biology plays a vital role in the economic development of a nation. This is because Ajaja, (2008) said that recent advances recorded in the field of biochemistry, physiology, ecology, genetics and molecular biology, have made the subject a central focus in most human activities including solutions to the problem of food scarcity, pollution, population explosion, radiation, disease, health, hygiene, family life, poverty eradication, management and conservation of natural resources as well as biotechnology and ethics.

Due to immense benefits of the subject (Biology) to both individual and societal development, the Federal Government of Nigeria, in the National policy on education, (FME 2005), made biology a core science subject at the senior secondary school (SSS). The objectives of biology Programme are:

- Adequate laboratory and field skills in Biology;
- Meaningful and relevant knowledge in biology;
- Ability to apply scientific knowledge to everyday life in matters of personal and community health and Agriculture;
- Reasonable functional scientific attitudes and
- Emphasis of content and context of the syllabus is placed on: field studies, guided-discovery/Biology as inquiry (FME 2005).

Thus, from the above objectives, an outdoor strategy such as field trip has been recommended by FME for its implementation for the accomplishment of biology objectives in the secondary schools in Nigeria. However, despite the recommendation on field trip as a strategy for teaching biology, many biology teachers in the various secondary schools still teach biology concepts using only traditional method ie lecture method (Usman, 2000).

There are different branches or concept of biology and there are different ways of dealing with them effectively. For instance, there is anatomy and physiology, genetics, evolution, nervous co-ordination, among others, much of which can be taught effectively by demonstration, discovery, lecture method, activity based in the class room and/or indoor laboratory. There is an aspect in biology that is referred to as ecology that requires students to be taken out to see living organisms in their natural habitats.

Ecology is defined as the study of the relationship of organism or group of organisms and their environment; or the science of the interrelationship among living organisms and their environment. Also, ecology is concerned with the biology of groups of organism with functional process on land in the oceans and in fresh water (Odum, 1971 and Obeka, 2010). The ecology concepts include the following: habitat, population, ecosystem, succession, adaptation, conservation, pollution, cycling material, biological control, community, biotic interaction, soil studies erosion, ecology and disease, sewage disposal, ecological study, feeding relationship, energy, environment to mention just a few. An outdoor strategy seems to have advantages in the teaching and learning of ecology in many ways; some of these are:

i. It is best to study organism in their natural environment,

ii. It also enables teachers to teach for acquisition of scientific skills which is a major goal of science education.

Ecology deal with the interaction of organisms and environment need to be taught with an appropriate method or strategy of teaching that requires direct observation of organisms in natural habitat. These organisms may be within or far away from the school. One of the most effective strategies to teach this aspect may be by taking the students to the natural habitat of the organisms. This strategy is called field trip.

A field trip is taking students outside the classroom for the purpose of making relevant observations and also obtaining some specific information. It could be in a nearby school farm, national park, zoo, *i*ndustry, forest or game reserve. It is an important component of science teaching (Bajah, 2002). According to Obeka, (2010) Field trip is an outdoor type of laboratory activity or field work or learning exercise undertaken by teachers and students in certain aspects of a subject, to give students the opportunity to acquire knowledge.

In addition, Aliyu, (2008) observes that field trip is taking students out of the classroom to places where they can see concrete illustration of classroom theories. It also offers direct observation and interpretation of the substance in their natural surroundings. It is on the spot requires the use of basic scientific skills that is observation, identification, classification and manipulation of substance in the natural surroundings. It provides real life context for the material being learned. It can make more sense and be remembered better if students can actually see where and how they work or take place in reality. This is in line with a Chinese proverb cited by Ukairo, (1978) that says;

What I hear, I forget;

What I see, I remember; and

What I do I understand.

However, field trip is not the only method/ strategy for effective teaching and learning of concepts in biology which can gear towards the training of the individual through child-

centered learning for maximum self and societal development. There are some strategies like problem solving, inquiry, questioning teaching strategy, discovery approach, concept mapping e.t.c. All these approaches could be used for teaching different concepts to make learning more effective, meaningful and relevant in biology. However, these approaches cannot be effectively used in the teaching and learning of ecology concept. Therefore, the study investigated students' academic achievement and retention ability in ecology concept using field trip teaching strategy.

However, some biology teachers do not discriminate, in the method they use in teaching. They teach all aspects of biology by lecture method (Okafor, 2002), this may be one reason for poor performance of students in this subject (Biology). And it is high time teachers of science began to vary in the methods/strategies they use to teach the different aspects for effective measures, so that students would be able to learn more, retain more, and apply what is learnt by engaging in significant activities. It is on the basis of improving students learning in biology, that the study focuses on field trip teaching strategy particularly for ecology concept which may help the students to partake fully in set out activities.

Lecture method is the teacher-centered method, which is seen as the traditional talk-chalk method of teaching where the teacher does the talking while students serve as receives only by listening and taking down notes. Obeka, (2009) described lectures method as a teacher-centered method. It further said that the method comprises the acquisition of subject matter usually by memorization and close supervision of the students by the teacher. However, lecture method does not require the use of basic science skills (observation, identification, classification and manipulation of substances in their natural environment). Therefore, it' cannot be used effectively in teaching and learning of ecology concept in

biology. Instead, field trip teaching strategy alongside lecture method of teaching may serve to improve students' academic achievement.

Teaching strategy, therefore, is simply defined as a process oriented model that allows teachers to present ideas and concepts at many different levels to meet the needs of a variety of learners (Bloom, 1956 and 2007). Shelley, (1998) stated that field trip falls under the category of teaching strategy because of the high potential for hands-on learning for the participants. It is also seen as a fun day away from school. The students are able to see the concepts learned in class work in the real world through direct observation of organisms in their natural environment by the process known as field trip. This study investigated the effect of field trip teaching strategy on students' academic achievement in biology.

Academic achievement is based on the degree of intellectual stimulation that the child could receive from learning situation, (Obeka, 2009). According to Blaiv, (2000), to achieve is to accomplish or gain by effort or do something successful with an effort and skill.' Love, (1973) in Okafor, (2000) on the other hand maintained that academic achievement concerns with mental health care. According to him, mental health has its basis, physical health, and intellectual skills which lead to satisfactory means of adjustment, social sensitivity and adequate self concept. Scientist such as Okafor, (2002); Kalu (2007); are therefore, concerned with how to improve the students' academic achievement and retention ability in science particularly biology. Hence the present study investigated the effects of field trip teaching strategy on the student's academic achievement and retention ability in biology.

Another variable which can be affected by teaching method is the students' ability to retain concept. Retention is the ability to preserve and later remember information or knowledge gained after learning (Bichi, 2002). It takes place when learning is coded into memory. Thus, appropriate coding of incoming information provides the index that may be

consulted so that retention takes place without an elaborate search in the memory lane (Oyedokun, 2000). The nature of the material to be coded contributes to the load of retention materials are related to, the quality of retention in terms of their meaningfulness, familiarities, concreteness and image involving characteristics (Adeniyi, 2004). This research investigated the effects of field trip teaching strategy on academic achievement and retention ability in ecology concept among urban and rural school location at senior secondary level.

Urban area is an area characterized by high population density and vast human features in composition to the area surrounding it. Urban settlements include towns and cities. They represent "organisms" within socio-economic sphere with roads as arteries and residential zones as main organs of a body. The function is mostly administrative (seat of regional administrative bodies), economic (Providing jobs), cultural (including entertainment). Normally, every commune with number of inhabitants more than 2,000 is considered to be urban settlement. The rural area is a geographical area that is located outside cities and towns. It is an area that has low population density and small settlement. Rural settlement includes communes and villages. Their function is mostly residential only. People sleep their work in a nearby town. Rural comprises all the settlements with number of inhabitants up to 2,000.

This definition and characterization of urban and rural settlement is a global average. However, the numbers of other parameters like mobility, types of streets for settlements vary within regions. The inter phases of settlements between urban and rural exhibit uban-rural and rural –urban characters (Abdulkarim 2012).

The field-trip could be of a benefit to all the students regardless of the geographical location (urban or rural) of the school. In the urban settlement, certain facilities such as light electricity, clean water source, hospitals, good roads etc are available. These are not usually

available in the rural settlements. The students in urban school are not exposed nor have access to many physical Ecological habitats like river, ponds farmland, mountain, but that may be only through Information and Communication Technology (ICT). And also students from rural areas are used to many ecological habitats for their day to day activities but they may not know the scientific and English names, the scientific benefit behind, adoptive feature and the interaction of the organisms, the possible food chain exist in each habitat, and they don't have access to Information and Communication Technology (ICT). Therefore, taking students out of the classroom regardless of where the school is located, to the natural habitat of the living organism, to observe, identify manipulate is very vital. The present study investigated the effects of field trip on students' academic achievement and retention among urban and rural school location in ecology at senior secondary school level.

1.1.1 Theoretical Frame Work of Field –Trip

Field trip can be considered as one of the three avenues through which science can be taught: through formal classroom teaching, practical work and field trips. The theoretical basis for field trip was Piaget's (1952) developmental theory of learning and thinking "that the child should be able to explore his environment for effective learning".

A central component of Piaget's (1952) developmental theory of learning and thinking is involving the participation of the learner. He said that knowledge is not merely transmitted verbally but must be constructed and reconstructed by the learner. Piaget asserted that for a child to know and construct knowledge of the world the child must act on objects and it is this action which provides knowledge of those objects; the mind organizes reality and acts upon it. Since field trips involve taking the students or learner to the natural environment of

the object(s), the learner should have the ability to act on object(s) by observing, identifying, classifying and even by manipulating the object(s) in its natural environment.

In support of Piaget's, Bruner (1960) held the view that learning occurs by self discovery. The students are exposed to basic concepts to discover things for themselves. This could be through field work and practical orientation by science educator and learner. Obeka, (2010) supported this view that during field trips the learner observe the different rock sample to be able to appreciate the characteristics features of rocks so as to sort them into sedimentary, metamorphic and igneous rocks.

In his contribution, Okafor, (2001) on philosophy of pragmatism maintained that experience is the center of learning. Accordingly it must be both in body and soul". Thus experience and the child's environment is a strong base in considering the development of field trip teaching strategy.

The field trip must therefore be within the experimental world of the child. Hence, it involves leaning by doing between the child and his environment. The experiences involve in field-trip strategy are learning by doing, problem solving and practical work which agrees with the pragmatist theory.

In their contributions Sorrentino and Bell,(1970) in reviewed texts and research by summarized reasons for taking field trip into five attributed values: providing firsthand experience, stimulating interest and motivation in science, giving meaning to learning and interrelationships, observation and perception skills and personal (social) development. Qualitative studies of the attitudes of teachers towards field trip were undertaken by Falk and balling (1979), Fido and Gayford, (1982), Muse, chiarelatt and Davidman, (1982),

Fred, (2007), and Aliyu, (2008), the researchers found that, in the opinion of teachers, the positive benefits derived from trips are hand on, real world experiences, quality of education,

positive attitude to science and motivation towards the subject. Therefore, the present study adopted field trip teaching strategy and investigated the effects on students' academic achievement, and retention among rural and urban schools location in ecology at senior secondary school level.

1.2 Statement of the Problem

Several studies on achievement in biology concepts among Nigerian final year secondary school students revealed under achievement (Adeniyi, 2004, Soyinbo, 1996, Okafor, 2002, Uzochi, 2007, Usman, 2008, Ibrahim, 2008 and Ajaja, 2010). The poor performance has been attributed to the attitudinal problems of students (Okafor, 2002), cognitive and socio-economic problems of teachers (Adeniyi, 2004), administrative problems of policy makers (Okafor, 2002), method of teaching (ie using lecture method, discussion, indoor laboratory) across all concepts in biology (Okafor, 2002 and Usman 2000) and also teacher factor may be due to poor mastery of subject matter which result in skipping of topics, (Shuaibu and Usman, 2002, Okoli, 2006, and Okeke, (2007). These poor performances are evident in the statistics of WAEC results for science subjects from 2006 – 2010 which indicated the poor performance of students in biology (Table 1.1). This poor performance in biology forms the basis for this study.

Table 1 .1: Biology WAEC/SSCE Results for Biology from 2006-2010

Year	Total No. that sat for the exam	Total pass	% pass	Total failure	% failure
2006	1,232989	727463	59.15	505526	40.58
2007	358260	182718	51.91	175542	48.09
2008	753300	286254	38.7	467046	61.3
2009	1,265090	620291	49.2	644799	50.8
2010	506,628	208,231	41.2	297,789	58.8

Sources: Federal Ministry of Education, Lagos (2010)

Table 1.1 shows the students performance from 2009 -2010 in Biology all over the federation. The percentage of students that passed at credit level and above and percentage that failed in biology were clearly shown. The table shows that for 3 years, the percentage failure is higher than 50% and only in 2006 and 2007 percentage pass is higher than 50%. This high level of failure may not be unconnected with the poor performance in ecology concepts because WAEC/NECO biology questions shows that students cannot escape answering questions on ecology. This is indicated from the analysis on question paper for 2004 and 2006 WAEC and 2008 and 2009 NECO see Table 1.2

Table 1.2 Final Year Examination Number of Questions on Ecology in NECO /WAEC.

Year	**Objectives**		**Essay**		**Practical**	
	T0tal Question	on ecology	Total questions	on ecology	Total questions	on ecology
2004(WAEC)	60	14	05	2	3	-
2006 WAEC)	60	12	05	2	3	1
2008(NECO)	60	14	4	1	3	1
2009 NECO	60	15	4	1	3	1

Sources: WAEC/NECO 2004-2009

Table 1.2 indicated that, WAEC and NECO always ask questions in ecology concept and couple with the number of questions appears every year, it shows that, students cannot escape answering questions in ecology concept. This may also be part of the reasons for the poor performance of the students in biology. The problem of this study is what will be the effect of field trip teaching strategy on students' academic achievement in ecology concept.

In addition Oyedokun (2002) and chief examiners reports on the West African examination council (WAEC) and National Examination Council (NECO) revealed evidence of low achievement and poor understanding of some basic ecology concepts (WAEC/NECO 2004-2009 results). This indicates that ecology concepts need serious attention of the scholars and educators to find other method of teaching ecology different from the ways and manners the teachers are handling the concept presently.

Therefore, this study investigated the effects or otherwise of field- trip teaching strategy on academic achievement and retention among urban and rural biology students.

1.3 Objectives of the Study

The study has the following objectives:

1 Investigate the effects of field trip teaching strategy on the academic achievements of students taught ecology concept at the SSS level.

2. Investigate the effects of field trip teaching strategy among urban and rural Senior Secondary students taught ecology concept in biology.

3. Determine the retention level of students taught ecology concepts using field-trip teaching strategy and those taught using lecture method.

4 Determine the retention level among urban and rural students of experimental group taught ecology concept using field trip teaching strategy.

1.4 Research Questions

The following research questions are set to guide the study;

1. What is the effect of field-trip teaching strategy on students' academic achievement in ecology concept in Zaria Educational zone?
2. What is the effect of field trip on students' academic achievement in urban and rural experimental schools in ecology concepts in the study area?
3. What is the effect of field trip on students' retention ability in ecology concept among senior secondary school in Zaria educational zone?
4. What is the effect of field trip on retention level of urban and rural experimental schools students in the study area?

1.5 Null Hypotheses

This study has the following null hypotheses:

Ho_1: There is no significant difference between the mean scores of the students taught ecology concept using field trip and those taught using lecture method.

Ho_2: There is no significant difference in the mean scores of the urban and rural experimental schools student's taught in ecology concept using field trip teaching strategy.

Ho_3: There is no significant difference between the mean scores of students in the experimental group and control group in retention ability using field trip teaching strategy.

Ho_4: there is no significant difference in the mean scores of urban and rural experimental schools student's in retention level taught ecology concept using field trip teaching strategy.

1.6 Significance of the Study,

The findings of this study will hopefully help to uplift the standard of biology teaching in senior secondary schools in a number of ways.

Encourage active participation of the students which will help in meaningful learning and teaching, help in minimizing the high failure rate of secondary schools students in biology. Serve, as a foundation for further research studies on field trip, particularly in teaching other science courses. Help the teacher to effectively teach ecology concept in senior secondary school so as to minimized the failure rate of final year Biology students,

It also helps the curriculum planners in designing ecological concept toward field work. Serve as an encouragement for teachers to use field trip for difficult concepts in science .Encouraged parents to pay for their children/ wards to go on field trip. Serve as a foundation to other research.

1.7 Scope of the Study

This study investigated the effects of field- trip on Retention and Academic Achievement in Ecology among Secondary School Students in Zaria, Nigeria. The delimitations of the study include:

i. The study is restricted to SS1 students because ecology concept appears more in SS1 Biology syllabus. See appendix "H".

ii. Four Senior Secondary Schools will be selected for the study i.e two from urban areas and two from rural areas respectively.

1.8 Basic Assumptions

1. Students under study have been taught ecology by qualified science teachers of JSS level with activity based teaching strategy such as field- trip.
2. The study subjects are familiar with ecology concepts.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

This Study investigated the Effects of field- trip on Retention and Academic Achievement in Ecology among Secondary School Students in Zaria, Nigeria. The chapter reviews the literature relevant to the study. The review is presented under the following sub-headings:

- Nature of Biology as Science Subject at Senior Secondary Level.
- Teaching Ecology concept at Senior Secondary level.
- Students Academic Achievement in Biology.
- Science Teaching Methods/Strategies.
- Field Trip for Teaching Science.
- Retention Ability in Science.
- School Location and Academic Achievement in Science.
- Overview of Similar Studies.
- Implication of the Literature Reviewed on the Present Study.

2.2 Nature of Biology as a Science Subject at SS Level

Biology as a separate science was developed in the nineteenth century as scientists discovered that organisms shared fundamental characteristics. Biology is now a standard subject of instruction at schools and universities around the world and over a million papers are published annually in wide array of biology and medicine journals, (crystal 2011). Also, Ambuno, Egunyomi & Osakwe, (2008) stated that Biology forms the basis of disciplines like human medicine, veterinary medicine, Nursing, Agriculture, forestry, fishery, pharmacy,

food technology, laboratory science Technology, biological weapons and human nutrition to mention just a few.

Most biological sciences are specialized disciplines. Traditionally, they are grouped by the type of organism being studied: botany (the study of plants); zoology (the study of animals); and microbiology (the study of microorganisms). The fields within biology are further divided based on the scale at which organisms are studied and the methods used to study them (Adeniyi, 2004).

1. Biochemistry examines the fundamental chemistry of life;
2. Molecular biology studies the complex interactions of systems of biological molecules;
3. Cellular biology examines the basic building block of all life, the cell;
4. Physiology examines the physical and chemical functions of the tissues and organ systems of an organism; and
5. Ecology examines how various organisms and their environment interrelate.

Biology is a very important part of everyday life, whether we realize it or not. Any advances in medicine, dealing with environmental issues, or biotechnology depend on an understanding of living organisms, great, medium, and small (Bichi 2003, Kalu and Ndokwo 2006). Even if our main goal is simply ensuring the survival of the human race, we still must be able to understand and sustain the biosphere. We poison our land, air and water. The greenhouse effect and global warming are both threats that concern our biosphere (Christyl 2011). According to Okeke, (2007), it would be utterly hopeless to try to sustain the diversity of life on earth in the future without a decent knowledge of biology. In order to maintain the delicate balance of life on earth, we first must understand that we are not alone on this planet. We need to learn about the effect we have on our environment and other living things.

The value of many species cannot be predicted. Many plants may contain chemicals that could prove useful in treating illnesses, among other things. Also, the extinction of any specie can disturb the equilibrium of an ecosystem. Therefore, there is the need to understand that all of our actions have effects on other organisms and the environment (Christyl 2011).

Biological concepts (Physiology, Ecology, molecular biology, Biochemistry, Chemical biology etc.) require more than one method or strategy to teach for effectiveness. For example, lecture method can be used alongside indoor laboratory teaching strategy in the teaching of physiology which examines the physical and chemical functions of the tissue and organ systems of an organism. This concept ecology deals with the science of the interrelationship between organisms and their environment. The teaching and learning of this concept (Ecology) needs strategy that require direct observation of organisms in their natural surroundings, this strategy is called field trip. This field trip teaching strategy may help the students to use the process skills and study things in their natural environment. Therefore, the present study investigated the effects of field trip on the academic achievement taught ecology concept at SS Level

2.2.1 Teaching Ecology at Senior Secondary Level.

Ecology literary Means study of living things in their natural surrounding or habitat Usnan, (2000), describe ecology as the study of the relationship of organisms with one another and their environment. And as such view ecology as being concerned with populations of organisms. Ajaja, (2010) define ecology as the study of the relationships of living organisms with each other and their non-living or physical surroundings. With these definitions, all are pointing to the physical environment in which the organisms live and their

biotic environment. It denotes that no organism can live in isolation instead it must interact with its environment which is simply referred to us "Ecology.

The undoubted interest which youngsters have in living things is at once and advantage and a trap to the teacher of Biology (Jean 2001). The teacher must make sure that the learners understand the ecology of the specimens under study and that they have some appreciation of its fellow species and possibly its place in the food chain.

Since ecology has to do with interactions of living organisms and the non- living components of the environment, it is necessary to create the awareness of ecology as a subject early in the life of the students (Nzewi, 2008). Certain aspects of basic ecological concepts like population density, habitat e.tc are expected to be taught in secondary schools require some basic measurements and calculations. Students and teachers have a natural phobia for anything that has to do with calculations. Such teachers and students would prefer a theoretical aspect require weighing and measuring. This trend has contributed to the general poor performance of candidates in question that deal with ecological concepts in the West African Senior Certificate Examinations (WASSCE) (Oyedokun, 2002). The senior secondary school biology curriculum places the basic ecological concepts to be studied under year one. And some include the ecological system, environment, biosphere, habitat, biome, food web, food chain, measuring instruments etc. The curriculum specified the performance objectives to be achieved as well as the activities to be carried out in the course of teaching and learning to facilitate understanding of the concepts being taught (Nzewi, 2008).

In this study, therefore, an investigation was made on the effects of field trip teaching strategy on academic achievement and retention among rural and urban students. It offers direct observation and interpretation of the substances in their natural surroundings. This may

help the students to remember and understand what they have seen in its natural environment, thus improving the students' academic achievement in biology.

2.2.2 Students Academic Achievement in Biology

Science Educators reported the downward trend in academic performance of Nigeria students in science (Ajagun 2001). Biology is among the science subject and in fact the failure rate in Biology is even more alarming compared to chemistry and physics despite the fact that it is the popular science subject among students (Ogunleye 1999). In Science Curriculum, biology is one of the major science subjects whose pass at credit level determines the admissibility of student to study major professional science based courses at the university, (Lawal 2010).

The failure rate in biology at SSCE has continued to be a source of worry to curriculum planners, educationist's, parents and the entire society at large. This is as a result of using an ineffective teaching method (Lawal 2010). Some of the factors identified as opposing effective teaching in Nigerian secondary school include: rote learning ((Usman 2008), lack of appropriate learning environment under which science teaching can take place (Bichi 2009); inadequate equipment and facilities (Okafor 2002); lack of opportunity for the child to have direct experience with learning materials (Bajah, 2002), and inappropriate use of teaching strategies (Adeniyi, 2004).

To minimize the failure rate in biology, teachers should be well armed with various teaching strategies which can be used alongside lecture method for the teaching of different concept in biology. Therefore, this study investigated the effects of field trip teaching strategy on SSI students' academic achievement in biology.

2.3 Science Teaching Method/Strategies

Several strategies and techniques that have been used for the effective teaching and learning of biology in secondary school level include: Discovery approach, field trip, project method, demonstration, lecture, discussion, questioning, inquiry, expert group discussion, activity approach; games approach; problem solving approach; cooperative learning strategy, computer assisted instruction (CAI) teaching strategy. Below are the explanations of some teaching strategies.

a. Lecture Method

The conventional lecture method is a traditional talk and chalk method of teaching in which the teacher does most of the talk while students listen and write notes. This is the method of teaching that emphasizes talk and chalk to the teaching of science subjects. Science teachers embrace this method for easy coverage of the school syllabus (Stanley 2008 Dunya, 2009 Obeka, 2009).

According to Okpala (1996), the guidelines for the lecture methods are as follows:

i. State the class and time available for the lesson,

ii. State the lesson topic or subject matter,

iii. State the objective of the lesson,

iv. State the previous knowledge,

v. Introduction: the teacher states the background of the new lesson.

vi. Evaluation: The teachers revise the lesson with the student and ask them proven questions to test their abilities and knowledge,

vii. Presentation: the teacher presents the new lesson in logical sequence.

Ezeudu and Agwagah (1996) and Usman (2000) describe lecture method as a teacher centered method. They further states that the method comprises the acquisition of

subject matter usually by memorization and close supervision of the students by the teacher:

According to them, the advantages and disadvantage are numerous. These include:

Advantages:

i. It saves time

ii. It does not task the students thus, it is less tedious,

iii. It provides fascinating and aesthetically stimulating experience especially for the new students on topics of interest.

Disadvantages:

i. It is teacher centered.

ii. It views the students as a "tabular rasa" clean slate with nothing to offer, but to sit down and listen to the teacher. (Without any Knowledge) Thus, he is incapable of making value judgment or inputs in a lecture. This encourages redundancy amongst students especially the low achievers.

iii. It is dull and less challenging

iv. The method does not create opportunity for creativity and

Self-discovery for learners to rationalize and explore,

v. The method do not promote excellence and hard work, thus it leads to failure. The technique is instruction-centered and does not challenge the teachers' ability hence, teachers could be ill prepared.

Supporting the above, Onwegbu (1997) James, (2000) and Onu (2007) maintained that it is an uninteresting, uninterrupted verbal presentation by a single speaker to an audience in the classroom environment. Michie, (2001) also confirms that in lecture method, the teacher lecture while the students only take notes and the blackboard is used for illustration.

Ezeudu (J991) on the other hand sees lecture method as a technique in which all the learning processes are verbally transmitted from the teacher's desk in front of the classroom to the students. Lecture method, therefore is a talk chalk method, teacher centered and traditional ancient approach, which did not promote creativity and academic excellence, thus a need to review other strategies of teaching to ward promoting academic excellence in science education.

However, teacher's qualification, experience, the skills acquired before certification are not put in practice and the method of teaching adopted by the teachers affect the level of interest and in general the performance of students in biology. In this study the lecture method would be adopted to teach students on control group to compete with students on experimental group using field trip teaching strategy. Therefore this study investigated the effects of field trip teaching strategy on academic achievement and retention in ecology concept in Biology. Another method that teachers used in the teaching and learning of biology is the discussion method.

Discussion method

This is a two-way interaction method. To a large extent it is student centered since students participate actively. The teacher in a discussion class acts as a moderator. Discussion method of teaching science increased curiosity about the subject, it enhances more positive perceptions of students about value of the subject, to get information on what to contribute during discussion students spend more time readings (Obeka, 2010). Students seem to attend to class more regularly since they usually enjoy the lesson especially when it is less formal. Discussion facilitates higher levels of thinking, accommodates conflict, negotiation and consensus, enhance learning and longer retention. Although the discussion method is effective, it could be time consuming and the classroom could appear noisy. Obeka (2010)

stated that if discussion is not well moderated by the teacher the discussion could be dominated by a few outspoken ones and sometimes the teacher may want to impose his own ideas on the class. The objectives of a discussion can only be achieved if the teacher plays his role as a moderator effectively.

This method of teaching can be used in the teaching and learning of few concepts in biology example living things and non-living things particularly in the classroom. But most of the concepts in biology require the use of process skills therefore, field work is very vital. Another method used in the teaching and learning of biology is the project method

Project method

Teachers using the project method act as guide or facilitators. In the use of the project in teaching the teacher selects a central theme, problem or an idea. The task is broken into sub-units so as to be easily understood and worked upon. The students are allowed to .work independently or in groups. Allowing students to work in groups is most effective. This brings about co-operative learning among members of the group (Obeka 2010). During the project students are expected to make observations, experiment, collect data, discuss, ask questions and clarifications, manipulate instruments and variables, collect and interpret results. These results are usually discussed with the whole class (Roger, 2003). This method is most appropriate with senior primary and secondary school classes (Lvie 2006). However students in the lower primary can undertake projects like the making of paper kits, fans, drawing objects and making simple shapes and models. The major difference between project method and field trip teaching strategy is that in the project method, students can use the strategy (project) without the teachers guiding them on the spot but field work required proper students' guidance by the teacher on the spot.

This method can be used in the teaching and learning of biology but cannot be effectively used in the teaching and learning of Ecology which requires real observation of organisms in their natural environment. Demonstration is another method of teaching and learning of biology.

Demonstration method

This involves showing students how they can carry out particular activities or do certain things to illustrate science concepts and ideas. Demonstrations are usually carried out when the resources are limited or when the activity is prone to accidents; otherwise students are expected to carry out their own experiment after the demonstration (Rogers 2003). He further states that during a demonstration the teacher should note the following.

- The teacher should state the purpose of the demonstration and this must be clear to all students participating in the activity.
- All students should be able to see every aspect of the demonstration clearly
- Explanations should be very clear and unambiguous.
- Involve the students as much as possible. They could be called upon to do things and explain their observations.
- Simple and readily available apparatus and instruments should be used for demonstration.

The method can be used in the teaching and learning of some concepts in biology but it does not require the seeing things in their natural environment. A part from methods of teaching that biology teachers uses, there are some strategy that biology uses in the teaching and learning of biology which include problems solving strategy discovery teaching strategy, activity based teaching strategy, Questioning technique and fieldtrip teaching strategy etc.

Problems Solving Strategy

Problem solving is an instructional strategy that has been increasingly emphasized in recent years. It combines the advantages of several other science teaching methods. It encourages inquiry, gives room for discovery, and facilitates process skills acquisition and knowledge. When children are engaged in problem solving activities they inevitably get involved in the inquiry, discovery, exploration and perform various process of science (Bichi 2008). Bichi, (1989) suggest four guidelines for teaching science through problem solving approach.

i. Encouraging the learner to tackle the problem by adopting scientific approach. (Observation, hypothesis, experimentation and conclusion),

ii. provide learners with adequate instructions and guidance, and

iii. Encourage learners to keep track of their activities always by jotting down major steps in the activities they carried out.

Problem solving strategy can be used to teach cell (Plants and Animals cell) effectively in biology.

Questioning Technique

Questioning is an act of making statement which requires respondents(s) to make responses(s). In teaching and learning, questions are used to determine student's readiness to learn new skill/concept (Adeniyi, 2004). When questions are appropriately used in the biology classroom, they encourage the learners to be at alert, active, thinking and seek alternative to responses.

Basically there are two types of questions adopted in teaching and learning process in class room are narrow questions and broad questions. Examples of narrow questions are (a) how many colour has a rain bow? (b) What is the S.I unit of mass? An example of broad

questions on the other hands is, give scientific explanation to the saying that what goes up must come down. e.t.c

Discovery Approach Teaching Strategy

Discovery Approach is a method which offers learners the opportunity to discover scientific facts, concepts and principles for themselves rather than being told. It allows learners the opportunity to discover and learn science, (Eneh, 2001).

Discovery approach is one of the instructional strategies used in effective teaching of biology. According to Bruner (1961), discovery is in essence a matter of re-arranging or transforming evidence in such a way that one is enabled to go beyond the evidence and re-assemble additional new knowledge. Discovery approach teaching strategy can be used to teach environment (waste/refuse dispersal).

Activity Based Teaching Strategy

Activity based approach is an approach to the teaching of biology concepts that involves hand-on engagement of both the teacher and the learners. It involves the manipulation of tools, materials, accurate measurement, accurate recording of observation, analyzing of results and drawing inferences. It also involves exchange of ideas and provides answers to questions asked by the teacher (Eneh, (2001) argued that activity approach promotes learning. This strategy can be used to teach physical properties of air in biology.

Research in science education has continued to seek better ways of teaching science to maximize meaningful learning and improve academic achievement (Jean, 2001). Science teaching in Nigeria has experienced many obstacles such as inadequate equipment and facilities, inadequate teacher, inadequate coverage of the curriculum and inappropriate use of teaching strategies (Usman, 2008). There is no single instructional strategy that is best for science teaching but educators are in agreement that any strategy that would involve active

learner participation, hands on, minds on, laboratory activities group work, concept mapping, field work, constructivism etc would ensure meaningful learning and academic achievement in science (Brown 2003).

Teachers of biology science should be acquainted with the various teaching strategies (Ajagun, 2001). The study therefore adopted field trip teaching strategy for the teaching and learning of ecology concepts to SSI students, which would help the students to connect school work with the world making it tangible and memorable by seeing organisms in their natural environment.

2.3.1 Field Trip for Teaching Science

Field trip is an outdoor or field work or learning exercise undertaken by teachers and students in certain aspects of a subject to give students the opportunity to acquire knowledge. It may refer to as trips to various places to obtain information directly by seeing things as they really are (Obeka 2010).

Field trips can connect school work with the world, making it tangible and memorable. A Field trip stimulates questions and ideas at the beginning or end of a unit. Field trip also provides an experimental "text" for students to study and interrogate. In this strategy planning for field trips, the need for field trips in teaching, tips and variation for field trip, safety rules for a field trip and merits and demerits of field trip would be discussed.

Planning For the Field Trips

In planning for the field trip, the teacher does the following:

i. Plan objectives for the field trip.

ii. Explain to the students where and why they are going and what they are expected to observe.

iii. Visit the field trip location and obtained copies of any available descriptive material.

iv. Discuss the field trip with the principal and obtain approval.

v. Acquainted with the place to visit: this is due by visiting the place, interacting with people there and obtaining a date and time for the trip well in advance.

vi. Obtain permission from parents and guardians of the students and also any other teacher whose periods are to be taken up by the field trip.

vii. Plan for transportation, time schedule, finances and others.

viii. Prepare with the students questions that will be asked. Also areas of interest of teacher and students to be visited.

ix. Share out responsibilities for documenting the field trip (examples include: photographing, sketching, and tape recordings).

x. Define safety and behaviour standards and also plan for appropriate clothing for trip condition.

xi. Plan for feeding and accommodation, unexpected illness or other emergencies (this necessitates carrying first aid kit).

The need for Field Trips in Teaching

With the availability of learning materials on the Internet, some teachers and students may question why field trips are needed anymore. Field trips can be troublesome and difficult to organize and supervise. But they do provide learning opportunities that cannot be experienced in the classroom.

i. Real Life Context: Field trips provide real- life context for the material being learned. Ideas can make more sense and be remembered better if students can actually see where and how the organisms' works or takes place in reality.

ii. Integrated Learning: Field trips do not only teach one idea, but many. A field trip to a vegetable farm, for example, can bring disparate topics together, such as photosynthesis, the scientific method, how to collect data, plants, insects, parts of flower, and soil erosion.

iii. Additional Resources: Field can provide additional resources for learning that neither classroom learning nor computer-assisted learning can. For example, a science field trip can allow for field labs, an extended length of time spent in a natural area for students to collect data, experiment and draw conclusions.

iv. Tactile: Field trips allow for actual tactile experiences. Students especially children, learn and remember better through experiences where they are allowed to touch and manipulate the material about which they are learning.

v. Cooperative: Field trips are taken in large groups. It can provide a good opportunity for students to work together cooperatively with others.

Tips and Variations for Field Trips

There are several tips and variation of field trips. Christopher, (2010) explains the tips and variations for field trip which are organized around the following sub heading, before, during and after the trip.

i. Before the Trip, Teachers Should:

- Visit the site to find connections to curricula, assess potential problems, and plan how the students could best use their time.
- Give as much context as possible so that the students will understand what they see. Teachers might consider having the students do something like a journal or a K/W/L chart (ie draw three columns with the K column representing what they already know, the W column displaying what they want to learn and the L column for ideas they learned on the field trip). Complete the K and W columns before embarking on the field trip and complete the L column when you return.
- Set standards of etiquette and respectful behavior.

ii. During the Trip, Teachers Should:

- Build in opportunities for students to view the site or work alone, in pairs, or in small groups. On a trip to a museum, for example, the students could be asked an open-ended question like, "Find a work that represents our theme or time period and sketch it. In class we will share our choices and discuss why we chose them." The students could also choose one aspect or part of the site to explore.
- Consider giving some students disposable cameras, small tape recorders, or mandates to record specific information. When the class is back at school, they can compile a complete picture.

iii. After the Trip:

- Allow the students to synthesize their experience creatively. For example, they might create trip brochures for other classes or the school library. They might create children books about a theme from the field trip. Or they might present their experience orally to another class or grade. However for the effective conduct of field trip the above mentioned tips and variations for the field trip should be properly adhered. And also a biology teacher should be acquainted with the safety rules for a field trip.

Safety Rules for a Field Trip

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

i. Safety Waivers and Permission Slips

Most school programmes have template safety waivers or permission slips. Students under 18 years old must have a parent or guardian sign a legal permission slip stating that they

accept the child's participation in the field trip. Students 18 years old and older must sign a waiver stating they accept full responsibility for their actions and legal implications of their participation in the field trip.

ii. Attendance Checklist

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

iii. Clothing

Rain on a field trip can ruin the day and jeopardize the safety of participants, but not if you planned ahead and required them to bring umbrellas, raincoats or winter clothing. Most field trip locations require long pants 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 cause. A good rule is to have one adult for every three to five kids. The chaperones should be school employees or parents who all participants will respect and follow. If you are planning an extensive or overnight trip, have references or a background check conducted for each chaperone.

v. Cancelling a Field Trip

You may have to cancel a field trip depending on the weather. If there is flash-flooding, storms or lightning, reschedule the trip. Most locations will reschedule the trip for free or even offer to send a representative to your school to bring the field trip to you.

vi. Bring a First Aid Kit

Having a basic first-aid kit can save hours of stress and potential injury. A complete kit includes: bandages, gauze, antiseptic, tape, scissors and home-made splint material. While you can't prevent an accident, having a first-aid kit in each group can limit the potential for disaster in an emergency.

vii. Groups

Participants can be divided into groups and assigned to an adult. If students are under 10 years old, consider various techniques to keep group cohesion. For example, assign a colored rope to each group that kids must hold on to while walking through a museum or ask each chaperone to hold a painted sign so high so that school kids can identify their group while walking through the zoo.

viii. Rules

Most students need the structure of having rules spelled out for them. Before embarking on the trip, make copies of the rules and regulations for each participant. To ensure each student will follow the guidelines, have each kid sign the "rule contract" promising to act respectably. Rules include: Don't run, stay with the group, complete all field coursework in a timely manner, obey all traffic laws, listen to the chaperone, don't talk to strangers, etc.

ix Stranger Danger

The safety and security of each child is in your hands. Talking and interacting with strangers can be dangerous. Younger kids especially get 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 trip chaperones or staff in marked uniforms. If the safety rules elicited above are maintained and properly followed, the pupils/ students could best enjoy benefit and retained knowledge gained from seeing real objects in their natural environment during the trips.

Merits and Demerits Field Trips

Abdullahi (1982) and Obeka (2010) outline some of the merits and demerits of field trip are:

Demerits

- Expensive to undertake
- Interrupt time programme
- Time waste excursion may be too far and accident through travel may lead to loss of life.

Merits

- It enables the students to have firsthand experience of real things. Thus it is considered as providing learning experiences which cannot be brought in to the class room practically.
- 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 enhance, students understanding of the subject matter.
- It affords valuable opportunities to develop interest in some subject areas and career opportunities,
- It helps to arouse students' interest and increases their motivation to learn a subject and related subjects.
- It makes the students to be more imaginative and inquest live observers. Hence, they acquire skills for careful observation and objective report of observations.
- It creates opportunities for the students to interact with experts, and this enhances effective learning and teaching. Most flied trip experiences make demand of all senses. This makes the students to gain complete picture of the concept than from any other mode of teaching. Teacher student's relationship becomes more cordial and developed more intimately during field trips. In the light of the above, the study investigated the effects of field trip teaching

strategy on students' academic achievement and retention in ecology concept in biology at senior secondary school level.

2.4 Retention Ability in Sciences

A retention interval is the time that elapses between a test of original learning and that of a retention test, thus Knowledge retention is defined as the proportion of knowledge retained by an individual after a specific retention interval. Research has, in general, proposed three main principles pertaining to knowledge retention.

First, knowledge retention generally falls to 75-89% of its original level after a relatively short period of time, Secondly, retention rate decreases over time as a finding of the length of retention interval in a relatively linear manner. Thirdly, all performances regardless of their individual levels of achievement have similar knowledge retention rates.

Many researchers have investigated and defined several variables that affect knowledge retention. According to Obeka (2010) they include the type and content of task to be learned, the amount of original learning, the instructional strategy used, the length of the retention interval and subject individual. Retention is generally affected by two very important variables. (1) Duration of study session. (2) The temporal distribution of study time across the session.

Retention of material is the primary goal of every teacher. However, in present day school, it is common for a student to learn material, take a test and forget the material soon after. This may likely be the reason for students' poor performance in biology WAEC and NECO exams.

It is, therefore, important to consider knowledge retention when evaluating learning strategies. One such strategy is distributed learning also known as spread practiced. In this procedure total study time is held constant but is spread across multiple study sessions. For

example, if a student solves five long-division problems in one day and five others in one week later, the study is distributed. However, if the student solves all the 10 questions on the same day, it would be considered mass practices. At longer retention intervals, distributed practice better retention than mass practice, this is termed spacing effect by Demster (1998).

According to Bichi (2000), it is widely accepted that the longer the period of non-use of retained material, the greater the probability of decay. Other factors that affect the amount of skill decay include, task type and over learning. Usman,(2001) conducted a study, investigating eight areas affecting acquisition and retention of knowledge and skills. The aim was to produce recommendations for effective training. They found three classes that optimize retention. These are: (1) Optimizing the conditions of training. (2) Optimizing the learning strategy used and (3) Achieving automatic levels of processing.

Michie (2005) performed an experiment using 2 groups of subjects to learn either 20 word definition pairs or 10 word definition pairs in the same study time (2 minutes). They were then given a test to establish initial learning followed by retention test 1 or 4 weeks later. Their findings showed that the individuals learning the 10 word-definition pairs, who had twice the study time, recalled a far greater proportion of their words after 1 week. This difference disappeared after 4 weeks and the number of words recalled by the 20-words group was greater than those recalled by the 10 word group. The implication of this finding is that quantity is important in retention; an individual would be better studying 50 words in 5 minutes and recall 20 than studying 20 words in the same time and recalled 15. That is, increase in information can be used to increase retention.

Nussbaum, (2000) examine differences in retention of learned material using lecture-based and small group-based teaching methods in a continuing medical education course. The result demonstrated that although both groups had a significant decline on a three-month

follow-up exam, the group who attended lecture classes retained information better than the group who attended small group classes.

In another study, OKoli, (2006) separated second year gastrointestinal medical students in to two groups one attended teacher-centered lecture based classes and the other student-centered small group-based classes. They concluded that the small group-based classes led to a greater learning and retention compared to lecture-based classes.

Fred, (2007) Stated that biological science trip has long been recognized as a teaching device since it present the concept being studied in its natural environment. Studies conducted by Aklugemidu, (1994), on the use of excursion showed that field trip stimulate student's interest in learning and allows for more retention of knowledge.

In addition Maikano, (2010) made comparism between outdoor and indoor laboratory teaching strategies on secondary schools students academic achievement and retention in ecology. The result implies that, the experimental group taught ecological concept using the outdoor laboratory approach achieved significantly higher than the control group taught the same concept using the indoor laboratory.

Also another study by Harrison (2004) tested medical students, by comparing knowledge retention after one year interval between groups assigned to attend either lectures or self-study classes. On both the original final examination and retention examination, there were no statistically significant differences between the two groups' performance. In addition Obeka (2010), study on the effect of inquiry and demonstration methods on students' achievement and retention in some environmental education concepts of geography. It found that there was a significant effect due to instructional methods on student's retention. However, the present study investigated the effects of field trip teaching strategy on academic

achievement and retention ability among urban and rural senior secondary students taught ecology concept in biology at senior secondary school level.

2.5 School Location and Academic Achievement in Science

Rural area is a geographic area that is located outside cities and towns. The health resources and services administration of the settlement is also located in the area. In other words rural area is an area that has a low population density and small settlement. Rural settlement includes communes and villages. Their function is mostly residential only. People sleep there while work in a nearby town. It comprises all the settlements with number of inhabitants up to 2,000 patrick, (2010). The people engage in farm activities like crops production, animals rearing, fisheries etc. Thus, they are familiar with natural things in their natural environments. They know the local names of these organisms. However many of these students might not know the English or scientific names, which is the way they are called in their examinations. Thus the need to take them out on field trip so that they can see, identify these organisms and get to know the scientific or English names, (David, 2006).

Urban area is characterized by higher population density and vast human features in comparison to the areas surrounding it. Urban areas may be cities, towns, conurbation, but the term is not commonly extended to rural settlements such as villages and hamlets. Urban settlements include towns and cities. They represent "organisms" within socio-economic sphere with roads as arteries and residential zones as main organs of a body. The function is mostly: administrative (seat of regional administrative bodies), economic (Providing jobs), cultural (including entertainment). Normally, every commune with number of inhabitants more than 2,000 is considered to be urban settlement Patrick, (2010). Urban people engage in sophisticated secondary & tertiary production activities of manufacturing processing, trading and administrative activities, and vast human features in comparison to areas surrounding it.

The students in urban schools may know the English names of the organisms through the ICT, but they cannot manipulate, for the simple fact that they don't have direct access to the physical habitat of the living organisms. They need to be taken outside the classrooms to the natural habitat of the organisms which on the spot requires the use of basic scientific skills ie observation, identification, classification and manipulation of substances in the natural surroundings. Thus, in no small measure can help to pass biology exam, since students cannot escape answering questions on Ecology concept. (Ajagun, 2001).

Students Achievement is greatly affected by the area in which the students live. Reasons for the variation in achievement are geographical location, resources, availability of technology and quality of teachers. The national Education Association showed that the low performing youth in physic, Chemistry and biology, are in public rural schools (Brownstein 2001). According to Brown, (2003), there is a large biology achievement gap between rural and non rural areas, but some rural areas are above average and others are just average.

Also biology scores of students in rural schools revealed a few differences at the grade levels assessed. The studies found a positive relationship between the number of students enrolled in more advanced classes and success levels. The difficulty with rural schools is that they vary greatly by geographical location, economy and resources. In rural areas where both the schools and students have access to high quality instruction, safe atmosphere and communal support, achievement tends to be better than in areas where the students do not have access to these crucial resources (Swanson and Brown, 2001).

David (2006) states that students in urban schools are expected to focus on acquiring skills to help them lead a more prosperous life. Rural areas are settled places outside towns and cities. They can have an agricultural character. Rural areas are less modern and open than urban areas. People there are probably more attached to their traditions and beliefs. They do

not usually see the society moving, population changing habits and accepting other cultures and adopting some, etc they lack many social amenities like information and communication technology (ICT).

Also, according to David (2006), an urban area is an area with an increased density of human-created structures in comparison to the areas surrounding it. Urban area may be cities, towns or conurbations. In fact, urbanized areas agglomerate and grow as the core population/ economic activity center within a larger metropolitan area or envelope. People living there are open, they choose cultures, beliefs, share them that's what make them a very modern society. They may care about information and communication technology (ICT).

Study conducted by Joubert (2010), shows that the use of instructional materials is very important in boosting students Biology achievement. With instructional materials alone accounting for up to 49.6% of the variance in the students Biology achievement. This underscores the need to use instructional aids and child centered method in teaching biology at the senior secondary and junior school levels. Instructional materials and child centered methods had much more significant effect in the urban areas than the rural areas. The interaction of the treatment and school location was statistically significant. The study showed that students in the urban centers achieve significantly higher than their rural counterparts regardless of their sexes.

The field-trip may be of a benefit to all the students regardless of the geographical location (Urban or rural) of the school. The students in urban area are not exposed nor have access to many physical Ecological habitats like river, ponds farmland, mountain, but they may have access through Information and Communication Technology (ICT). And students in rural area are used to many ecological habitats for their day to day activities but they don't know the scientific and English names, the scientific benefit behind, adoptive feature and the

interaction of the organisms, the possible food chain exist in each habitat, and they don't have access to Information and Communication Technology (ICT). Therefore, taking students out of the classroom, regardless of where the school is located, to the natural habitat of the living organism, to observe, identify manipulate is very vital. This study verified the significant relationship between performance in rural and urban senior secondary school students in ecology concept in Zaria Educational Zone.

2.6 Overview of Similar Studies

Many scholars and researchers have used field trip teaching strategy in various subject areas such as Geography and Business studies. However, in the field of biology particularly on the concept of ecology not much work has been carried out on the effect of field trip teaching strategy on students' academic achievement and retention ability among rural and urban students. This informed the researcher choice of this research.

Ajaja, (2010), investigated the effect of field studies on leaning outcome in Biology. The major purpose of the study was to determine the effects the field experience on students' knowledge of process and biology achievement. The design of the study was experimental involve pretest posttest control group design. The sample of the study consists of 100 biology students in two intact classes. Four research questions were used collapsed to four hypotheses. The first three hypotheses were tested with t-test statistic at 0.05 level of significance. The fourth hypotheses were tested with Pearson Product Moment Correlation Statistic. The major findings of the study included a significance difference in process of science scores between pretest and posttest of field trip students, a significant difference in process of science test scores between students exposed to field trip experiences and those who were not exposed a significant difference in biology achievement test scores between students exposed to field trip experiences and those who were not; and a strong correlation

between process of science score and biology achievement score. It was concluded that field trip experience enhanced students understanding of process of science, improved students' attitude toward biology and significantly influenced their biology achievement.

The Ajaja (2010) work on field trip and determines the effect of field studies on leaning outcome in biology. The present study investigated the effects of field trip on academic achievement and retention in ecology among senior secondary school students of rural and urban location in Zaria educational zone Kaduna state.

Michie (2000) investigated knowledge gains of two groups of high school biology students. His study covered a period of one mouth. He used students numbering sixty eight (68) made up of (34) experimental and 34 control groups were established, with the experimental group participating in a field (excursion). Posttests were given to both groups; knowledge gains were found to be significant only with the experimental group. The groups were reversed (control becoming experimental, and vice-versa), and a new unit of study was taught following the same procedures, the new experimental group showed more significant gains than did the new control group.

The impact of extended excursions was studied by Michie (2003) with 50 students who were taken to the coal fields of West Virginia on a ten-day trip. Students who had participated in the trip were judged to be superior in their abilities to evaluate tasks related to scientific inquiry when compared to 50 non-trip students, after t-test was used to analyse the data.

Mechie (1998) conducted a research on the factors influencing secondary science teachers to organize and conduct field trips. A series of interviews with 28 secondary science teachers was used to determine the influences on those teachers to take field trips. The interviews were evaluated using an interpretive methodology and indicate a range of

influences. Science teachers are in general willing to use field trips as part of their pedagogy because they feel that their students need hands-on, real life experiences or to examine applications of science which augment their classroom studies.

Patrick (2010) conducted a research on the effect of field studies on learning outcome of senior school in biology achievement. The design of the study was experimental involve pre-test, post-test control group design. The sample of the study consisted of 100 biology students in two interactive classes. Four research questions were raised and collapsed to four hypotheses. The first three hypotheses were tested with t-test statistics at 0.05 level of significance. The fourth hypothesis was tested with Pearson product Moment Correlation Statistics. The major findings of the study included: a significant difference in process of science scores between pre-test and post- test of field trip students; a significant difference in process of science test scores between students exposed to field trip experiences and those who were not exposed. A significant difference in biology achievement test scores between students exposed to field trip experiences and those who were not; and a strong correlation between process of science score and biology achievement score. It was concluded that field trip experiences enhanced students understanding of process of science, improved students' attitude towards biology and significantly influenced their biology achievement.

The two studies that is Mechie (2000) and Patrick (2010), investigated the effects of field trip on students academic achievement. But the present study investigated the effects of field trip on academic achievement and retention in ecology among senior secondary school students of rural and urban location in Zaria educational zone Kaduna state

Prince and Hein (2001) conducted a study in which they compared the results obtained from the use of an excursion technique with those of other teaching methods (lecture method). They found that with an increase in excursions there was an increase in

investigating the phenomena associated with the experience, and demonstrated that the excursion technique was superior to class discussion for teaching material requiring comparisons and knowledge of concrete objects.

When testing the usefulness of field trip guidebooks, outlines, instructional materials, and associated techniques, Orion, (2000)found that classes that used the planned field trip technique learned more, retained more, and did better on tests than did those not participating in field trips.

Michie (2001) conducted an experimental evaluation of field trips for achieving informational gains in an earth science unit. He made use of one hundred and twenty students, sixty (60) were treated with field trip (the experimental groups) and went on excursions to sites of geologic interest, while sixty (60) students remained in the classroom (control groups) and reviewed the content through slides. Based on comparisons of pretest and posttest results, Michie concluded that superior students tend to profit more from field trips than do students with average to less-than-average ability, but that field trips may contribute to the understanding of scientific principles for all students.

A comparison of two instructional methods-field instruction and discussion-was undertaken in a study by Sorrentino and Bell (1970). They used 120 students. The students were grouped equally into experimental and control group. A unit on ecology was taught by both methods to separate groups of seventh graders. The data was analyzed using t-test. They found no significant gain from the experimental field treatment as compared to the traditional classroom discussion method, but noted that the field experience technique was as effective as the discussion technique.

The effectiveness of learning geology through field experiences was probed by N0vak, (2001).The study made a comparison of the field technique to the use of color slides

with classroom discussion In none of the comparisons did the field trip group score significantly higher than did the group taught with slides.

In research conducted by MacKenzie and White (2000), the effects of field work on retention levels were examined with one hundred and fifty (150) students among eighth and ninth graders in Australia. Three groups of students were involved. The same general learning programme was employed in all treatments, but with different approaches to the excursion phase; there was an active processing excursion group which comprises 50 students, a traditional passive excursion group, 50 students in a group that did not have field work. Two tests were given, one on achievement of unit objectives and the other on formation of episodes and linking them with other knowledge items. Both tests were given prior to formal instruction; posttests were given during the summer holidays, just prior to the beginning of the new school year. Posttest results indicated that the students who had field work performed better than did students who did not have either field component of instruction. Retention was superior in the group that participated in the active excursion program.

To evaluate the effects of field activities on student learning, Kern and Carpenter (2000) conducted a study with two sections of a college laboratory course in earth science. One section involved primarily classroom activities using a laboratory manual, while field-oriented activities were employed in the other. Comparisons of the performance of the two classes at the end of the term revealed almost identical levels of lower-order learning (recall), but higher-order skills were demonstrated to a greater degree by the field-oriented section, indicating an enhanced ability to apply the information acquired.

David (2006) the study was on the comparative effect of different museum tours on children attitudes and learning. The study involved 200 students in 6 tours of the natural

History Gallery of the British provincial museum in Victoria. The t-test was used to analyse the data collected after posttest. This study concluded that students of grades 5, 6 and 7 had significantly greater learning when they participated in a more structured tour.

Fred, (2007) States that biological science trip has long been recognized as a teaching device since it present the concept being studied in its natural environment. Studies conducted by Aklugemidu, (1994), on the use of excursion showed that field trip stimulate student's interest in learning and allows for more retention of knowledge. He also reported that field trip enable students to see things in their true situation and translate classroom theory into practice. Studies also conducted by Urulor, (2000) showed that a greater percentage of what is heard, see and touched during field trip is remembered than what is merely heard.

Field trip, if properly planned, it affords the students the opportunity to become actively engaged in observing, collecting, classifying studying relationships and manipulate objects. A field trip is one of the most enjoyable and exciting experience for students studying biology which has a lot to do with living organisms and their environment, Tete, 2007). In excursion, the students and teachers observe people and machines, equipment and materials in industries, companies and offices to see for themselves, those things they have been taught and learned theoretically (Aliyu, 2008).

In addition Turton, (2007) Observes that, if field trip is properly Planned, it affords the students the opportunity to become actively engaged in observing collecting, classifying, studying relationships and manipulate objects in Biology. Kristen, (2007), states that Field trips can be an essential part of learning, if they are used properly. They provide a hand- on experience that cannot be completely duplicated in the classroom.

Furthermor, Klawe and Levenwson , (2002), stated that, field trip, when properly used can create enriching experiences that provide meaningful, long- lasting learning in the learner. Field trips early provide the concrete, hands – on experiences that the learner need Kay (2008), also stated that field trips are an interactive and engaging method of learning in environment outside the classroom. Whether planning a zoo expedition with elementary school children or ecology fields study research with college students. According to Jean (2001) stated that, the undoubted interest which young starts have in living things at once an advantage and a trap to the teacher of biology. Christopher (2010) outlines the benefit of field trip as follow:

- Field trips bring classroom study alive for students and help them remember and relate to what they have learned. They provide rich resources that can rarely be approximated in the classroom. They also help connect school to the world.
- Field trips provide new cultural contexts for literature and provoke questions.
- Field trips stimulate and focus class work by helping students synthesize information.

Kemakilan (1994) observes from his own studies that excursion has several advantages for students contemplating choosing a vocation. He said that it is not only creating job awareness but has the advantage of preparing students for occupation and of the requirements training opportunity offered.

Research on problems of teaching ecology revealed (i) inadequacy of resources for ecology teaching (ii) teachers' unsatisfactory use of resources and (iii) field work and practical work unsatisfactorily to carried out, as some of the problems militating against the effective teaching and learning of ecology (Ajaja, 2007). The study of Adeniyi (1985) also reveals that the misconceptions which students hold about some ecology concepts affected their performance in an ecology concept test. However, the work of Shachak (1979) and

Kristin (2002) reveal that a high achievement of ecology concepts could be acquired through meaningful teaching and appropriate fieldwork.

Most researches on ecology devoted to the use of fieldwork for teaching ecology (e.g. Fred 2007), conclude that students and teachers showed negative attitudes to ecology fieldwork. However, it was also established from the studies that fieldwork could have a strong motivating effect on the students because what is seen touched and felt usually facilitates permanency of learning.

Fred, (2007) Conducted research on the field trip in Biology in the New York City. Two groups of incoming freshmen in a New York City High School were selected on the basis of the "Otis Mental Ability Test." The groups, designated as "A" and "B" each consisted of two Hundred and one pupils although later in the experiment the number dropped to one hundred and ninety-four. Groups "A" had an Intelligent Quotient average of 103.75 and group "B" an Intelligence Quotient average of 102.09. After the groups were post tested and t-test was used to analysed the data, the result demonstrated that, groups exposed to field trip teaching strategy achieved more significantly than their counter part that were strictly taught in the class using lecture method.

Another research was conducted by Aliyu, (2008) on education excursions and students achievement in Business studies. The result shows that the performance of both the experimental and control groups in business studies after the excursion remain the same.

In addition Maikano, (2010) make comparism between outdoor and indoor laboratory teaching strategies on 200 secondary schools students academic achievement and retention in ecology. After t-test was used to analyse the posttest result, the result implies that, the experimental group taught ecological concept using the outdoor laboratory approach

achieved significantly higher than the control group taught the same concept using the indoor laboratory.

Also Urulor (2000) in his study on excursion among 140 studnets grouped equally into a experimental and control. Anova was used to analyse the post test result which showed that the results of his experiment placing the experimental group who were taught using excursion approach are better in terms of performance after the experimental treatment, than control group who were taught the same concept using lecture method.

Therefore, the researcher investigated the effects of field trip teaching strategy on academic achievement, retention and school location in ecology concept at senior secondary school level.

2.7 Implication of Literature Reviewed on the Present Study

A field trip is one of the most enjoyable and exciting experiences for students studying biology which has a lot to do with living organisms and their environment. Field trip plays almost the same role as laboratory experiments and demonstrations. This is because through the process one gains firsthand experience. The only difference is that a field trip deals with living organisms in their natural habitats. This gives field trip a higher advantage as students feel more excited when they see things happening naturally (Michie 1998, Usman 2008, Patrick 2010 tete 2007 and Patrick 2010). Field trip as a description of human cognition is often associated with pedagogic approaches that promote active learning by doing.

Field trip is fundamental to biological studies which derive much of their impetus from the interrelationships of living organisms with themselves and their environment. If properly planned, it affords the students the opportunity to become activity engaged in observing, collecting, classifying, studying reltionships and manipulate objects, which resulted to

meaningful learning. The idea was supported by a number of researchers and evidence supporting field trip Aliyu (2008), AJaja, (2010) , Patrick (2010), Fred (2007).

Most researches devoted to the use of fieldwork on students academic achievement for teaching ecology (e.g. Gayford, 2000; Ajaja, 2007 :) all conclude that students and teachers showed negative attitudes to ecology fieldwork. However, it was also established from the studies that fieldwork could have a strong motivating effect on the students because what is seen touched and felt usually facilitates permanency of learning.

In view of the implication above, it showed that their findings did not compare the academic achievement and retention ability of students in urban and rural areas using the field trip teaching strategy. Therefore, this study investigated the effects of field trip teaching strategy on student's academic achievement and retention among rural and urban senior secondary school biology students. As a result of that, the study made recommendations on the teaching strategy that should be used in teaching ecology concept in senior secondary school biology, despite different location such as Urban and rural areas.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

In this chapter, the methodology was discussed under the following sub headings:

- Research Design,
- Population of the Study,
- Sample and Sampling Procedure,
- Instrumentation,
- Validation of the Instrument
- Pilot Testing
- Reliability of the Instruments
- Treatment Administration,
- Procedure of Data Collection
- Data Analysis.

3.2 Research Design

The research design for this study was Experimental design involving the pre and posttests. There were two groups: the control and experimental, all sampled students were pre-tested to determine the level of equivalence academically. The experimental groups received treatment (field trip), while the control groups received no treatment (lecture). Also, all the groups were subjected to posttest (to determine the effect of the treatment on students Academic achievement), and Post- Posttest (to determine treatment effect on retention ability, the researcher design illustration is presented in figure 3.1

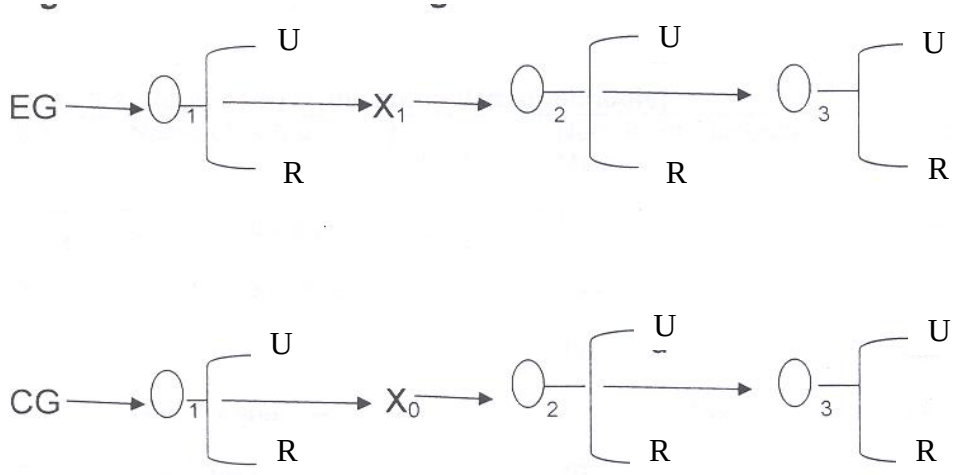


Fig 3.1: Research Design Illustration

Key: EG = Experimental group,

CG = control group,

0_1 = pretest,

x_1 = treatment,

X_0 = no treatment,

0_2 = posttest,

O_3 = post posttest

U = Urban area,

R = rural area

3.3 Population of the Study

The population of the study consisted of 2934 SS1 students from nineteen (19) schools admitted in, 2011/2012 session in Zaria Educational Zone of Kaduna State. Though, these schools are physically different in terms of location, they are the same in terms of administration, staffing, infrastructure and students were admitted on merit. See Table 3.2

Table 3.2: Population of the study

S/No.	Name of Schools.	Location	Number of Students Male	female	Total
1.	Barewa College	Urban	274	-	274
2.	Alhudahuda College	,,	339	-	339
3.	GSS Zaria (Snr)	,,	262	-	262
4.	GGSS Zaria	,,	-	142	142
5.	GSS Dakace	,,	70	30	100
6.	GGSS Pada	,,		70	70
"7.	GSS Magajiya	,,	100	50	150
8.	GGSS Kofan Gayan	,,	-	155	155
9.	GGSS D/Bauchi (Snr)	,,	-	225	225
10.	GSS Muchia	,,	84	18	102
11.	GSS Chindit	,,		70	70
12.	GSSChindit	,,	118	-	118
13.	Aminu GSS	,,	229	80	309
14.	GSS T/Jukun	,,	119	85	204
15.	GCC Zaria	,,	60	46	106
16.	GSST/Saibu	Rural	129	22	151
17.	GSSDinya	,,	35	28	63
18	GSS Likoro	,,	54	6	60
19	GSS Yakasai	,,	29	5	34
				GRAND TOTAL	**2934**

Source: Ministry of Education Headquarters, Kaduna State (MEHK) 2012

3.4 Sample and Sampling Technique

The study used stratified Random Sampling technique due to location to obtain its sample size. This study considered 10% of the target population 200 SS I students in both rural and Urban as observed by Asika (2006). Two boys were asked to hand pick a piece of

paper already folded with the names of the schools. As a result of this, two schools were randomly selected from urban and rural areas respectively. These schools are GSS Magajiya Zaria City and GSS Dinya as control group while GSS Tudun Jukum and GSS T/Saibu as experimental group. In both schools, 25 males and 25 females were randomly selected through balloting method (ticked piece of paper). The sample sizes involved 200 students see Table 3.2

Table 3.2: Sample of the study.

S/NO.	Location	Schools	Male	Female	Total
1.	Urban	GSS Tudun Jukun	25	25	50
2	Rural	GSS Tudun Saibu	25	25	50
3.	Urban	GSS Magajiya zaria	25	25	50
4.	Rural	GSS Dinya	25	25	50
		Grand total			**200**

3.5 Instrumentation

The instruments used for this study include:

- Ecology Achievement Test (EAT) and
- Ecology retention test (ERT).

3.5.1 Ecology Achievement Test (EAT)

Ecology achievement test (EAT) was administered in determining the achievement of students. Before the Administration of Post test, pre test was administered using EAT to ascertain the students ability level, was confirmed the same see appendix "A". The Ecology Achievement Test was administered after the treatment. EAT were made up of 25 multiple choice questions with four options each to choose the correct options. The questions were collected from past WAEC/NECO question papers for 5 years 2004 - 2010. See appendix “E”

3.5.2 Ecology Retention Test (ERT)

Ecology Retention Test (ERT) was set and administered to both control and experimental groups in order to determine the retention ability of the subjects. The test was conducted after three weeks of ecology achievement test (EAT) as recommended by Tukman (1976) which proposes minimum of two (2) weeks. This helped the researcher to investigate the effects of field trip on students' retention ability. It was made up of 25 multiple questions with four options from which the correct answers were chosen (See Table 3.3 and 3.4) for the specification of the instrument base on topic and specification of the instrument based on Bloom cognitive taxonomy

Table 3.3 Table of Specification of the Instrument Based on Topic selected

Topic	No Items	Total
River	8,11,12, 1, 16	5
Pond	5,15,2 18, 24	5
Marsh	7,14,13, 20,19	5
Abandoned farm land	6,9,4, 22,25	5
Mountain	3,10,17,21,23	5
Total		25

Table 3.4: Table of Specification of the Instrument Based on Bloom Cognitive Taxonomy

Topic	%	K	C	A	AN	S	E	Total
River	31%	2	1	0	1	2	2	8
Pond	20%	0	0	2	0	2	1	5
Marsh	16%	1	2	1	0	0	0	4
Farmland	20%	0	1	0	2	1	1	5
Hill (Kufena	12%	1	0	2	0	0	0	3
	100%	4	4	5	3	5	4	25

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 materials in parts.

Synthesis (S): Putting together parts to form a whole and

Evaluation (E): judging the value of materials and methods for a given purpose

3.6 Validation of the Instrument

The test instrument Ecology Achievement Test (EAT) and Ecology retention Test (ERT) with the marking scheme were validated by two lecturers of ABU Zaria. One was a Ph.D holder and the other Master degree holder of the Department of Science Education Ahmadu Bello University Zaria and one specialist in test and measurements from Ahmadu Bello University Zaria. They evaluated the content validity for accuracy, clarity and level of phrasing of the test items.

3.7 Pilot Testing

Government Secondary School Kauru in Anchau Inspectorate Division was used for pilot testing of the instrument. Four classes of SS1 with 200 students were used as a sample size. Two classes were Experimental and Control groups respectively. Pretest was administered to determine the level of equivalence of students' ability level academically. The Experimental group received treatment (Field trip) while Control group received no treatment (lecture) for six weeks. The groups were subjected to posttest using Ecology Achievement Test (EAT) to determine the effect of the treatment on students' academic achievement. Three weeks after posttest; post posttest using Ecology Retention Test (ERT) was administered to determine treatment effect on retention ability of the students. The data collected were analyzed by t-test at 0.05 level of significant (see Appendix A). The pilot study determined the characteristics of the test items which include their facility and discrimination indices and the reliability coefficient. It also determine the number of weeks that was suitable for conducting the study,

assess the clarity of the items of the EAT and ERT and calculate the reliability coefficient of the EAT and ERT.

3.8 Reliability Coefficient of the Instrument

A test retest method was used to test the reliability of the test items Ecology Achievement Test EAT and ecology retention test ERT. Postest was given after two weeks, the second test was given in line with Tuckman, (1975) recommendation. A Pearson Product Moment correlation Co- efficient statistics was used to find the co-efficient of the test items and was found to be $r = 0.83$ and $r = 0.85$. Therefore it shows that test items are reliable and can be used for the study.

3.9 Treatment Procedure

The field trip was observed as a treatment, where the researcher and two laboratories technicians (with HND in science laboratory technician with more than five years working experience) helped to monitored the students in taking the students to the following habitats located in different parts of Zaria educational zone:

i. Fresh water Pond: Anguwan Madaci Zaria along Saye road,

ii. River Galma the major tributary of the river Kaduna.

iii. Hill: Kufena inselberg (Kufena Zaria settlement).

iv. Farmland: Emir's Farmland along Jos road in Zaria

v. Marsh: Banks of lower kubanni stream.

The researcher carried the students in the experimental group to field and instructed them on what to do according to the lesson plan (see Appendix D). They constructed "K.W.L" Chart in their books (ie to draw three Columns with "K" Column represented what they already know, the "W" Column displayed what they want to learn and the "L" Column for ideas they learned on the field trip), in their books. See Table 3.5

Table 3.5 A KWL Chart

Topic	**K = Column** Ideas already know	**W = Column** to Ideas want to learn	**L = Column** Ideas learned on the field

The students were divided into groups one and two to carry everybody along. Group leaders were appointed to each group to co-ordinate the activities of the group. Each member of the team was given work sheet that contained specific questions to answer.

During the trips the students worked in groups, asked questions and collected samples where possible. They observed, and recorded all that was required strictly under the guidance of the questions designed. They were encouraged to use their field guide sheets and discuss with each other what they saw, touched and heard during the trip (See appendix "G" for the designed sample questions).

The students were encouraged not to picked sample flowers or vegetation and not to disturb animals in their specific habitat except instructed to do so. They used cameras, small tape recorders or mandated to recorded specific information. Each group was given 40 minutes only. They were asked to collect some samples according to the lesson plan designed (see Appendix "D").

After each trip students returned from their group investigation, they were allowed to discussed and put together their experiences creatively. Each team was asked to present their experiences to the rest of the groups on what they had observed and recorded in the field. Anybody can be called to present and when one team or group completed or showed what they have observed and learned from investigation the other team or group took over. Each

group was given 40 minutes only. The presentation awarded marks and the data or result collected was analyzed

The sixth week was used for the general revision of the trips areas covered. Then Ecology Achievement Test (EAT) was administered to determine the student's achievement. Also, Ecology Retention Test (ERT) was administered after three weeks of EAT to ascertain the retention ability of both control and experimental groups. The flowcharts and table for treatment procedure was presented in fig. 3.6 and table 3.7 respectively.

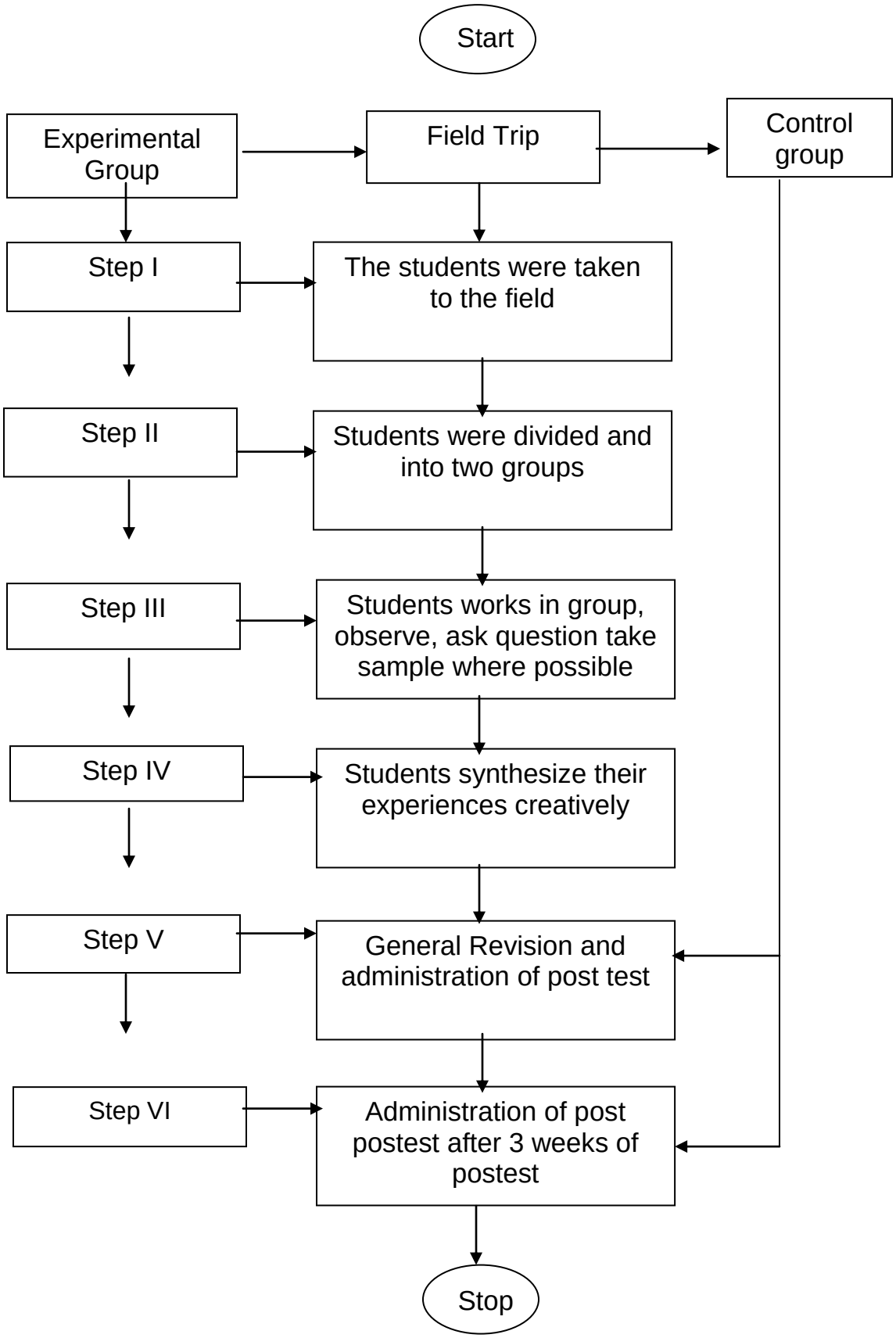


Fig 3.7 Flow chart for the treatment procedure source: Fred 2007

Table 3.7 Treatment Procedure

Week	Habitat	Location	Teacher activity (s)	Students activity (s)	Time	Students and teacher activities after the trip
Week one (1)	Ponds	Unguwan madaci Zaria.	The teacher explained pond as an aquatic habitat and how plants and animals could be identified, he also advised students to strictly follow the guide sheet.	The student observed, both group "A and B" noted and recorded all the animals and plants observed in the pond visited and the interaction observed.	40 minutes	The teacher guided the students on how to presented the report. Group "A" will presented what they have observed or learned during the trip, and after which group "B" also presented what they have observed during the trip. (40 minute for each group)
Week two (2)	River	River Galma in Zaria	The teacher explained river as an aquatic, food chain and how plants and animals were identified. And also advice students to strictly followed the guide sheet.	The students observed, both Group "A and B" noted and recorded all the animals and plants observed in the river visited and the interaction observed.	40 minute	The teacher guided the students on how to present the report. Group "A" presented what they have observed or learned during the trip, and after which group "B" also presented what they have observed during the trip. (40 minute for each group)
Week three (3)	Marsh	Kubani in T/wada zaria	The teacher explained marsh as a terrestrial food chain, and how plants and animals were identified. And	The students observed, asked questions, both. Group "A and B" will take note and recorded all the animals and plants observed in the marsh.	40 minutes	The teacher guided the students on how to presented the report. Group "A" presented what they have observed or

			advised students to strictly follow the guide sheet.			learned during the trip, and after which group "B" also presented what they have observed during the trip. (40 minute for each group)
Week four (4)	Farm land	Emir's farm land along Jos road in Zaria	The teacher explained farm land as terrestrial habitat, food chain and how to identified plants and animals. And he advised the students to strictly follow the guide sheet.	The students observed, ask questions. Both group "A and B" noted and recorded all animals and plants observed in the farm land.		The teacher guided the students on how to present the report. Group "A" presented what they have observed or learned during the trip, and after which group "B" also presented what they have observed during the trip. (40 minute for each group)
Week five (5)	Hill	Kufena Hill in Zaria	The teacher explained mountain as one of the terrestrial habitat, food chain and how to identified plants and animals. And advised students to strictly follow the guide sheet.	The students observed, asked questions. Both Group "A and B" noted and recorded all animals and plants observed in the Hill.		The teacher guide the students on how to presented the report. Group "A" presented what they have observed or learned during the trip, and after which group "B" also presented what they have observed during the trip. (40 minute for each group)
Week six (6) General Revision and Administering of EAT.						

3.10 Procedure for Data Collection

The data were collected through the administration of the test under strict supervision of the researcher to both control and experiment group. EAT consisted of 25 multiple choice question which was administered to both experimental and control groups. The papers were collected, marked and each question awarded four marks using marking scheme,(see appendix "F"). The data collected using EAT and ERT was recorded based on school location, experimental and control groups.

ERT were administered with the same 25 multiple choice questions administered in EAT under strict supervision of the researcher. The papers were marked with each question carrying 1 mark, using marking scheme (see appendix"F") for marking scheme. The scores obtained were used for the data analysis to ascertain the retention ability of the groups.

3.11 Data Analysis

After the data was collected, the statistical package used for data analysis was the Statistical Package for Social Science (SPSS). The descriptive statistics such as mean and standard deviation was used to answer research questions 1-4; while the inferential statistics i.e independent sample test t-test was used to test hypothesis 1-4 at Alpha value $P \leq 0.05$ level of significant.

Research Question Testing

Descriptive statistics such as means and standard deviation was used to answer the following research questions.

1. What is the effect of field-trip strategy on students' Academic Achievement in Ecology concept in Zaria Educational zone? α

2. What is the effect of field trip on student academic achievement in Urban and rural experimental schools in Ecology concepts in the study area?

3. What is the effect of field trip on students' retention ability in Ecology concept among Senior Secondary School in Zaria Educational zone?

4 What is the effect of field trip on Retention level of urban and Rural Experimental schools students in the study area

Null Hypothesis testing

The inferential statistics independent sample test t-test was used to test the following hypothesis

Ho_1: There is no significant difference between the mean scores of the students taught ecology concept, using field trip and those taught using lecture method

The Data collected under this were continuous data within two samples. The statistical test that was employed for the analysis is t –test at $\alpha = 0.05$ level of significant. This is because it involve two way analysis of mean between experimental and control groups

Ho_2: There is no significant difference between the mean scores of students in the experimental group and control group in retention ability using field trip.

The Data collected under this were continuous data within two samples. The statistical test that was employed for the analysis is t –test at $\alpha = 0.05$ level of significant. This is because it involve two way analysis of mean between experimental and control groups

Ho_3: There is no significant difference in the mean scores of the urban and rural schools student's taught ecology concept using field trip.

The Data collected under this were continuous data within two samples. The statistical test that was employed for the analysis is t –test at $\alpha = 0.05$ level of significant. This is because it involve two way analysis of mean between experimental and control groups

$H_{04:}$ There is no significant difference in the mean scores of urban and rural schools students in retention ability taught ecology concept using field trip.

The Data collected under this were continuous data within two samples. The statistical test that was employed for the analysis is t –test at $\alpha = 0.05$ level of significant. This is because it involve two way analysis of mean between experimental and control groups

CHAPTER FOUR

ANALYSIS, RESULT AND DISCUSSION

4.1 Introduction

This chapter contains data analysis, result presentation and discussion. The analysis involves statistical testing of the research questions and hypotheses stated in chapters one and three. The level of significance ($= 0.05$ Level) used for the analysis is $p \leq 0.05$. This level of significance forms the basis for retaining or rejecting each of the null hypotheses.

4.2 Analysis and Results Presentation

The data collected for the purpose of this study were analyzed based on the research questions and hypotheses formulated.

Research Question 1: What is the effect of field trip strategy on students' academic achievement in ecology concept in Zaria educational zone?

The descriptive statistics of mean and standard deviation were used to answer this research question and the summary of the results is presented in Table 4.1.

Table4.1 Means and Standard Deviation of the Experimental (field trip) and Control (lecture) groups in Ecology Achievement Test (EAT)

Variable	N	Mean	SD	MD
Experimental group	100	51.73	12.68	6.97
Control group	100	44.76	14.43	

Results in Table 4.1, shows the mean score of the experimental group was 51.73 and a standard deviation of 12.68 while the mean scores for the control group was 44.76 and a standard deviation of 14.43. The mean difference of the experimental and control group was 6.97 in favour of the experimental group. This shows that the experimental group had mean

scores more than the control group. This implied that the effect of the treatment had impact on the experimental group.

Research Question 2: What is the effect of field strip on students academic achievement in Urban and rural experimental schools in ecology concept in the study area?

A descriptive statistics of mean and standard deviation were used to answer this research question and the summary of the result is presented in table 4.2 below.

Table 4.2 Means and Standard Deviation of Urban and Rural Students of the Experimental group (field trip) in Ecology Achievement Test (EAT)

Variable	N	Mean	SD	MD
Experimental group (urban)	50	58.76	13.27	7.66
Experimental group (rural)	50	51.10	13.53	

Results in Table 4.2, showed that the mean scores of the urban experimental group were 58.76 and a standard deviation of 13.27 while the means scores for the rural experimental were 51.10 and a standard deviation of 13.53. The mean difference of the urban experimental and rural experimental groups was 7.66 in favour of the urban experimental group. This proved that the urban experimental group had mean scores more than the rural experimental group. This implied that the effect of the treatment had impact on the urban experimental group.

Research Question 3: What is the effect of field trip on student's retention ability in ecology concept among senior secondary schools in Zaria Educational Zone?

A descriptive statistics of mean and standard deviation were used to answer this research question and the summary of the result is presented in Table 4.3

Table 4.3 Mean and Standard Deviation of the Experimental (field trip) and Control group (lecture) in Ecology Retention Test (ERT)

Variable	N	Mean	SD	MD
Experimental group	100	55.09	14.14	
				10.33
Control group	100	44.76	14.43	

Results in Table 4.3, show that the mean scores of the experimental group was 55.09 and a standard deviation of 14.14 while the means scores for the control group was 44.76 and a standard deviation of 14.43. The means difference of the experimental and control group was 10.33 in favour of the experimental group. This proved that the experimental group had mean scores more than the control group. It implied that the effect of the treatment had impact on the experimental group.

Research Question 4: what is the effect of field trip on retention level of urban and rural experimental schools students in the study area?

A Descriptive statistics of mean and standard deviation were used to answer this research question and the summery of the results is presented in table 4.4

Table 4.4 Means and Standard Deviation of Urban and Rural Students of the Experimental group (field trip) in Ecology Retention Test (ERT)

Variable	N	Mean	SD	MD
Experimental group (urban)	50	42.21	12.30	
				2.01
Experimental group (rural)	50	40.20	11.29	

Results in Table 4.4, showed the mean scores of the urban experimental group was 42.21 and a standard deviation of 12.30 while the mean scores for the rural experimental

was 40.20 and a standard deviation of 11.29. The means difference of the urban experimental and rural experimental groups was 2.01 in favour of the urban experimental group. This proved that the urban experimental group had mean scores more than the rural experimental group. This implied that the effect of the treatment had impact on the urban experimental group.

Null Hypothesis 1: There is no significant difference between the mean scores of the students taught ecology concept, using field trip and those taught using lecture method. The Ho_1 was analyzed using t-test statstics.

The inferential statistic t-test was used to test this hypothesis, and Table 4.5 below presented the summary of the analysis.

Table 4.5 presents t-test of posttest means score of the control and Experimental groups in Ecology Achievement test (EAT)

Variable	N	Mean	SD	DF	SE	t-cal	t-crit	p-value	remark
Experimental group	100	51.73	12.68						
				198	1.92	3.63	1.98	0.00	Significant
Control group	100	44.76	1 4.43						

The results in Table 4.5 Shows that the t- cal is 3.63 and the P-value = 0.00 at degree of freedom (df) = 198. Since the P-value = 0.00 < α= 0.05. It means that there is a significant difference in the mean scores of the experimental and control groups. The significant difference is in favour of the experimental group exposed to field trip teaching strategy as indicated by the mean scores. With this result the Null hypothesis 1 was therefore rejected.

Null hypothesis 2: There is no significant difference in the mean scores of the urban and rural experimental School Students taught Ecology concept using Field Trip.

The inferential statistics t-test was used to analyze this hypothesis and results of the analysis are presented in table 4.6

Table 4.6 presents t- test of posttest means scores of Urban and Rural Students of Experimental groups (field trip) in Ecology Achievement Test (EAT)

Variable	N	Mean	SD	DF	SE	t-cal	t-crit	P-value	Remarks
Experimental group (urban	50	58.76	13.27						
				98	2.68	2.76	1.96	0.01	Significant
Experimental group (rural)	50	51.10	13.53						

The results in Table 4.6 Shows that the t- cal = 2.76 and the P-value= 0.01 at degree of freedom (df) = 98. Since the P-value = 0.01 < $\alpha = 0.05$, it means that there is a significant difference in the mean scores of the urban and rural experimental groups in academic achievement level of the students. The significant difference is in favour of the urban experimental group exposed to field trip teaching strategy as indicated by the mean scores. With this result the Null hypothesis 2 was therefore rejected.

Null Hypothesis 3: there is no significant difference in the mean scores of students in experimental and control groups in retention ability using field trip.

The inferential statistic t-test was used to test this hypothesis, and Table 4.7 below presented the summary of the analysis

Table 4.7 present t-tests of post-posttest means scores of Experimental (field Trip) and Control (lecture) groups in Ecology Retention Test (ERT)

variable	N	Mean	SD	DF	SD	t-cal	t-crit	p-value	Remarks
Experimental group	100	55.09	14.14						
				198	2.68	2.86	1.98	0.00	Significant
Control group	100	44.76	14.43						

The results in Table 4.7 Shows that t- cal is 2.86 and the P-value = 0.00 at degree of freedom (df) = 198. Since the P = 0.00 < α = 0.05. It means that there is a significant

difference in the mean scores of the experimental and the control groups in retention level of the students. The significant difference is in favour of the experimental group in retention level exposed to field trip teaching strategy as indicated by the mean scores. With this result the Null hypothesis 3 was therefore rejected.

Null hypothesis 4: There is no significant difference in the mean scores of urban and rural experimental schools students in retention level taught ecology concept using field trip.

The inferential statistics t-test was used to analyze this hypotheses and result of the analysis is presented in table 4.8

Table 4.8 present t- test of post posttest means scores of Urban and Rural Students of Experimental groups (field trip) in Ecology Retention Test (EAT)

Variable	N	Mean	SD	DF	SE	t-cal	t-crit	P-value	Remarks
Experimental group (urban)	50	42.21	12.30						
				98	2.32	2.30	1.96	0.01	Significant
Experimental group (rural)	50	40.20	11.29						

The results in Table 4.8 Shows that the t- cal is 2.30 and the P-value = 0.01 at degree of freedom (df) = 98. Since the P-value = 0.01 < α = 0.05. It means that there is a significant difference in the mean scores of urban and rural experimental groups in retention level of the students. The significant difference is in favour of the urban experimental group in retention level exposed to field trip teaching strategy as indicated by the mean scores. With this result the Null hypothesis 4 was therefore rejected.

4.4 Summary of Major Finding

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

- Shown in Table 4.5, there is a significant difference between students exposed to field trip experiences and those who were not on the ecology concept (P = 0.00, < α 0.05). With this result Ho_1 was therefore rejected.

- Table 4.6, the result of analysis suggested that the difference between the mean achievement of the urban and rural student of the experimental group in ecology concept was statistically significant (P = 0.01, < α =0.05). With this finding, Ho_2 was rejected.
- Table 4.7 shows that, the result of analysis between the mean achievement of the experimental (field trip) and control(lecture) groups in a retention ability of students taught ecology concept is statistically significant (p = 0.00 < $\alpha = 0.05$). With this finding Ho_3 was therefore rejected.
- The result in Table 4.8 shows that the analysis between the achievement of the urban and rural experimental schools students in retention level taught ecology concept is statistically significant (p = 0.01 < α =0.05). With this finding null hypothesis 4 was rejected.

4.5 Discussion of the Results

This study is very significant in the sense that it has been able to demonstrate the usefulness of field trip in the learning of biology particularly ecology concept. The most important usefulness of field trip lies in the basic facts that they provided most realistic means of meeting organisms in their actual environment. This makes topics or concepts and principles taught more vivid and retention better. This Unit presented explanation of results obtained from the hypothesis tested and acknowledged the published works of other authors in the study like Ajaja, (2010), Michie (2001) &Fred (2007).

Null Hypothesis 1: There is no significance difference between the mean scores of the students taught ecology concept using field trip and those taught using lecture method. Table 4.5 proved that there was significant difference between mean score of the experimental and control groups in ecology concept. This suggested that the field trip teaching strategy has favoured the experimental groups. This confirmed the findings of David (2006) , Ajaja

(2010) and Michie (2007) which stated that knowledge gains were found to be significant with the experimental group using field trip teaching strategy more than their counter part that were strictly taught in the class using lecture method in ecology concept?

Null Hypothesis 2: there is no significant difference in the mean scores of the urban and rural experimental schools students in ecology concept using field trip. Table 4.6 confirmed that there was significant difference in the mean scores of the urban experimental and rural experimental group in ecology concept. The outcome demonstrated that field trip teaching strategy has more positive effect on urban experimental group than the rural experimental group. This might be due to the following reasons: (1) Exposure: This is not surprising, because those in urban seen to be more exposed to those organisms on media like Television, Internet e.t.c and they might have know more about the organisms even before they saw live. The rural group might be coming in contact with them but know very little about them hence the difference in achievement. (2) Students in the urban area used English as a means of communication much more than those in the rural area. Therefore are able to express themselves better than these in the rural areas. Moreso, WAEC / NECO questions were sets and answers in English language. (3) Closely related to this, another advantage of the urban students over rural is electric light which would help in the use of internet. However, these reasons and many more could be advanced for the inability of the field trip teaching strategy to make more impact on the rural experimental group.

Null Hypothesis 3: There is no significant difference between the mean scores of students in the experimental group and control group in retention ability using field trip. It was established in table 4.7 that there was a significant difference between mean score of the experimental and control group retention ability in ecology concept. This confirmed that the

field trip teaching strategy gained upper hand than the traditional method in retention ability. This confirmed the study of Mechie (2000), Ajaja and kpangbari, (2004) Fred, (2007), their finding recommended that field trip teaching strategy should be adopted as the most effective teaching strategy in science because of it influence on retention, more than their counter part that were strictly taught in the class using lecture method.

Null hypotheses 4, there is no significant difference in the mean score of urban and rural experimental schools students in retention level using field trip. This confirmed in Table 4.8 that experimental (field trip) teaching strategy retained more than the rural experimental group in ecology retention test using field trip teaching strategy.

However, the discussion can be concluded that the purposes and objectives of the study have been achieved. This confirmed the piaget, (1952) developmental theory of learning and thinking which assented that, for a child to know and construct knowledge of the world, the child must act on objects and it is this action provides knowledge of those objects. The mind organizes reality and acts upon it. Therefore, since field trips provide the most realistic means for meeting organisms in their actual environment of the objects the learner should have the ability to organize reality and also to act on objects by observing, identifying, classifying and even manipulating the objects in its natural environment. Therefore, field trip should be seen as a strategy that enhanced the teaching and learning or the achievement of students in ecology concept at Senior Secondary School Level.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter was discussed under the following headings, summary, conclusion and recommendations

5.1 Summary

The major purpose of this study was to determine the effects of field trip on student's achievement, and retention, in ecology among senior secondary school 1 students of Rural and urban location in Zaria educational zone. The study reviews the literature relevant to the study under the following sub-headings: Nature of biology as Science subject at senior secondary level, teaching ecology concept at senior secondary level, student's academic achievement in biology, science teaching methods/strategies., field Trip for teaching science, retention ability in science, school location and academic achievement in science, overview of similar studies and Implication of the literature reviewed on the present study.

The design of the study was quasi experimental control involving the pre-test posttests. The sample of the study consisted of 200 SS 1 biology students in both rural and urban areas. Three research questions were raised and collapsed to three hypotheses. The research questions were tested with descriptive statistics such as mean and standard deviation and the hypotheses were tested with inferential statistics i.e independent sample test (t-test).

From the results of the analyses discussed in 4.2, the field trip teaching strategy favored the experimental group in ecology concept. This provided a positive response to the question does field trip strategy have any effect on students' performance in ecology concept? The

study shows that, there is significant differences between the achievements of students taught using field trip teaching strategy and those taught by traditional method. The study further confirmed that field trip teaching strategy is a good tool in teaching ecology concept at secondary school level.

Field trip teaching strategy also favoured the urban experimental group in ecology concept; this provided a positive response to the question, what is the effect of field trip on urban and rural students' performance in ecology concept in Zaria educational zone? The study shows that, there are significant dif s between the achievement of students in urban experimental group using field trip teaching strategy and those students in rural experimental group using the same strategy. The study further confirmed that field trip teaching strategy has made more impact on urban students.

Field trip teaching strategy favoured the experimental group in ecology concept on retention ability. This provided a positive response to the question, what is the effect of field trip on student's retention ability in ecology concept among senior secondary school in Zaria educational zone. The study shows that, there is significant difference between the achievement of students taught using field trip teaching strategy and those taught by traditional method. The study further confirmed that field trip teaching strategy is a good tool in teaching ecology concept at senior secondary school level.

5.2 Conclusion

This unit gave inferences drawn from the finding thus:

Generally, it was confirmed that there was high significant difference between the mean achievement of the experimental and control groups in ecology concept. And there was also high significant difference between the mean achievement of the experimental and

control groups in ecology concept on retention ability. This further confirmed that the field trip teaching strategy has gained more than the traditional method of teaching.

However, it was statistically, shown that field trip teaching strategy favoured students in urban experimental group in teaching ecology concept. This might be that, the students in urban are more curious i.e want to know when taken to the natural surroundings, urban student used English as a means of communication so they have advantage in NECO/WAEC examination and also availability of electric light in the urban help in the used of internet.

Field trip teaching strategy favored the experimental groups was due to the fact that the pre-requisite steps of activities in teaching of ecology concept were followed. This has stimulated students' attention and interest, which led to good performance in ecology concept. The students on experimental group were taught with the strategy (field trip) that required the used of basic science process skills i.e observation, identification, classification and manipulation of substances in the natural surroundings. The students in this group became more active and creative since they can see and manipulate organism in their natural surroundings.

5.3 Recommendations

Based on the findings of this study; the following recommendations are made; thus:

1. Although field trip is integrated into the teaching programme, it is not being used. Therefore, the government should make the use of field trip teaching strategy compulsory particularly in the teaching and learning of the ecology concept at SS level. This will enhance students gain first hand information, and provide opportunity for them to see, possibly touch and feel what they have heard about certain organism and situations.

2. Field trip experiences when used should be relevant to contents in the curriculum, if they are to make the necessary impact.
3. Field trip experiences should emphasizes real practical experiences with the students collecting, analyzing data, interpreting data and using them to explain previous knowledge.
4. Field trip when used should be such that can serve as an integrated learning i.e field trip cannot teach one idea, but many. A field trip to a vegetable farm, for example can bring disparate topics together such as photosynthesis, the scientific method, how to collect data, plant, insect, part of flowers, soil erosion etc.
5. For the exercise (field trip) to be successful, it has to be well-funded, by both school authorities and parents. As such the school authorities and parents should put hands together to make field trip teaching strategy at all level of learning in successful one by proper funding at any design time.

Contribution to Knowledge

Science education is dynamic. It changes based on frontier of new knowledge which makes it to be dynamic. Base on this several studies were carried out on field trip teaching strategy. These studies focused mostly on academic achievement and retention ability of the students. The present study was carried out on effects of field trip on academic achievement and retention in ecology concept among senior secondary school and another different variable such as students of urban and rural location in Zaria educational zone Kaduna state. The researcher from his finding now provides new innovation on the effective use of field trip in ecology concept on students of urban and rural location. Therefore, the study provides new area where field trip teaching strategy has positive impact.

5.4 Limitations of the study.

1. Security challenges / Atmospheric condition: due to insecurity in the state, the students got scared easily when there was unusual noise or sound which distracted the attention of students thereby reducing the attention of the students.
2. Language Barrier; it was observed that some students kick understanding of a simple biological terms or relations or even the English grammar. Therefore a means was developed through student to student relationship to explain such.
3. Lack of motivation by the parents: it was observed that when students were given circular for the trips some parents do not help them to pay and bought the needed materials.
4. Lateness on the part of students; some students are fond of coming to school late. This may be due to distance, traffic congestion and faulty nobilities used when coming to school.
5. In some cases teachers teaching Biology are not fully equipped to handle the subject and the issue of pedagogy is lacking.

5.5 Suggestions for Further Studies

This research intended to promote and encourage further findings in the related studies; hence the following research areas were suggested.

1. Effect of field trip on students academic achievement, attitude and school location in ecology concept at senior secondary school level.
2. Effect of fieldtrip on students achievement, interest and school location in ecology concept at senior secondary school level.
3. Effect of teacher factor on the field trip teaching strategy in ecology concept at senior secondary school level.

4. Effect of administrator factor on the field trip teaching strategy in ecology concept at senior secondary school level.

The study can be repeated in other educational zones.

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APPENDIX A
Pretest Analysis Of Eat

Variable	N	Mean	SD	DF	SE	T-cal	T-crit
Exptl Group	100	43.35	3.66	198	0.81	1.61	1.98
Contl group	100	41.23	3.11				

From the above table, the t-calculated (1.61) is less than the t-critical (1.98) at alpha value $\alpha = 0.05$ level of significance. Therefore null hypothesis is up hold. The results of the analysis suggested that the difference between the mean achievement of the experimental group and control groups was not statistically significant. We then conclude that there was no significant difference between the means achievements of the experimental and control groups in Ecology Achievement test. It also shows that the test instruments are reliable and can be used for further studies.

APPENDIX B

Pilot Study Analysis in EAT
T-test analysis of Difference between means of experimental group (field trip) and control groups (lecture) in Ecology Achievement Test (EAT)

Variable	N	Mean	SD	DF	SE	T-cal	T-crit	
Exptl Group	50	45.28	3.59					
				98	0.76	2.21	1.98	
Contl group	50	43.98	3.20					

From the above table, the t-calculated (2.21) is greater than the t-critical (1.98) at alpha value $\alpha = 0.05$ level of significance. Therefore null hypothesis is rejected. The results of the analysis suggested that the difference between the mean achievement of the experimental group and control groups was statistically significant. We then conclude that there was significant difference between the means achievements of the experimental and control groups in Ecology Achievement test. It also shows that the test instruments are reliable and can be used for further studies.

APPENDIX C

LESSON PLAN:

Experimental Group (Field Trip Teaching Strategy)

Subject: Biology

Topic: Habitat (fresh water- pond)

Class: SSI

Time: 40 Minutes

Objectives: It is expected that at the end of the lesson, 70% students should be able to:

I Identify and name the characteristics of ponds habitat.

ii Identify and name the adaptation of the plants and animals in the pond habitat

iii Identify and name the food chain in the pond habitat

iv Identify and name animals and plants that can be found in pond habitat

Previous Knowledge: The students have l know the meaning of Ecology, biotic and biotic components

Introduction: The teacher introduces the lesson by asking questions on the previous knowledge eg what is ecology?

Presentation Step 1: The teacher takes the students to the pond and requires them to use the work sheet. Also advise them to record what they observe in their K WL chart.

Step II: The teacher defines and explains pond while the students are looking at the pond, e.g pond is a small body of shallow water having no or feeble current. Ponds vary in size depending upon age and location.

Step III: The teacher guided the students to identified the characteristics of pond habitat, e.g the water is stagnant, lack waves and tides, it has little or no salt in them e.tc.

Step IV: The teacher explains and asks students to observe the pattern of distribution of the biotic components of the pond and their adaptive features:

Step V: He then takes students to identify and ask questions and take sample where possible of (plants and Animals) component in the pond habitat eg tad pole, water lettuce, tree frog, water lily water snake, arrow head e.t.c

Step VI: The teacher guided the students to identify and construct food chain of the biotic component observed. eg

insect ⟶ tree frog ⟶ bird snake.

Step VII: The teacher guides students to take reading of temperature, relative humidity and estimate light intensity of the pond.

Evaluation: The teacher evaluates the lesson by asking questions base on the lesson presented eg what are the characteristic of pond habitat? What are the examples of plants and animals that can be found in pond habitat?

Conclusion: The teacher concludes the lesson by summarizing a topic learnt eg define pond, mention some characteristics of pond habitat, naming some of the plants and animals seen in pond habitat.

Students Activities: The students would used the possible sample collected and what they have observed and write report.

EXPERIMENTAL GROUP (FIELD-TRIP)

Subject - Biology

Topic - Hill (Terrestrial) Habitat

Class - SS1

Time - 1 ^{1}/2 hours

Objectives: It is expected that at the end of the lesson, 70% students should be able to:

i. Identify and name the characteristics of Hill habitat.

ii. Identify and name the adaptation of the plants and Animals in the Hill habitat.

iii. Identify the food chain in the Hill habitat.

iv. Identify and name some biotic component in the hill

Previous knowledge: The students have observed pond, characteristics and the types of plants and animals found in the pond habitats.

Introduction: The teacher introduces the lesson by asking questions on the previous knowledge e.g. what is pond? What are the characteristics of pond? What are the biotic components seen in the pond habitat? What is aquatic habitat?

Presentation STEP I: The teacher takes the students to at site Kufena Hill and requires them to use the guided sheet and also advise them to record what they observed in their KWL chart.

STEP II: The teacher defines Hills e.g. Hills are regarded as small high land areas exposed out due to agent of denudation. .

STEP III: The teacher help students to identify and names, shows and explains the Characteristics of a Hill eg hill is social mass of intrusive igneous rock which are undergoing modification due to weathering process in the area. Because of humid, climate condition of savanna (guinea savanna) both physical, chemical and biological weathering are active in the environment, which consequently lead to fragmentation of rock materials to form soil at base and hill top.

STEP IV: The teacher explains and asks students to observe the pattern of distribution of biotic components of the Hills and their adaptive features.

STEP V: The teacher then takes the students round to observe, ask questions and collect sample where possible of the biotic component of the Hill habitat e.g. Rat, insect, Birds, frogs, snake, chameleon, frogs lizard, grasses, shrubs tree etc.

STEP VI: The teacher guided the students to identify and construct food chain of the biotic component observed in the Hill habitat.

e.g Grasses ⟶ Grasshopper ⟶ Toad.

STEP VII: The teacher guides students to take reading of temperature, relative humidity and estimate light intensity of the Hill.

Evaluation: The teacher evaluates the lesson by asking questions based on what student observed e.g. what is Hill? What are the characteristics of hill habitat? What are the biotic components found in the hill habitat? What are the adaptive features observed on the biotic component in the Hill?

Conclusion: The teacher concludes the lesson by summarizing the lesson by defining Hill; list some characteristics of hill habitat and naming some of the biotic component seen in the hill. **Students Activities:** The students would use the possible sample

Collected and what they have observed to write a report.

EXPERIMENTAL GROUP (FIELD TRIP)

Subject - Biology

Topic - Farm land (terrestrial) habitat

Class - SSI

Time - 1 $^{1}/_{2}$ hours

Objectives: It is expected that at the end of the lesson the 70% of students should be able to :

i. Identify and name the characteristics of abandoned farm land habitat
ii. Identify the adaptive features of the biotic component of the abandoned farm land habitat,
iii. Identify and name some of the biotic components found or observed in the abandoned farm land habitat.

Previous knowledge: The students have observed Hill habitat, they know the meaning of Hill, characteristics of hill, the adaptive features of Hill and biotic component of the Hill.

Introduction: The teacher introduces the lesson by asking questions on the previous knowledge e.g. what is a Hill? What are the characteristics of a Hill habitat? What are the adaptive features of the biotic component of the hill habitat? What are the biotic components seen in the Hill habitat?

Presentation Step I: The teacher takes the students to the farmland and defines abandoned farm land while students are observing e.g this is an open field where crops are cultivated, some farmland that are abandoned have weeds, underground stems, seeds of plants, egg and lavae of insects are warms in abundance.

STEP II: The teacher helps the students to names, shows and explains the characteristics of farm land. E.g. It has been an open field, in the abandoned farm land, the pioneers are weeds and underground stems, seeds of plant, eggs and larvae of insect and worms.

These pioneers derived their food from the left over nutrients of the old farm. Animal such as mice, rats, and cane rats, lizard are also found.

STEP III: He then takes the students round to observe ask question and collect sample where possible of the biotic component of the farm land e.g. grasses, insects rat, lizard, trees etc.

STEP IV: The teacher guides students to identify and construct food chain of the biotic component observed in the farm land.

E.g Grass ⟶ Grasshopper ⟶ Lizard ⟶ Bird

Evaluation: He evaluates the lesson base on what the students has been observed on the farm land habitat e.g. what are the characteristics of farm land? What are the adaptive features of the biotic component that can be observed in the farm land? What are the biotic components seen in the farm land habitat.

Student's activities: The students would use what they have observed and the possible sample collected to write report.

EXPERIMENTAL GROUP (FIELD -TRIP)

Objectives: At the end of the lesson 70% of students should be able to:

- Recognize types of marshes
- Recognize the adaptations of organisms in habitat.
- Name of the plants and animals that live in marshes.

PREVIOUS KNOWLEDGE:- The students have observed pound; the characteristics of pond, the adaptive features of plants and animals in the pond.

INTRODUCTION:- The teacher introduces the lesson by asking questions on the previous knowledge e.g what are the adaptive features of plants observed in the pond, what are the general characteristics of pond habitat?.

STEP I:- The teacher takes the students to the marsh habitat and he then defines and explain marsh habitat while the students are observing e.g Marsh is a low, flat land completely or partly covered by shallow water with silt frequently, deposited. The water is about knee deep in most parts while is less in many other places.

STEP II:- The teacher help the students to name and explains the types of marshes: temporary marshes are seasonal occurring during the rainy season drying up in the dry season, while permanent marshes: contains water throughout the year. They are close to the rivers or seas which serve as permanent water source.

STEP III:- He also guides students to identify, name, shows and explains the characteristic of marsh habitat e.g low and habitat covered with water (if permanent) but dry up during the dry season (if temporary), soils is soft making difficult for big animal to move, the vegetation is normally dominated by grasses, the contents of mineral salts is high and dissolved oxygen content is low.

STEP IV:- The teacher also help the student identify, names and shows adaptive features of plants and animals e.g animals; warm, crabs and bivalves burrow into the soft mud to avoid high temperature and drying up, insect larvae, beetles and frogs come near the surface to gulp atmospheric air to survive the low oxygen content in the water. P lants. The grasses grow in large branches or tussocks to avoid being washed away by water movement; their leaves are long narrow and held high above water for atmospheric gaseous exchange to compensate for poor aeration of the water logged soil.

STEP V:- He also help the students to identify, name and shows plants and animals that lives in marsh habitat. Plants: vossia cuspidate, duckweed, water lily, water lettuce, salvina, Azolla, algae etc. Animals: Water snake, tad pole, frogs, larvae, insects e.t.c.

STEP VI:- The teacher guide students on how to take reading of temperature, relative humidity and estimate light intensity of the marsh.

EVALUATIONS:- The teacher evaluate by asking questions on what has been seen in the lesson presented e.g what are the plants and animals observed in marsh habitat?

CONCLUSION

The teacher concludes the lesson by summarizing the whole lesson particularly on what has been observed e.g by defining marsh, naming the characteristic of marsh adaptive feature. e.t.c

APPENDIX D

LESSON PLAN:

Lecture Method (control group)

Subject: Biology

Topic: Habitat (fresh water- pond)

Class: SSI

Time: 40 Minutes

Objectives: It is expected that at the end of the lesson 70% of students should be able to :

i. Identify and name the characteristics of ponds habitat.

ii. Identify and name the adaptation of the plants and animals in the pond habitat.

iii. Explain food chain in the pond habitat

iv. Identify and name animals and plants that can be found in pond habitat

Previous Knowledge: The students have learnt the meaning of Ecology, biotic and a biotic component

Introduction: The teacher introduces the lesson by asking question(s) based on the previous knowledge eg what is ecology?

Presentation – Step 1: The teacher defines and explains pond eg pond are irregular shallow water bodies of surrounded by land. They do not have noticeable currents and they varying in size. Some are bigger than others.

Step II: The teacher then list and explain the characteristics of pond habitat. eg the water is stagnant, it has little or no salt in them, lack waves and tides etc.

Step III: The teacher explains plants and animals adaptive feature to pond: Plants: Well developed numerous fibrous roots system for firm anchorage into the soft mud, Numerous root hairs for absorption of nutrient from the soil, there are numerous spines

on the long petioles. These spines are protective in function. Animals: the body is long and flexible which help to locomotion, protective coloration, the scales are smooth and water repellent for easy locomotion in water.

Step IV: He also list the plants and Animals that can be found in pond habitat eg plants: Water lettuces, water fern, Duck weed, water lily. Animals: Tree frog, dragon flies, Bird e.t.c

Step V: The teacher explains the possible food chain found in pond environment

e.g insect → tree frog ⟶ water snake

Evaluation: The teacher evaluates the lesson by asking questions based on the lesson presented eg what are the characteristic of pond habitat? What are the examples of plants and animals that can be found in pond habitat?

Conclusion: The teacher concludes the lesson by summarizing the lesson eg defining pond, mention some characteristics of pond habitat, naming some of the plants and animals that can be found in pond habitat.

Control Group (lecture method)

Subject - Biology

Topic - Hill (Terrestrial) Habitat

Class - SS1

Time - $1\ ^{1}/_{2}$ hours

Objectives: It is expected that at the end of the lesson 70% of students should be able to:

i. Identify and name the characteristics of Hill habitat.

ii. Identify and name the adaptation of the plants and Animals in the Hill habitat.

iii. Explain the food chain in the Hill habitat.

iv. Identify and name some biotic component in the hill

Previous knowledge: The students have learnt pond, characteristics and the types of plants and animals found in the pond habitats.

Introduction: The teacher introduces the lesson by asking questions on the previous knowledge e.g. what is pond? What are the characteristics of pond? What are the biotic components found in the pond habitat? What is aquatic habitat?

STEP I: The teacher defines hills e.g. hills are regarded as small high land areas exposed out due to agent of denudation.

STEP II: The teacher, name and explains the characteristics of a hill i.e. its characterized as social mass of intrusive igneous rock which are undergoing modification due to weathering process in the area. Because of humid, climate condition of savanna (guinea savanna) physical, chemical and biological weathering are active in the environment, which consequently lead to fragmentation of rock materials to form soil at base and hill top.

STEP III: The teacher explains the pattern of distribution of biotic components of the Hills and their adaptive features.

STEP IV: He then names the biotic component of the Hill habitat e.g. Rat, insect, Birds, frogs, snake, chameleon, frogs, lizard, grasses, shrubs tree etc.

STEP V: The teacher explains food chain and guide students to construct food chain of the biotic component that can be found in Hill habitat.

eg Grasses $\longrightarrow$ Rat $\longrightarrow$ Snake.

STEP VI: The teacher explains to the students how to take reading of temperature, relative humidity and estimate light intensity of the Hill.

Evaluation: The teacher evaluates the lesson by asking questions base on the lesson presented e.g. what is Hill? What are the characteristics of hill habitat? What are the biotic components found in the hill habitat? What are the adaptive features of the biotic component in the hill?

Conclusion: The teacher concludes the lesson by summarizing the lesson by defining Hill, list some characteristics of Hill habitat and naming some of the biotic component found in the hill.

Students Activities: The students will copy Note in their exercise books.

Control Group (Lecture Method)

Subject - Biology

Topic - Farm land (terrestrial) habitat

Class - SSI

Time - 1 $^{1}/_{2}$ hours

Objectives: It is expected that at the end of the lesson70% of the students should be able to :

i. Identify and name the characteristics of abandoned farm land habitat

ii. Identify the adaptive feature of the biotic component of the farm land habitat.

iii. Identify, and name some of the biotic component found or observed in the farm land habitat.

Previous knowledge: The students know Hill habitat, they know the meaning of Hill, characteristics of hill, the adaptive features of Hill and biotic component of the Hill.

Introduction: The teacher introduces the lesson by asking questions on the previous knowledge e.g. what is Hill? What are the characteristics of Hill habitat? What are the adaptive features of the biotic component of the hill habitat? What are the biotic components found in the Hill habitat?

Presentation Step I: The teacher defines farm land e.g. This is an open field where crops are cultivated. Some farm lands that are abandoned have weeds, underground stems, seed of plants eggs and larvae of insects and worms in abundance.

STEP II: The teacher explains and names the characteristics of farm land. E.g. in the abandoned farm land, the pioneers are weeds and underground stems, seeds of plant, eggs and larvae of insect and worms. These pioneers derived their

food from the left over nutrients of the old farm. Animal such as mice, rats, and cane rats, lizard are also found.

STEP III: He then names the biotic component of the abandoned farm land e.g. grasses, insect rat, lizard, trees etc.

STEP IV: The teacher explain food chain and guide students to construct food chain of the biotic component observed in the abandoned farm land.

e.g Grass ⟶ Grasshopper ⟶ lizard ⟶ Snake

Evaluation: He evaluates the lesson base on what the lesson has been presented on the farm land habitat e.g. what are the characteristics of abandoned farm land? What are the adaptive features of the biotic component that can be found in the farm land. What is the biotic component found in the farm land habitat?

Students activities: The students would copy note into their exercise books.

Control Group (Lecture Method)

Instruction materials:- chart showing marshy areas.

Objectives:At the end of the lesson 70% of the students should be able to:

- Recognize types of marshes
- Recognize the adaptations of organisms in habitat.
- Name of the plants and animals that live in marshes.

PREVIOUS KNOWLEDGE:- The students know the meaning of pond the characteristics of pond, the adaptive features of plants and animals in the pond.

INTRODUCTION:- The teacher introduces the lesson by asking questions on the previous knowledge e.g what are the adaptive features of plants in the pond, what are the general characteristics of pond habitat.

STEP I:- The teacher define and explain marsh habitat e.g Marsh is a low, flat land completely or partly covered by shallow water with silt frequently, .deposited. The water is about knee deep in most parts while is less in many other places.

STEP II:- He then name and explains the types of marshes: Temporary marshes are seasonal occurring during the rainy season drying up in the dry season. While permanent marshes: contains water throughout the year. They are close to the rivers or seas which serve as permanent water source.

STEP III:- He also names, and explains the characteristic of marsh habitat e.g low and habitat covered with water (if permanent), but dry up during the dry season (if temporary) soils is soft making difficult for big animal to move, the vegetation is

normally dominated by grasses, the contents of mineral salts is high and dissolved oxygen content is low.

STEP IV:- The teacher also name adaptive features of plants and animals e.g Animals warm, crabs and bivalves burrow into the soft mud to avoid high temperature and drying up, insect larvae, beetles and frogs come near the surface to gulp atmospheric air to survive the low oxygen content in the water, Plants: the grasses grow in large branches or tussocks to avoid being washed away by water movement, their leaves are long narrow and held high above water for atmospheric gaseous exchange to compensate for poor aeration of the water logged soil.

STEP V:- He also names plants and animals that lives in marsh habitat. Plants: vossia cuspidate, duckweed, water lily, water lettuce, salvina, Azolla, algae etc. Animals: Water snake, tad pole, frogs, larvae, insects e.t.c.

STEP VI:- The teacher tells students how to take reading of temperature, relative humidity and estimate light intensity of the marsh.

EVALUATIONS:- The teacher evaluate>by asking questions on lesson presented e.g what are the plants and animals found in marsh habitat?

CONCLUSION

The teacher concludes the lesson by summarizing the whole lesson e.g by defining marsh and naming the characteristic of marsh, adaptive feature of the marsh.

APPENDIX E
Ecology Achievement Test (EAT)

1. River organisms are characterized by:
   a. Gills, arms and wings.
   b. Webbed feet, legs, gills
   c. air filed parts, tins, wings
   d. fins, gills, air filled parts and webbed feet.

2. Which of these is a food chain in the ponds?
   a. Seed → mouse → snake
   b. grass → grasshopper → toad → snake
   c. water lettuce → tadpole → fish
   d. cactus → woodrat → wasp → hedgehog

3. Mountain organisms are characterized by
   a. webbed feet, arms, legs
   b. air filed, parts, legs, arms
   c. limbs, legs, arms, and feet
   d. limbs, webbed feet, air filed parts.

4. All these are ecological factors affecting all habitat except
   a. rainfall,
   b. temperature
   c. humidity
   d. None of the above

5. Which of the following plants can be found in ponds habitat?
   a. mango tree
   b water-lilly
   c. tadpole
   d. orange tree

6. Which of the following is an example of food chain in an abandoned farmland
   a. Grass → bacteria → fish
   b. fish → tad pole → sand
   c. Grass → Grasshopper → lizard → snake

7. A low and wet land habitat representing a transition between aquatic and terrestrial habitat
   a. marsh land
   b. brackish
   c. forest
   d. desert

8. Which of the following animals can not be found in river habitat?
   a. lizard
   b. tad pole
   c. king fisher
   d. fish.

9. Which of the following organisms can not be found in both abandoned farm land and mountain habitats?
   a. rats
   b. maize plants
   c. birds
   d. insects

10. One of the following is not a mountain adaptation
   a. Poorly developed roots
   b. lungs for respiration
   c. presence of sweat gland
   d. possessions of hairs

11. Which of the following animals cannot be found in rivers habitat?
   a. Frogs
   b. monkeys
   c. insects
   d. king fisher .

12. Which of the following living organism cannot be found in river habitat?
   a. Elephant grasses
   b. toad
   c. Crabs
   d. rodents

13. The functional role of an organism in a given habitat is described as termed
   a. niche
   b. biomass
   c. hydrosphere
   d. atmosphere

14. Which of the following is not a characteristic of marsh habitat?
   a. Soil is soft making difficult for big animal to move
   b. The vegetation is mostly dominated by grasses
   c. It has little or no salt in them.
   d. The contents of mineral salt is high

15. Which of the following organisms cannot be found in ponds?
    a. scorpions
    b. spirogyra
    c. mosquitoes
    d. water lettuce
16. What is the name of an instrument for measuring temperature?
    a. thermometer
    b. rainguage
    c. hygrometer
    d. anemometer
17. Mountain, abandoned farmland, rock are grouped together as
    a. ecosystem
    b. Marine habitat
    c. Aquatic habitat
    d. Terrestrial habitat

18. The following are characteristics of hill habitat except
    a. the water is stagnant
    b. it is a solid mass of instrusive igneous rock
    c. it is a natural flow of water that continues in a long line across land to the sea/ocean,
    d. The grasses grow in large bounches or tussocks.

19. What is the name of an instrument for measuring relative humidity?
    a. thermometer
    b. rainguage
    c. hygrometer
    d. wind vane

20. The following are adaptation of animals in pond habitat except
    a. the two nostrils (for breathing) are placed on the heard
    b. the mouth is terminally placed for the capture of preys
    c. the body is long and flexible
    d. they have limbs legs, arms, feet for walking, running and jumping.

21. Which of the following is the adaptive feature of animals in Abandoned farmland?
    a. the two nostrils (for breathing) are placed on the head,
    b. the mouth is terminally placed for the capture of preys,
    c. they have limbs legs, arms feet for walking, running and jumping,
    d. the body is long and flexible.

22. What is the name of an instrument for the measuring of transparency of water
    a. hydrometer
    b. a seechidise
    c. thermometer
    d. rainguage

23. Ponds, rivers, lake seas and ocean are grouped together as
    a. ecosystem
    b. Marine habitat
    c. Aquatic habitat
    d. Terrestrial habitat

24. Which of the following is a food chain in the hill habitat?
    a. Grass → Rat → snake
    b. insect → tree frog → water snake
    c. spirogyra → Tadpole → carp → kingfisher

25. The instrument for measuring light intensity is called
    a. hygrometer
    b. light meter
    c. wind vane
    d. barometer

APPENDIX F
Answer For the Instrument (EAT)

1. D
2. C
3. C
4. B
5. B
6. C
7. A
8. A
9. B
10. Bonus
11. B
12. D
13. A
14. D
15. A
16. A
17. D
18. B
19. C
20. C
21. C
22. A
23. C
24. A
25. B

APPENDIX G

Ecology Retention Test (ERT)

1. Ponds, rivers, lake seas and ocean are grouped together as
   a. ecosystem
   b. Marine habitat
   c. Aquatic habitat
   d. Terrestrial habitat

2. Which of these is a food chain in the ponds?
   a. Seed → mouse → snake
   b. grass → grasshopper → toad → snake
   c. water lettuce → tadpole → fish
   d. cactus → woodrat → wasp → hedgehog

3. The following are characteristics of hill habitat except
   a. the water is stagnant
   b. it is a solid mass of instrusive igneous rock
   c. it is a natural flow of water that continues in a long line across land to the sea/ocean,
   d. The grasses grow in large bounches or tussocks.

4. All these are ecological factors affecting all habitat except
   a. rainfall,
   b. temperature
   c. humidity
   d. None of the above

5. The instrument for measuring light intensity is called
   a. hygrometer
   b. light meter
   c. wind vane
   d. barometer

6. Which of the following is an example of food chain in an abandoned farmland
   a. Grass → bacteria → fish
   b. fish → tad pole → sand
   c. Grass → Grasshopper → lizard → snake

7. What is the name of an instrument for measuring temperature?
   a. thermometer
   b. rainguage
   c. hygrometer
   d. anemometer

8. Which of the following animals can not be found in river habitat?
   a. lizard
   b. tad pole
   c. king fisher
   d. fish.

9. Which of the following organisms can not be found in both abandoned farm land and mountain habitats?
   a. rats
   b. maize plants
   c. birds
   d. insects

10. One of the following is not a mountain adaptation
   a. Poorly developed roots
   b. lungs for respiration
   c. presence of sweat gland
   d. possessions of hairs

11. Which of the following animals can not be found in rivers habitat?
   a. Frogs
   b. monkeys
   c. insects
   d. king fisher .

12. Which of the following living organism can not be found in river habitat?
   a. Elephant grasses
   b. toad
   c. Crabs
   d. rodents

13. The functional role of an organism in a given habitat is termed
   a. niche
   b. biomass
   c. hydrosphere
   d. atmosphere

14. Which of the following is Not a characteristic of marsh habitat?
   a. Soil is soft making difficult for big animal to move
   b. The vegetation is mostly dominated by grasses
   c. It has little or no salt in them.
   d. The contents of mineral salt is high

15. Which of the following organisms can not be found in ponds
   a. scorpions
   b. spirogyra
   c. mosquitoes

d. water lettuce

16. A low and wet land habitat representing a transition between aquatic and terrestrial habitat
    a. marsh land
    b. brackish
    c. forest
    d. desert
17. Mountain, abandoned farmland, rock are grouped together as
    a. ecosystem
    b. Marine habitat
    c. Aquatic habitat
    d. Terrestrial habitat

18. Mountain organisms are characterized by
    a. webbed feet, arms, legs
    b. air filed, parts, legs, arms
    c. limbs, legs, arms, and feet
    d. limbs, webbed feet, air filed parts.

19. What is the name of an instrument for measuring relative humidity?
    a. thermometer
    b. rainguage
    c. hygrometer
    d. wind vane

20. The following are adaptation of animals in pond habitat except
    a. the two nostrils (for breathing) are placed on the heard
    b. the mouth is terminally placed for the capture of preys
    c. the body is long and flexible
    d. they have limbs legs, arms, feet for walking, running and jumping.

21. Which of the following is the adaptive feature of animals in abandoned farmland?
    a. the two nostrils (for breathing) are placed on the head,
    b. the mouth is terminally placed for the capture of preys,
    c. they have limbs legs, arms feet for walking, running and jumping,
    d. the body is long and flexible.
22. What is the name of an instrument for the measuring of transparency of water
    a. hydrometer
    b. a seechidise
    c. thermometer
    d. rainguage

23. River organisms are characterized by:
    a. Gills, arms and wings.
    b. Webbed feet, legs, gills
    c. air filed parts, tins, wings
    d. fins, gills, air filled parts and webbed feet.

24. Which of the following is a food chain in the hill habitat?
    a. Grass → Rat → snake
    b. insect → tree frog → water snake
    c. spirogyra → Tadpole → carp → kingfisher

25. Which of the following plants can be found in ponds habitat?
    a. mango tree
    b water-lilly
    c. tadpole
    d. orange tree

APPENDIX H
Answer For the Instrument (EAT)

1. C
2. C
3. B
4. B
5. B
6. C
7. A
8. A
9. B
10. Bonus
11. B
12. D
13. A
14. D
15. A
16. A
17. D
18. C
19. C
20. C
21. C
22. A
23. D
24. A
25. B

APPENDIX I

Questions on the Animal's Work Sheet

1. What are 5 signs of (non – domesticated) animal presence found in the area?

(signs = feathers, for tracks, burrows, droppings nests, trails, others?).

2. Describe size, Color composition or other details of the sign.
3. What animals were actually seen during the observation period. Describe the colors, size and behaviors of each.
4. What were 3 major SOUNDS heard?
5. What was the function of each sound
6. What were 3 types of insects observed?
7. Describe 3 animals seen near or in the water.
8. Of all the animals observed which one seemed to have benefited by the presence of humans? why? Which one has been put at a disadvantage by humans?. Why?
9. Describe the characteristics of the Area
10. What are the adoptive features of the animals observed?

Include definitions, notes or topics to read or ask about and add.

Questions on the plants work sheet

- What is the site location?``
- What is the name of t he life zone/ habitat for this site?
- Write a simple 3 sentences generally describing of the vegetation at the site.
- What are 3 distinguishing trees found in this life zone site?
- What are 5 most common flowering or non- flowering plants found in this site?

How is each identified? Is there a specified type of soil found in the site?

- What are 2 rare or uncommon, but colorful or unusual plants found at the site? How is each identified?
- Have humans, animals or natural forces had any impact on the trees or plants found here? Describe your observations.
- What are the adaptive features of the plants observed in the location.

Include definitions notes, or topics to read or ask about and add later.