EFFECTS OF ACTIVITY-BASED TEACHING STRATEGY ON ACADEMIC ACHIEVEMENT AND RETENTION IN BASIC SCIENCE CONCEPTS AMONG JUNIOR SECONDARY SCHOOL STUDENTS

BY

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DECLARATION

I hereby declare that this thesis titled "**Effects of Activity-Based Teaching Strategy on Academic Achievement and Retention in Basic Science Concepts among Junior Secondary School Students"** has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree. All quotations are indicated by quotation marks or indentation and the sources of information are specifically acknowledged by means of references.

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Ngozi Pauline, IWUJI Date

CERTIFICATION

This thesis titled **"Effects of Activity-Based Teaching Strategy on Academic Achievement and Retention in Basic Science Concepts among Junior Secondary School Students"** by Ngozi Pauline, IWUJI meets the requirements governing the award of Masters Degree (M.ED) in Science Education of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to Almighty God for His goodness and mercy to me all the time. To my late husband, Mr. Christopher Iwuji who was by my side when I started this research work. May his gentle soul rest in perfect peace, Amen. My children, Obinna, Chioma, Cynthia, Judith, Ikechukwu and Emmanuel and to my father, brothers and sisters for their encouragement and support, especially their prayers and their useful advice to me during the process of this study. May God bless them all.

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OPERATIONAL DEFINITION OF TERMS

Academic Achievement is the overall performance of students in a given test after series of instruction and training.

Constructivism is the contemporary learning school of thought in which learners actively construct their own knowledge.

Activity-Based Teaching Strategy is the teaching strategy where students learned by carrying out activities planned, guided and supervised by the teacher.

Basic Science Concepts: Elementary Science Topics taught at Junior Secondary School Level.

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ABBREVIATIONS AND MEANINGS

MDGs	-	Millennium Development Goals
JSS	-	Junior Secondary School
JSCE	-	Junior Secondary Certificate Examination
STAN	-	Science Teachers Association of Nigeria
NERDC	-	Nigerian Educational Research and Development Council
NCE	-	National Council on Education
NEEDS	-	National Economic Empowerment and Development Strategy
BSAT	-	Basic Science Achievement Test

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ABSTRACT

The study investigated effects of Activity-Based teaching strategy on academic achievement and retention in Basic Science concepts among junior secondary two students. A sample of 80 JS 2 Basic Science students were randomly selected made up of 37 male and 43 female, pre – tested and categorized into experimental and control groups. The subjects in the experimental group were taught measurement concepts using the Activity-Based teaching strategy and their achievement and retention abilities were compared with that of the control group who were taught same concepts using lecture method. Pretest, post test and postpost test data were analyzed to determine the group equivalence, achievement and retention abilities of the students in the experimental and the control groups. Three hypotheses were tested using t-test statistics of P-value 0.05 and the following major findings were made: Students exposed to Activity-Based teaching strategy i.e. (Experimental group) achieved significantly higher than their counterparts taught using lecture method. Students exposed to Activity-Based instructional strategy retained the learnt concepts significantly better than their counterparts exposed to lecture instructional strategy; there was no significant difference in academic achievement between the male and female students exposed to Activity-Based and lecture instructional strategies. On the basis of these findings, some recommendations were made, one of which is that teachers of Basic science should use Activity-Based instructional strategy in their teaching as it enhances achievement and retention among JSS2 students.

CHAPTER ONE

THE PROBLEM

1.1 Introduction

Science is a body of organized knowledge and a process of inquiry that is geared towards understanding nature in order to enhance the living standard of man. Many scientists define science according to their own perception and understanding of the subject matter. (Bichi, 2002) defines science as intellectual activities carried out by scientists designed to discover information about the natural world in which we live and to discover ways in which this information can be organized to benefit human race. In this respect, the primary focus of science is to collect data and the ultimate purpose is to discern order that exists in natural phenomena and happenings around us.

Encarta Reference Library (2005) opines that science consists of the following:

a. the systematic observation of natural events and conditions in order to discover facts about them and to formulate laws and principles based on these facts.

b. an organized body of knowledge that is derived from such observations and that can be verified or tested by further investigation.

c. any specific branch of this general body of knowledge such as biology, chemistry, physics, geology or astronomy etc

At junior secondary school level integrated science was introduced for the purpose of giving foundation skills and knowledge for subsequent science studies at the higher level (Isa, 2000). The acquisition of appropriate skills and the development of mental, physical and social abilities and competencies for the individual to live in and contribute to the development of the society in which he lives, has been a major concern of Basic science. The subject views nature in a holistic approach and this makes it a discipline in its own right. The above definitions show that science is not just a collection of data and facts neither is it an assembly of sterile body of knowledge but that, it involves engaging in certain activities as well (Isa, 2000).

Integrated science (now Basic Science) was introduced to Nigerian secondary schools in 1972 at the junior secondary school level as a result of the outcome of Science Teachers Association of Nigeria (STAN) Committee set up to look into the three (3) sciences i.e. Biology, Chemistry and Physics. The program has been in existence for forty (40) years. Recently, there was a trend from Integrated science to Basic science following the Nigeria Educational Research and Development Councils (2007) decision to re-structure the Basic Education Programme to the 9-year Basic Education Programme in order to attain the

Millennium Development Goals (MDGs) by 2015. It became imperative that the existing curricula for primary and JSS should be reviewed, re-structured and realigned to fit a 9-year basic education programme and the upper basic education curriculum is for JSS 1-3 level. Basic Science concepts (content is almost the same except for introduction of some basic technological concepts) is generally geared towards technological development and appropriate strategy for the acquisition of relevant skills needed for meaningful learning of science concepts.

Various studies such as those of Akale, (1992) and Usman, (2007) have shown that teachers of Basic Science are not qualified and this in turn affects academic performance. One major problem of the teachers is their inability to use appropriate activity based teaching strategy. They often resort to traditional, lecture method that has been shown to lead to poor academic performance in Junior Secondary Schools, (Maduabun, 1990; Akale, 1992; Usman, 2007). [Inspite of the Federal Government of Nigeria's encouragement in the teaching of science in Nigerian schools by providing both moral and financial support, e.g. the establishment of National Science and Technology Fund (1998). National Policy on Education Federal Republic of Nigeria (FRN, 2008). Science is still presented to pupils as facts that young people are expected to memorize, thus less emphasis is placed on science processes and practical application of science which makes science more relevant to the needs and aspiration of the society]. Fisher (2001) feels that science suffers from pedagogical deficiency as a result of which most people cannot see the connection between the scientific knowledge they learn and daily life.

Mari (1994) observed that science subjects are taught in Nigerian schools today predominantly by using the traditional method, commonly known as lecture method. Isa (2000) observed that "most science teachers do not encourage student's active participation in the teaching process. Bichi (2002) compared the effectiveness of problem solving teaching method with traditional method in promoting students' academic achievements in evolution concept, and found that the former was more effective than the latter. The use of inappropriate teaching strategy and lack of adequate instructional materials have been a major challenge to effective teaching of the subject. The poor performance in science subjects is partly as a result of the way in which the teachers teach the subject (Barker, Slingsby, & Tilling, (2003). This study investigates why Activity-Based Strategy teaching would improve student's academic achievement in Basic science.

According to Inekwe (2002), Activity-Based Teaching Strategy is the method that enables students to learn with the same vigour that marks their natural activity. David (2007) said it introduces element of joy, team spirit, respect for each other's opinions and it reduces the abstractness in science concepts. Mari (2001) said that in this method, the work is carried out in friendly manner, gladly with motivating spirit and activeness throughout the whole lesson, even to an uninteresting topic. Activity-Based teaching strategy is in-line with Piagetian tasks as it affords the students a variety of activities and experiences that involve the use of concrete objects. This hastens the learners' ability to order events through application, knowledge and predict changes. According to Mari (1994) adequate and appropriate use of this method through a rich variety of stimulating experiences, progress from concrete to abstract and then a powerful conceptualization maybe achieved. Thus the learner now will reason or make hypothesis with symbolic or ideas rather than needing objects, in physical world as the basis for thinking. The learner according to him can therefore use a hypothetical, deductive procedure that no longer ties his thought to existing reality but could consider all possible explanations to problem and can evaluate alternative explanations or solution to the problem.

In the Activity-Based teaching strategies, local resources are effectively utilized in the teaching process. Activity-Based is a type of research-oriented teaching technique recommended for Basic Science instruction by National Policy on Education, Federal Ministry of Education (2004). Activity-Based instructional strategy promotes instruction in the three domains of knowledge. Activity-Based teaching enables students to handle concrete materials which reduce the abstract nature of the concept learned. This makes learning more meaningful and when concepts are meaningfully learned, it enhances retention and heightens student's performance and achievement. Activities given to students help to widen the mental horizon of the students. Students begin to see that many other matters, besides those of purely scientific interest are involved when scientific knowledge is used to benefit a community. Besides, the Nigerian Integrated Science Project (NISP) is built around activities that are expected to encourage the development of science process skills in the learners, (Shaibu and Mari, 2002).

The Activity-Based Strategy of teaching science encourages group interactions among pupil, and if properly used, the spirit of teamwork, exchange of ideas and respect for each other's point of view will be enhanced at early stages of learning. Another feature of Activity-Based teaching strategy is that local resources can be effectively utilized in the teaching process. In typical students' Activity, costly scientific equipment are often substituted with locally available teaching aids. According to Lowenstein (2002) Activity-Based teaching Strategy makes students active participants, aids retention of materials learnt, builds confidence, helps students maximize their potential and favour intrinsic motivation. This according to him is fundamental to academic achievement and effective teaching and learning of sciences in schools. Usman (2000) attributed the poor performance of students in science concepts to rote learning. This according to him is as a result of non-exposure of students to activities in their classes due to lack of science teaching facilities. However, Adeniyi (1997) in David (2007) agreed that though science teaching facilities are necessary but many teachers of science are ill-equipped and ill-prepared to guide students towards inquiry. They seem to find activity-oriented instruction difficult to manage. This study investigates the effectiveness of Activity-Based teaching strategy on academic achievement and retention among JSS2 Basic Science students.

The concept "retention" is the ability to retain and consequently remember items/things learned or experienced by an individual at a later time. And this takes place when learning is coded into memory. Thus the 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 in David (2007). The nature of the materials to be coded contributes to the level of retention. Thus materials are related to the quality of retention in terms of their meaningfulness, familiarity, concreteness and image evolving characteristics. This study investigated the effects of Activity-Based teaching strategy on retention of Basic Science concepts among JSS 2 students.

Gender has attracted the attention of many researchers (Bichi, 2002; Stanley 2008 and Usman, 2000), for this reason, gender and academic achievement were investigated in this study. Oakley (1993) defined gender as the amount of masculinity and feminity found in a person and obviously while there are mixtures of both in most human beings, the normal male has a preponderance of masculinity and the normal female has a preponderance of feminity. For instance based on social expectation and orientation, women are socialized in preparation for their role as wife and mother and they are expected to fulfill this role effectively while males are socialized and oriented in manner that stand them in a good position to fulfill their social and cultural roles as fathers and husbands. Also males are socialized and oriented to take up masculine jobs carrying high prestige, high skills and income. It has been reported by Stanley (2008) that most girls choose to be successful in those subjects considered appropriate for females as a way of being a high achiever while at the same time maintaining their feminity.

Several researchers reported gender differences in subject choice and also in achievement within the subjects. School subjects according to investigations are sex–stereotype. For instance, Mathematics, Physical sciences, Computer and Engineering are regarded as masculine subjects, while humanities, languages; domestic subjects (English, Home Economics etc) are regarded as feminine. However, in other studies carried out Mari (1994) revealed that female students are academically superior in Mathematics and the sciences. They showed that despite the discrimination that the female child faced, they were able to navigate successfully academically through maintaining a positive definition of themselves. This study investigates effects of Activity-Based teaching strategy on the achievement of boys and girls in Basic Science.

Theoretical Framework

This study is based on the theory of constructivism. The concept 'constructivism" refers to the contemporary learning school of thought in which learners actively construct their own knowledge. Bunner (1961) and Piaget (1980), postulate that students create their own maps and theories of the world. The constructivists' school of thought view learning as an active process in which students actively construct their own knowledge of the situation at hand based on the existing previous knowledge. Constructivism argues that students are not passive absorbers, but active constructors of knowledge. According to this theory, students engage their minds very actively in constructing meaning out of their interactions with the environment. They make their own connections between experiences and the words other people are teaching them and they create their own network of relationships and patterns of thinking (Stanley, 2008). They read, watch television, listen to or overhear older students, parents and teachers talking and they make sense of their environment not necessarily to explain it of course, but certainly to use it to their advantage.

The researcher is of the view that if these traits in students can be properly nurtured and directed towards learning through the Activity-Based teaching strategy, learning will be more meaningful and fruitful. Therefore, this work will be carried out based on demonstration and discussion methods of teaching Basic science in junior secondary schools.

1.2 Statement of the Problem

Review confirms that Basic science is not being taught the way it should in Nigerian schools (Usman, 2008). According to Brent (2005), it is to be viewed and practiced in a practical way, instead teachers teach students to memorize facts and give them no room to do science. This has affected the performance of students in the subject. They do not only perform poorly, but have very low interest for it. The researcher further said that Activity-Based teaching strategy allows students to independently plan, investigate, collect data, analyze them, draw conclusions and generalizations. Use of activity makes learning learners' centered and could lead to meaningful learning and acquisition of science process skills. The students also have ample opportunity to make plausible hypotheses and test them to generate ideas, which are expected in their own language (Mari, 2008).

Literature also shows that 70% of scientific information or principles are passed to students via lecture methods (talk and chalk method) by science teachers (Bichi, 2002). This has been observed to be responsible for poor achievement in Basic Science over the years (Bichi, 2002). Though, lecture method makes coverage of syllabus easy and lesson planning for a wide audience easier, it is however viewed by majority of science educators as inadequate in promoting meaningful learning among all categories of learners (Bichi, 2002). This general call for teaching strategies could radically enhance meaningful learning and acquisition of science skills. The Activity-Based teaching strategy is being suggested in this study.

Science is a universal vehicle for human development and civilization world-wide. Basic science teaching is best carried out by the involvement of students while the teacher serves as a facilitator. Stanley (2007) says several researches carried out for the improvement of students' academic achievement in science did not solve the problem as a result of teacher's persistence in the lecture method in teaching of Basic Science. Barker, Slingsby, Tilling, (2003) and Usman (2000) observed that indiscriminate use of lecture method still persists which has led to poor achievement of JSS students. Against this background, this study is conceived in order to find a lasting solution to students poor performance in Basic Science

1.3 Objectives of the Study

The concern of the study is to investigate the effect of Activity-Based teaching strategy and Lecture Teaching Strategies on academic achievement and retention among junior secondary two students. Specifically, the study has the following objectives to:

- Determine effects of using Activity-Based teaching strategy on students' academic achievement among Basic Science Students of Junior Secondary schools.
- Establish whether Activity-Based teaching strategy of teaching Basic science enhances retention ability among Basic science students of Junior Secondary Schools.
- Find out whether the effect of Activity-Based teaching strategy is appropriate for learning Basic Science concepts among male and female students.

1.4 Research Questions

The study investigates the following research questions:

1. What is the effect of Activity-Based teaching strategy and lecture method on students' academic achievement among Basic science students of junior secondary schools?

2. What is the effect of Activity-Based and lecture teaching strategies on retention ability of Basic science students in Junior Secondary School?

3. What is the difference in academic achievements between male and female students taught Basic science using the Activity-Based and lecture teaching strategies?

1.5 Null Hypotheses

The study has the following null hypotheses:

$H0_1$: There is no significant difference in academic performance between junior secondary two students taught Basic Science using Activity-Based teaching strategy and their counterparts taught same concepts using lecture teaching method.

$H0_2$: There is no significant difference in retention ability between students taught Basic science using Activity-Based teaching strategy and their counterparts taught using lecture method.

$H0_3$: There is no significant difference in academic performance between male and female students taught Basic Science using Activity-Based teaching strategy.

1.6 Significance of the Study

This research investigated the effect of Activity-Based teaching strategy on academic achievement and retention in Basic Science concepts among junior secondary two students. The findings of the study provides empirical evidence for further research in the area of the study. Besides, teachers of Basic Science would have insight and awareness of the effectiveness of each of the two teaching strategies being compared in the study.

Curriculum designers would hopefully benefit from the findings of this study, fitting in activities to topics that require activity. Such findings may be developed in future curriculum. Textbook writers would hopefully find this study relevant to their profession in view of the fact that the effectiveness of two teaching strategies being investigated in Basic Science would be incorporated into their publications for effective teaching and learning. Stakeholders in education would hopefully benefit from this study in that teachers, lecturers will be aware of the topic that required activities in their teaching.

1.7 Delimitation of the Study

The study is delimited to JSS 2 students from two Government Junior Secondary Schools in Giwa Educational Zone of Kaduna State. The two schools are public schools with same academic calendar, similar staffing and similar provision of infrastructures. JSS 2 are selected because they are stable and have adequate exposure to Basic Science concepts. The topic selected for this study is “Measurement” which is central to JSS 2 curriculum and has applications to several other concepts. Thus the study was carried out in:

a. Government Secondary School, Kwangila which served as the experimental group and

b. Government School Basawa which served as the control group

1.8 Basic Assumptions

The study has the following basic assumptions:

1. Experienced and qualified teachers are teaching the students under study in the way recommended by National Policy on Education.
2. Relevant instructional materials are used in the teaching and learning of Basic Science.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviews literature on the following subheadings.

- Historical Background of Basic Science in Nigeria
- Objectives and Philosophy of Basic Science
- Curriculum of Basic Science
- Instructional Methods of Teaching Basic Science
    - i Activity-Based Method
    - ii. Lecture Method
    - iii. Project Method
    - iv. Discovery Method
    - v. Discussion Method
    - vi. Demonstration Method
    - vii. Fieldtrip
    - viii. Laboratory Method
    - ix. Problem solving
- Instructional Strategy and Students' Retention
- Gender and Academic Achievement
- Overview of the Similar Studies
- Implications of Reviewed Literature on the Present Study
- Summary of Literature Review

2.2 Historical Background of Basic Science

Formally, general science was taught in schools before Science Teachers' Association (STAN) set up a 3 member committee to look into science curriculum under the 3 respective disciplines of Biology Chemistry and Physics. The committee came out with a unified discipline called integrated science between late sixties and early seventies. Integrated science existed for over 40 years and played a tremendous role in the scientific and technological improvement of mankind till 2007 when the Nigerian Educational Research and Development Council (NERDC) has the mandate to develop curricula for use at all level of the educational system in Nigeria.

In line with government declaration for a 9 – year Basic education programme the NERDC was directed by the National Council on Education (NCE) to re-structure and re-align the existing primary and junior secondary school curricula to meet the targets of the 9 – year Basic Education in the context of National Economic Empowerment and development strategy (NEEDS) and the millennium development goals (MDGS). There came Basic Science formerly called Integrated Science, (NERDC, 2007). This research investigated the effectiveness of Activity-Based teaching strategy on student's academic achievement and retention in Basic Science. Thus, in subsequent chapters, Basic Science would be freely used in place of Integrated Science.

2.3 Objectives and Philosophy of Basic Science

Stanley (2007) is of the view that the essence of a beginning course in science is to begin to teach students what science is and how scientists work. Thus, Basic science can be regarded as a form of unified science. Also science is concerned with the understanding of natural phenomena and creating conceptual framework for its explanation. The role of science and technology in modern world cannot be overemphasized. Many factors have been identified in earlier studies as responsible for the poor achievement of students in science especially at senior secondary schools. After the definitions and statements of Basic Science, it became clear that the proponents of the supposedly new brand of science hold the view that the several sciences are characterized by a common methodology and that their contents present a whole and become more meaningful when integrated.

Bajah in Isa (2000) believed that integration may then be regarded as the removal of boundaries between subject subdivisions. Furthermore, philosophical view of inductivism claims that individuals attain meaningful knowledge only from experience with physical environment, (Isa, 2000). There are many reasons for teaching Basic Science to students especially in lower secondary education. One of these reasons may be the long term of preparing them to pass a prescribed examination. However, while we do appreciate an examination oriented goal, we would also like to draw our attention to some objectives which are equally important in the teaching of Basic science to our pupils, they are:

i. to teach the students how to tackle some of the questions that arise from observations of his own environment.
ii. to sharpen the power of observation of the students.
iii. to direct the attention of the students toward matters which are significant to him, and to the society to which he is a member.
iv. to continue the process of science concept building for acquiring a science vocabulary, not only by definition but by experience.
v. to prepare him for a take off into the exciting world of science later in his career.
vi. to offer diversified science (curriculum) to cater for the difference in talents, opportunities and future roles.
vii. to provide trained manpower in the applied sciences, technology and commerce at sub-professional grades.
viii. for useful living within the society and obtain higher education (National Policy on Education, 2004).

Objectives of Basic science cannot be overemphasized; Basic science course eliminates the repetition of subject matter from the various sciences and does not recognize the traditional subject boundaries when presenting topics or themes.

2.4 The Basic Science Curriculum

Science as a concept is a body of organized knowledge and a process of inquiry. It is geared towards problem solving in order to enhance the living standard of man. According to Gottlieb (2005) science is intellectual activity carried on by human that is designed to discover information about the natural world in which we live and to discover the way in which this information can be organized to benefit human race. Curriculum refers to the total experiences that are given to students via the agency of the school. The Basic Science Curriculum is spiral in nature in which same concepts are developed from Jss1 through JSS3 in increasing scope and details with advancing years. The JSS Basic Science curriculum is also thematic in approach i.e. themes that cut across all the sciences are used as major topics of study etc Details of the curriculum are given in Appendix 6.

The Science Teachers Association of Nigeria (STAN 2004) stressed that 'you and your home" is one of the six themes on which Junior Basic Science core curriculum is based. It continued that the objectives of the themes as outlined in the curriculum include showing students (pupils) constant interaction with biological and physical components of science in their homes. That it focuses on these interactions and the parts the pupils can play with a view to giving the child a deeper and clearer understanding of science in the home (FME 2004) the theme covers the following content area (see appendix 5).

The purpose of teaching is to ensure that students learn or practice what they are taught. Teachers teach to impart knowledge and skill to students. Knowledge however is a complex issue, which can be conveniently broken down into three (3) areas or domain according to Bloom's Taxonomy of educational objectives namely:

i. Cognitive domain: this deals with the recall and remembering of information, understanding and re-organization of information the use and application of learnt information to other situations

ii. Affective domain: which deals with attitudes and feelings. For example, honesty, co-operation, neatness and openness are positive attitude, which fall in this area of knowledge.

iii. Psychomotor domain: this deals with the skills of manipulation, the use of hands, especially in practical work e.g. the Ability to use burette to measure volume, view microorganism from the microscope etc.

The findings of this study are on the relevant teaching and learning strategy for the achievement of these purposes.

2.5 Instructional Methods of Teaching Basic Science

There are various methods of teaching science, they are:

2.5.1 Activity-Based Teaching Method

Students learn by doing. It is employed when the teacher allows the students to do piece of work and they learn at the same time. Students endeavour to do the work as someone else has done it successfully. Students in doing the work should know the purpose before they become interested in doing it. Students learn little by listening, a little more by watching but learn most by actually doing (i.e. direct contact with actual/natural situation). Inekwe (2002), Activity Based method is the method that enables students learns with the same vigour that marks their natural activity. (David, 2007) opines that, Activity Based method introduces element of joy, team spirit, respects for each other opinions and reduces abstractness in science concepts. Mari (2001) in this method, the work is done in friendly manner, gladly with motivating spirit as active throughout the whole lesson even to an uninteresting topic/work. Activity-Based method is applicable in subjects like Agriculture, Home economics, Basic science (practicals), etc.

There is no single method of teaching that is absolute in meeting the learning needs of every individual learner in the classroom. According to Maduabum in David (2007) all teaching strategies have their limitation and strength however Felder and Brent (2005) assert that a more balance approach that attempts to accommodate the diverse needs of the students in a class and allow for optimum learning is by the direct involvement of students in the teaching-learning process. They further stated that this approach is scientific and conform to the tenets of acquisition of knowledge by doing or direct participation by learners.

These leaner-centered or activity oriented approach employs the processes of science in gathering, transforming and interpreting data, a major objective of teaching sciences in the secondary school. Brekke (2005) assert that through such activities, students will not only learn science concepts but that they will also practice and understand the scientist work to acquire knowledge relevant to solve problems that surrounds the world around them.

Contemporary theories of learning indicate that learners get actively involved in the teaching-learning procedure if presented with variety of learning activities, Brennan in David (2007). Also it was opined by Piaget (1967) that intelligence is a continuing process of "adaptation" and "organization" as the learner interacts with the physical and social environment. He further show that when learners are provided with adequate rich experiences and activities, it enhances cognitive development and movement from one level of the domain to another.

This experience according to Bakare in David (2007) will cause cognitive stimulation seen as the availability richness and the use made of various learning materials which are designed to foster such cognitive skills as perception, conception, memory, language, reasoning and creativity. These can only be favoured according to Bloom (1976) if consideration is given to appropriate cognitive and effective entry behaviours in science which involve expertise in organized and systematized sequencing of tasks and topics within the syllabus. This way learning will not only be promoted but time taken to accomplish task will be reduced. Also Gague in David (2007) opined that such procedures will provide a firm foundation in acquisition of scientific skills to learn concepts and broad principles.

Advantages are that this method is connected with real life as lived outside the school, lesson learnt are real, practical, interesting and meaningful. It develops social living or awareness in students, also self-education is encouraged, it frees the teacher from being termed a “talking teacher”. It leads to cooperation and led to a sense of responsibility, it develops self discipline although it requires much space, encourages laziness in the teacher, plenty money is required and encroaches upon the leisure of the teacher (David, 2007).

2.5.2 Lecture Method

This is the method of teaching that emphasizes “talk and chalk” to the teaching of science subjects. More than 70% of scientific information and principles are delivered as lectures. Science teachers embraced this method for easy coverage of the school syllabus. This method is sometimes referred to as the "talk and chalk" method. It is characterized by the one-way flow of information. From the teacher who is always active, to the students will always be passive. In its true nature the lecture approach is not effective for science teaching, Abdullahi (2005), and Usman (2000). Lecture method is not effective for the following reasons:

i) It does not promote much meaningful learning of science as it appeals to hearing only.

ii) The differences in student's ability are not considered because it cannot satisfy the differences in individuals such as slow learner and fast learner.

iii) The students easily become restless and disruptive since their attention span is very limited.

iv) It promotes rote learning and regurgitation of information, Abdullahi (2005).

2.5.3 Project Method

This method is used by teachers to individualize instructions; usually it is given to individuals or small groups. Here, students are required to look for topics of special interest to them and investigate solutions using projects. Project is one of the activity-based of science teaching strategies which local resources can be effectively utilized in teaching process.

Project method is derived from the educational idea of one of the great educators John Dewey, an American, Dewey argued that education should not prepare a child for future that is unknown, but rather that it should fit him rightly into his society. One of the best ways to do this is to allow the child to take full part in the life of community and wider neighbourhood. Later, the followers of Dewey further developed this idea into what we called in schools “the project method: put it in another form, a school projects it is the cooperative study of real life situation over situation by either a class or the whole school, usually under the expert guidance or a teacher (Bello, 1996). Sometimes students obtain topics for the project work from the sources available. The teacher is expected to guide them where necessary. The project method could take a week, month, or even some years, Abdullahi (2005).

2.5.4 Discovery Method

This approach in science teaching was postulated by Brunner (1961). The approach enables pupils to get first how experience in getting fact, concepts and principles and processes by using mental processes and manipulating scientific equipment and materials. Brunner believers that a child who is exposed to the heuristics of discoveries gets four (4) benefits these are:

i) There will be increase in intellectual attainment

ii) There is a shift from extrinsic to intrinsic motivation

iii) The learning of the heuristics of discoveries is valuable to student's investigative processes.

iv) Discovery learning aids memory of the child.

Finally discovery method is one of the best methods of teaching that involves mental skills for learning by student to observing, measuring, classifying and so on (James, 2001 and Usman, 2000). Activity-Based and lecture methods was employed in this study to find their effectiveness in teaching of Basic science in relation to retention ability at JS Two student level to see whether the result will promote achievement in and retention at JSCE level.

2.5.5 Discussion Method

It is students-centered based on the philosophy that knowledge arising within the person and not horn external sources. The students lack over subject or communicate over knowledge, while teacher moderates the discussion. Advantage

i) It can be used to introduce a lesson, which provides motivation for student's activities. Both the teacher and the students discuss procedure- for the activities.

ii) It develops positive understanding between teacher/student and student/student, which motivates a desire to gain more knowledge.

iii) It provides the students with the sense of confidence through frequent exchange of idea between their teachers and students.

2.5.6 Field Trip

This is an important component of science teaching. It is trip or excursion taking outside the classroom for observation and obtainance of specific information. If well planned, it affords the students opportunity to become actively engaged in observing, classifying, studying and manipulating objects.

From the foregoing discussion on the various methods of teaching science, it must be emphasized here that new approach of science teaching as advocated today is the student-centered approach, Abdullahi in Stanley (2008).

2.5.7 Demonstration Method

This approach involves showing a particular procedure or skills to the students who after careful teaching and learning and interaction repeat and practice the same process shown to them. The demonstration approach can be used when the available resources, equipment cannot go round for each individual in the class. The teacher or some groups of students usually carry it out. The approach is used to:

i. Motivate the students
ii. Teach certain techniques or skills, theory, practice etc.
iii. Introduce a lesson
iv. It consumes time and materials

v. The correct use of materials, equipment and the abundance of breakage can be shown

vi. It a1lows teachers to use activities; it could be harmful to students if carried out by them, Abdullahi in Stanley (2007)

2.5.8 Laboratory Method

This is an activity performed by an individual or a group of students for the purpose of making personal observations or processes, products or event. It has been used in teaching science as:

i) A means of verifying principles, laws or theories.

ii) Practising one or more cognitive skills such as ability to observe, classify, measure, interpret data etc.

iii) To determine the relationship between causes and effects, Abdullahi in Stanley (2007).

2.5.9 Problem-Solving Method

Olalekan and Jerome (2006) defined problem solving as a skill that requires finding a solution that is unique and novel to identified problems and it is also the ability to adopt relevant techniques from task only marginally related to the task at hand and to generate possible strategies to solve problems that are familiar. It demands strong background knowledge of concept, facts, structures, principles and computational skills that enable them to tackle problem in the classroom. Teachers and parents play significant roles in the growth and development of learners in the society to acquire skills for problem solving. This will also enable learners to acquire cognitive styles towards tackling of problems with little or no assistance from fellow students or teachers. Problem solving calls for an initial identification of problem, relation of problem to known idea or a problem earlier solved structure of the problem, carryout necessary computation, obtaining solutions, generalizing and analysis of solution procedure. According to Inekwe (2002), to teach problem solving skill successfully, Mathematics teachers must provide a more conducive learning atmosphere that will allow students for thinking, analyzing, experimenting and be willing to entertain and answer questions to improve students' performance in the concept.

2.6 Instructional Strategy and Students Retention

The ultimate target of our educational endeavour is permanent and meaningful learning. Understanding and retention of learned items are products of meaningful learning when teaching is effective and meaningful to the students, (Bichi, 2002). However, observations from Basic Science classrooms reveal that most teachers do not adopt instructional techniques and strategies that could stimulate such permanent creative thinking skills that aid retention (Olorukooba and Lawal, 2010). Motivation conditions at the time of learning can either facilitate or interfere with its success, i.e. can enhance retention or facilitate forgetting. Thinking styles of individuals have also been studied in relation to retention. It has been observed that fast learners are superior in both short-term memory and long-term memory (Martins, 1994).

Several factors are known to influence retention. Bichi (2002) reports that anything that aids learning should improve retention while things that lead to confusion or interference of learned materials decrease the speed and efficiency of learning and accelerates forgetting. In this study, the retention level of students taught using the Activity-Based method was investigated and compared with that of students taught the same Basic Science concepts using traditional (lecture) method of teaching.

2.7 Gender and Academic Achievement in Science

The word "gender" has attracted the attention of many scientists (biologists, psychologists, and researchers) as a result of which a lot of literature exists on different aspects of the concept, (Bichi, 2002). In this study, gender and academic achievement in Basic Science was investigated. Stanley (2008) defines gender as the amount of masculinity and feminity found in a person and obviously while there are mixtures of both in human beings, the normal male has a preponderance of masculinity and the normal female has a preponderance of feminity.

Struggling after academic achievement in science conflicts with the traditional female role in many societies, (Oakley (1993). Right from the childhood, a boy traditionally receives more training and encouragement for achievement than girls. Besides, decline in school achievement of many girls during adolescent is the side effect of their new concentration on personal appearance. David (2007) revealed that academic achievement of students in different learning situation and in particular subject areas, largely reflects the socio-economic background, type of school and its location, qualification of the teachers, learner's attitude, the quality of the instructional activities and sex of the learners among others. However Oakley findings may not hold true of the present day Nigeria, given the rapid socio-economic changes Nigeria is experiencing. Lowenstein (2002) and Usman (2000) in Stanley (2008) observed that women in most societies are judged and ranked on the basis of their husband's or father's occupational rank and this makes them consider school and career achievement as secondary.

In males, academic success is compatible with stereotypical notion of masculinity leading to high achievement and high status job. Stanley (2007) opines that most girls choose to be successful in those subjects considered appropriate for females as a way of being a high achiever while at the same time maintaining their feminity. Several studies reported gender-related differences in subject choice and also in achievement within the subjects. School subjects, according to several investigations are sex-stereotyped such that subjects like Mathematics, physical science, computing and Engineering are regarded as masculine subjects while humanities, languages, domestic science are regarded as feminine (Archer and Macrae (1991). The males appear to be higher in achievement than the females and also reported that boys are better at activities requiring manipulation than girls, and that boys are more aggressive towards laboratory and project work. According to his findings, boys also perform better than girls in process of measuring and experimenting. Lentz (1992) observed that boys are more mechanically and scientifically inclined than girls and are also found to be more technical, more confident, more assertive and more competitive in games than girls.

In this study, an attempt was made to investigate if academic achievement in Basic Science using Activity-Based traditional/lecture method of teaching is gender-stereotyped. Students' responses from pre-test and post-test of Basic Science achievement test were grouped according to gender and analyzed to see if there were any significant difference.

2.8 Overview of Related Studies

Several studies have been carried out on effects of instructional strategies on student's academic achievement and retention.

In a similar study, Olorukooba and Lawal, 2010 investigated the effect of Science Technology Society (STS) approach and lecture method on academic achievement and development of creative traits of junior secondary school Basic science students. The experimental group were taught using (STS) approach while control group were taught using lecture method, the null hypothesis of no significant difference is thus rejected. This by implication means that the student in the (STS) class performed better than those in the lecture method class. Hence (STS) produced a higher effect on students' performance.

David (2007) investigated on the effect of activity-based teaching method on the academic achievement of slow learners in chemistry. The researcher used two experimental classes and two control classes, both groups were exposed to the same topic in chemistry from SS1 curriculum materials. The experimental groups were taught using Activity-based teaching method while the control group were taught same concept using lecture method. In his findings, the experimental groups achievement significantly better than the control groups which implies that Activity-based method is effective than the lecture method of teaching science compotes.

Esiobu and Soyibo (1995) investigated the effects of instructional strategies on achievement in biology. They used nine (9) experimental classes and 9 control classes, both groups were exposed to the same curriculum materials, the difference was that the experimental group were taught using concept mapping while the control groups were taught using the lecture method. It resulted that the experimental group achieved significantly better than the control group on Biology achievement Test (BAT). This research investigated the effect of Activity-Based teaching strategy on achievement and retention among junior secondary two students. The Activity-Based method was used to teach the experimental group while the control group was taught using the traditional lecture method.

2.9 Implications of Literature Review to the Present Study

Science teaching in Nigeria (in spite of efforts by researchers to suggest better methods of science teaching) has been dominated by emphasis on factual knowledge. This is reflected on examinations, which depends almost exclusively on factual recall, recollection of formula and precise definitions as well as description of routine experiments. The process of science which requires the students to look for evidence is often neglected by most teachers; instead, they continue to pump factual information to the students which they memorize in order to pass their examinations. When scientific facts are memorized, they are easily forgotten and any examination question requiring application and synthesis of knowledge proves difficult to the students. The practical aspects of science are also neglected and the consequence of the neglect is shown in very poor performance of students in science examination.

Poor academic achievement and unhealthy attitude towards science has been reported in the literature by Adeniyi, (1997). As earlier stated, it is as a result of ineffective teaching. Some of the factors identified as opposing effective teaching in Nigerian secondary schools include: Learning by rote Ajewole (1990: 1991). Lack of conducive learning environment under which science is being taught lead to lack of opportunity for the child to have direct experience with learning materials, (Bajah, 1995). But science involves active participation of the learner in the learning process; consequently; science is about doing things; that is, activity-oriented and any teaching that neglects the activity-based aspect of science teaching method renders "empty" knowledge. As a result of these, this study is carried out to investigate the effects of Activity-based teaching Basic Science to keep away from the predominant use of lecture method. It is to encourage active participation of students to construct their knowledge as to be in line with the current theory of constructivism. In this research, Activity-Based teaching strategy seem to be the method that would enable students achieve and retain material in Basic Science Concepts.

Lecture method makes coverage of syllabus easy and lesson planning for a wider audience easier and cheap, though majority of educators found it inferior and inadequate for meaningful learning.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

In the last chapter an attempt was made to review the literature relevant to the study. This chapter examines the methodology to be used in conducting the study. The chapter is presented under the following sub-headings:

- Research Design
- The Population of the Study
- Samples and Sampling Procedure
- Instrumentation
- Validity of Instrument
- Reliability of Instrument
- Pilot Study
- Instrument Administration
- Data Collection Procedure
- Data Analysis

3.2 Research Design

The study is quasi experimental with pretest, posttest, postpost test experimental and control groups. In the design, both the experimental and the control groups were pre-tested to ensure group equivalence, thereafter exposed to treatment for 6 weeks and at the end of which post-test was administered to determine students' achievement and two week later, postpost test was administered to determine their retention level. The design is graphically illustrated thus:

$CG \rightarrow O_1 \rightarrow LM \rightarrow O_2 \rightarrow O_3$

$EG \rightarrow O_1 \rightarrow ABM \rightarrow O_2 \rightarrow O_3$

Where:

CG = Control Group

EG = Experimental Group

O_1 = Pretest

O_2 = Post test

O_3 = Postpost test

LM = Lecture Method

ABM = Activity-Based Teaching Strategy

3.3 Population of the Study

The population for this study consists of all junior secondary two students registered in government junior secondary schools located in Giwa Education Zone. They are government owned schools; operate same academic calendar and same curriculum. The schools are GSS Kwangila, GSS Giwa, GGSS Samaru, GSS Basawa, GSS Bomo, GSS Kudan, GSS Hunkuyi, GSS Fatika, GSS Yakawada, GSS Giwa, GSS Ganagara and GSS Shika. The total student's population consists of 1333, consisting of 547 males and 786 females. All schools offer courses in Basic science with particular reference to measurement, which is relevant to this study. The students in the study population have an average age of 14 years. Details of the population are given in Table 3.1.

Table 3.1: Population of the Study

S/N	Name of school	No. of JSS2 students	Male	Female
1	Govt. Sec. Sch. Kwangila	60	27	33
2	Dr. Shehu Lawal Giwa (G.S.S Giwa)	252	-	252
3	Govt. Girls Sec. Sch. Samaru	108	-	108
4	Govt. Sec. Sh. Basawa Junior	58	28	30
5	Govt. Sec. Sch. Bomo	102	42	60
6	Govt. Sec. Sch. Kudan	126	80	46
7	Govt. Sec. Sch. Hunkuyi	201	106	95
8	Gvot. Sec. Sch. Fatika	28	17	11
9	Gvot. Sec. Sch. Yakawada	75	51	24
10	Govt. sec. Sch. Giwa	90	52	38
11	Govt. Sec. Sch. Gangara	41	24	17
12	Dr. Yusuf Aboki Sec. Sch. Shika	192	120	72
	Total	**1,333**	**547**	**786**

This table shows the enrolment of junior secondary two students in Giwa Education Zone of Kaduna State, the target for this study. The sample to be used for study was drawn from the population described above.

3.4 Sample and Sampling Procedure

Sampling refers to selecting units or subsets (e.g. people, organization or schools) from a population of one's interest so that by studying the sample we may fairly generalize relatively to the population from which they are chosen.

A random sampling technique was used in this study to select the samples. According to Tuckman (1975) random sampling is a sampling procedure that assures that each element in a population has an equal chance of being selected. The researcher put the names of all the students in experimental group that is Government Secondary School, Kwangila in leather and then pulled out 40 names by-lot and the same as done to the control group that is Government Secondary School Basawa. In this way, not only does each person has an equal chance of being selected, but also the researcher can easily calculate the probability of a person being chosen in the study. In this study, 2 schools have been randomly selected for the study. Details of the samples selected are given in Table 3.2.

Table 3.2: The Study Sample

S/N	Name of School	Groups	No of JSS II students	M	F	Selected
1	Govt. Sec. Sch. Kwangila	Experimental Group	60	19	21	40
2	Govt. Sec. Sch. Basawa	Control Group	58	18	22	40
	Total		**118**	**37**	**43**	**80**

Total numbers of 80 students were pre-tested in order to ascertain their group equivalence. The sample groups known as the experimental group and control group. The experimental group was exposed to Activity-Based in Basic Science while control group were taught the same concepts using Lecture method.

These students were of average age of 14 years drawn from the 2 junior secondary schools under study. And they are registered in the two schools residing in the study area. Students from Government Secondary School Kwangila, served as the experimental group while students from Government Secondary School Basawa, formed the control group. The two schools are far-apart located to control experimental contamination on account of proximity.

3.5 Instrumentation

3.5.1 The Instrument Used

The instrument used for this study is Basic Science Achievement Test which is specifically titled (BSAT) developed by the researcher on the topic ‘measurement’.

This topic is derived from the National Curriculum for junior secondary school JS 2 Basic Science. The topic was selected because it features in JS 2 Basic Science curriculum and can be taught using the Activity-Based as well as Lecture teaching strategies.

Forty five (45) items were constructed, forty (40) were taken and five (5) remained after validity. Forty (40) test items were administered by the researcher in person in form of objective questions. The results were subjected to t-test analysis.

Basic Science Achievement Test (BSAT) was pilot-tested using JSS 2 students of Government Secondary School Kudan and Government Secondary School, Giwa. The reliability co-efficient of the instrument was calculated to be .979 after pilot study. Details of calculations are presented in Appendix I.

3.5.2 Validation of the Instrument

The content of the Basic Science Achievement Test (BSAT) was validated by a panel of experts which includes.

- Two senior lecturers from science education section of Faculty of Education, Ahmadu Bello University, Zaria.
- Four Basic Science teachers at secondary school level. This is because they are teachers that translate the curriculum of Basic Science at the classroom level.

These experts examined teaching materials and measuring instruments for the purpose of (a) face validity (b) appropriateness of the items in terms of reading difficulty for the groups (c) clarity of the statement in the instrument and learning materials (d) check possible errors in the instrument. Their constructive criticisms and feedback were used to improve the quality of BSAT.

3.5.3 Reliability of Instrument

The reliability of the instrument for this study was obtained by subjecting responses of the pilot study to a statistical analysis using the Cronchbach alpha technique. Consequently a Cronchbach reliability coefficient of .979 was obtained. According to Spiegal and Stevens (1956) an instrument is considered reliable if its reliability coefficient lies between 0 and 1. The closer it is to 1, the more reliable the instrument, the closer it is to 0, the less reliable is the instrument. Therefore, the instrument is considered reliable and fit for the study.

Pretest was also carried out during pilot study for the purpose of ascertaining the ability level of the study sample. Two schools were tested using (BSAT) and analysis of variance statistics was used at $P \leq 0.05$ in which two groups that show no significant difference in their ability level of the chosen sample.

3.6 Pilot Study

In order to further validate the instrument of this study, a pilot study was conducted using 30 students from G.S.S Giwa and another 30 from GSS Kudan. The scores of the pilot study sample on 40 items was used to refine and modify the test items. The result of the data collected from the pilot study was collected to determine the reliability coefficient of the instrument of the study, as reported in 3.5.3.

The instrument for the study that is Basic Science Achievement Test (BSAT) was pilot-tested. Also the pilot study was done to:

i. find out the characteristics of BSAT items through item analysis;
ii. determine the appropriateness of the length of time required to take the test;
iii. determine the appropriateness of the wording of the Basic Science Achievement Test (BSAT); and
iv. find out the reliability of Basic Science Achievement Test (BSAT).

3.7 Instrument Administration

In the course of this research work, Experimental Group (EG) and the Control Group (CG) were pre-tested using Basic Science Achievement Test (BSAT) to ascertain their group equivalence on the level of understanding of the research topic at the start of the study.

To the experimental group (Basic Science) was taught for the period of six weeks using Activity-Based Method. To the control group, same concepts were taught using traditional lecture method for a period of six weeks. After the treatment both groups were post-tested using same instrument, which was reshuffled to make it look different. The mean scores of the two groups collated were subjected to t-test statistics to determine their achievement level.

Experimental Group

In this group, the research instrument was administered by the researcher with the assistance of the class teachers. The students were given numbers to use instead of names. The necessary instructions was presented in writing to the subject and explicitly explained before they began the test. The test was administered in the science laboratory during normal class period of 80 minutes which is double period after which the control group were treated the same, all their different schools and enough time was allotted to the students were also requested to provide personal data (information) such as school, class and sex which were used in analyzing the data.

Control Group

The research instrument was administered to the control group in the classroom during the normal class period with the assistance of the class teachers. The students were assigned numbers to use to replace their names. The needed information were presented to them accordingly in writing and was explained to them before the commencement of the test. Also, enough time was given to them (60 minutes) to complete the test items. The students were also requested to provide information to be used for the data analysis. Two weeks later a post-post test was administered to the two groups the experimental group and control groups to ascertain their retention ability.

3.8 Data Collection Procedure

The data were collected using the Basic Science Achievement Test (BSAT). BSAT was used to generate three types of data viz:

i. Pre-Test Data (to ascertain their group equivalence)

ii. Post- Test Data (to ascertain their achievement level)

iii. Postpost test to (to ascertain their retention level)

The 3 types of data generated were then analyzed in relation to the research questions investigated.

3.9 Data Analysis Techniques

Different statistics were used to analyze the data collected. Descriptive statistics mainly mean, mode, standard deviation and frequency were calculated and deferential statistics mainly t-test was used to analyze the Null Hypotheses at $P \leq 0.05$ level of significance. The t-test is a sensitive test of significance of the difference between two means and it reduces the experimental error and thus increases the probability of rejecting the null hypothesis when it is false Ferguson in Bichi (2002).

Furthermore, the t-test was chosen because it is the most appropriate statistical test for determining the significance of the difference between means when the number of subjects in the two groups being compared is about equal (Carol *et al.,* in Bichi, 2002).

The type of data and the nature of hypothesis tested in the study determine the type of statistics to be employed by the researcher (Oyedun 1992. In this study, the data collected were analyzed thus:

$H0_1$: There is no significant difference in academic performance of students taught Basic Science using Lecture method and their counterparts taught same concepts using Activity-Based Method.

A t-test statistics was used to analyze data to test this null hypothesis.

$H0_2$: There is no significant difference in the retention of learned concept between students taught Basic Science using Lecture method and their counterparts taught same concepts using Activity-Based Method.

A t-test statistics was used to analyze data to test this null hypothesis.

$H0_3$: There is no significant difference in academic performance between male and female students taught Basic Science using Activity-Based Method.

A t-test statistics was used to analyze the data in relation to this null hypothesis.

CHATPER FOUR

ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The focus of this study was to investigate effects of Activity-Based teaching strategy on academic achievement and retention in Basic Science concepts among Junior Secondary Two Students. In the last chapter, 3 types of data were collected using BSAT. In this chapter, the data generated are analyzed and the results are discussed accordingly. The chapter is presented in the following subheadings:

4.2 Data Analysis and hypothesis Testing

4.3 Summary of Findings

4.4 Discussion of Results

4.2 Hypotheses Testing

4.2.1 Testing Null Hypothesis 1

Research Question 1. ***What is the effect of Activity-Based Teaching Strategy and lecture method on students' academic achievement among Basic Science students of Junior Secondary Schools?***

For the purpose of data analysis, the null hypothesis is restated for testing at $P \leq 0.05$

Ho_1 There is no significant difference in academic performance between Basic Science students taught concepts in measurement using

Activity-Based teaching strategy and their counterparts taught same concepts using the lecture method.

The data generated via the Basic Science Achievement Test (BSAT) were subjected to t-test statistics to determine if there was any significant difference between the achievement of the experimental group and the control group. Summary of the analysis are given in Table 4.1.

Table 4.1: t- test Analysis of Mean Scores of Posttest of the Experimental Groups (EG) taught using Activity-Based Method and the Control Group (CG) Taught Using Lecture Method

Group	N	Mean score	S.D	S.E	t-cal	t-crit.	df	P-value
Experimental	40	32.57	2.69	0.30	33.56	1.96	78	0.00
Control	40	19.75	2.09	0.23				

Significant at $p \leq 0.05$

It is clear from Table 4.1 that the experimental group has a mean score of 32.57 which is greater than that of the control group which is 19.75. This finding answers research question 1. It is thus empirically established that students exposed to Activity-Based Teaching Strategy have higher mean scores than their counterparts in the control group. In order to test the corresponding $H0_1$, the following argument is made:

From Table 4.1, the calculated t-value is 33.56. This value is greater than the t value critical, of 1.96 at α=0.05 with df = 78. This means there is a significant difference between the mean scores of the experimental (group) and the control groups in favour of the experiential group. Thus the hypothesis is rejected. This implies that the experimental group taught Basic Science concepts using Activity-Based teaching strategy achieved significantly higher than the control group taught the same concepts using the Lecture teaching strategy. The null hypothesis which says there is no significant difference is therefore rejected.

4.2.2 Testing Null Hypothesis 2

Research Question 2. ***What is the effect of activity – based and lecture teaching strategies on retention ability of basic science students.***

For the purpose of data analysis, the null hypothesis is re-stated for testing at $P \leq 0.05$.

Ho_2 There is no significant difference in the retention of learned Basic Science Concepts between students taught Basic science using Activity-Based teaching strategy and their counterparts taught same concepts using the lecture method.

To test this hypothesis, the postpost test data were subjected to t-test statistics. Summary of the analysis are given in Table 4.2

Table 4.2: t-test Analysis of the Mean Scores of Postpost Test Data of the Experimental Group Exposed to Activity-Based Method and the Control Group Exposed to Lecture Method

Group	N	Mean Score	S.D	S.E	t-cal t-value	t.crit	df	P-value
Experimental	40	33.75	2.58	0.40	30.37	1.96	78	0.000
Control	40	19.17	1.58	0.25				

It is also clear from Table 4.2 that the experimental group has a mean score of 33.75 which is greater than that of the control group of 19.17. This finding answers research questions No 2. It is empirically established that student exposed to activity – based teaching strategy have higher mean scores than their counter parts in the control group.

From Table 4.2, the calculated t-value is 30.37. This value is greater than the t-value critical which is 1.96 at α=0.05 with df 78 also the P-value observed was 0.00 which is less than $p \leq 0.05$. This means that there is a significant difference between the postpost test mean score of the experimental and control groups in favour of the experimental group. Thus the hypothesis is rejected. This implies that the experimental group taught measurement concepts using Activity-Based teaching strategy retained the learned concepts better than the control group taught the same measurement concepts using traditional Lecture Method. Null hypothesis, which says there is no significant difference is therefore rejected.

4.2.3 Testing Null Hypothesis 3

Research Question 3: ***What is the difference in academic achievement between male and female students taught basic science using the activity – based and lecture teaching strategies?***

Ho_3 There is no significant difference in academic performance of male and female students taught Basic Science concepts using the Activity-Based teaching strategy.

To test this hypothesis the post test data generated through the Basic Science Achievement Test (BSAT) were grouped according to gender and were subjected to t-test statistics to determine if there is any significant difference between the achievement of the male students and their female counterparts taught measurement concepts using the Activity-Based teaching strategy. Summary of the t-test are given in Table 4.3.

Table 4.3: t- test Analysis of Post Test Mean Scores of Male and Female Students Exposed to Activity-Based Teaching Strategy

Gender	N	Mean Score	S.D	S.E	t-cal	t-crit.	df	P-value
Male	37	32.22	2.78	0.47	1.01	1.96	78	0.31
Female	43	32.84	2.62	0.39				

Not significant at $p \leq 0.05$

From Table 4.3 above, the mean scores of 32.22 and 32.84 between male and female respectively are virtually the same. This finding answers research questions No 3. It is empirically established that there is no difference in academic achievement between male and female exposed to activity-based teaching strategy.

From Table 4.3, the calculated t-value is 1.01. This value is less than the t – value critical which is 1.96 at $\alpha=0.05$ with df 78. Also P-value of 0.31 is higher than $P \leq 0.05$. This means that there is no difference between the mean scores of male and their female counterparts. This implies that the level of achievement of the male students exposed to Activity-Based teaching strategy is the same with their female counterparts. Therefore the null hypothesis number 3 is retained. This implies Activity-Based teaching strategy is gender-friendly.

4.3 Summary of Results

In this study, the following findings are made:

1. there is significant difference between the mean scores of the experimental group taught Basic Science concepts using Activity-Based teaching strategy and the control group taught same concepts using traditional teaching strategy in favour of the experimental group.
2. there is a significant difference in the Postpost test mean scores of the experimental and control groups in favour of the experimental group. This implies that the experimental group retained the learned concepts better than the control groups.
3. there is no significant difference in the post test mean scores of the male and their female students exposed to Activity-Based teaching strategy. This also implies that the Activity-Based teaching approach is gender friendly.

4.4 Discussion of Results

The aim of this study is to investigate effects of Activity-Based teaching strategy on academic achievement and retention in Basic Science concepts among Junior Secondary two students. To achieve this aim, students in the Experimental Group (EG) were taught Basic Science concepts using Activity-Based teaching strategy. Students in Control Group (CG) were taught the same concepts using traditional (lecture) teaching method restricted to the "talk and chalk" approach.

The students in the experimental group (EG) and Control Group (CG) were then post tested, postpost tested and their achievements and retention abilities were compared according to the variable being investigated. It was found that the students in experimental group achieved significantly higher than the students in the control group.

Hypothesis 1

The result of testing hypothesis one shows that the students in the Experimental Group (EG) who were taught Basic Science Concepts using the Activity-Based Teaching. Strategy performed significantly better and achieved higher than their counterparts in the Control Group (CG), the significant difference in achievement of mean scores of 32.57 and 19.75 in favour of the experimental group (EG) at a significance of 0.05 level is revealing a greater effectiveness of the Activity-Based teaching strategy over the lecture (talk and chalk) as a teaching strategy. This shows that there is a connection/link between teaching-learning, achievement and methodology in shaping the learners in science (Brekke, 2005).

According to Abdullahi (2005), Activity-based teaching strategy makes the learner to construct his own knowledge to be used in later age; so teachers should pick from the science curriculum topic that involves activities for the learners to discover solution themselves and teachers are expected to guide them.

In Activity-Based teaching strategy students has the opportunity to work with concrete materials and engaged in activities, which enhanced meaningful learning and reduces abstract nature from concepts and provide a motivating environment for learning (Mari, 2002). Earlier in the literature it was stated in Stanley (2008) that science is intellectual activity carried on by human that is designed to discover information about the natural world in which we live and to discover the way in which this information can be organized to benefit human race.

Hypothesis 2

The postpost test result showed that the experimental group exposed to Activity-Based teaching strategy retained the taught Basic Science Concepts significantly better than their counterparts in the control group who were exposed to lecture method. The result showed that the experimental group (EG) had a postpost test means score of 33.75 while their counterparts in the control group (CG) had the mean score of

19.17. The statistically significant difference between the two mean scores suggests that the Activity-Based teaching strategy experience led to more effective learning and higher retention level than the traditional (lecture) method. According to Mari (1994) adequate and appropriate use of Activity-based method through a rich variety of stimulating experiences progress from concrete to abstract and then a powerful conceptualization maybe achieved. Thus learner would now reason or make hypothesis with symbolic or ideas rather than needing objects in the physical word as the basis for his thinking. The learner according to him, can therefore use a hypothetical deductive procedure that no longer ties his thought to existing reality but consider all possible explanations to problem and can evaluate alternative explanation or solution to the problem.

This finding agrees with that of Abdullahi (2005) and Usman (2000) who reported that the conventional lecture method used by most teachers is inferior in promoting effective learning. Teachers use it only for easy coverage of the school syllabus, teacher being active while students are always passive learners. It is further characterized by one – way flow of information and encourages rote learning and yields little retention. Meaningful and concretely learned concepts by students are always retained and even coded in the memory for easy recall when the need arises.

Hypothesis 3

Hypothesis 3 centered on gender – related differences in academic achievement in relation to the variables of the study. The results of testing hypothesis three showed that there is no statistically significant difference between the posttest mean scores of the male (32.229) and the female (32.844) in the experimental group. This implies that the level of achievement of the male students exposed to Activity-Based teaching experiences is the same with their female counterparts. The result indicated that the Activity-Based teaching strategy is gender friendly.

This finding agrees with the findings of Bichi (2002) and Stanley (2007) who said understanding and retention are products of meaningful learning, when teaching is effective and meaningful to the students whether male or female. Thus, meaningful learning is the product of students involvement in act of learning like in Activity-Based teaching strategy.

Also this finding agrees with that of Abimbola in Stanley (2008) who observed that the type of instructional strategy used does not discriminate between male or female. Therefore, the Activity-Based teaching strategy is gender friendly as far as this study is concerned. Concrete and meaningful learning appears to be gender-friendly.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study investigated the effectiveness of Activity-Based teaching strategy and lecture method of teaching on academic achievement and retention in Basic Science Concepts among Junior Secondary two (II) students in Giwa Education Zone of Kaduna State. The previous chapter analyzed data and discussed the findings. This chapter gives an overview of the whole study. It is presented under these subheadings:

5.2 Summary

5.3 Major Findings

5.4 Conclusions

5.5 Recommendations

5.6 Limitations

5.7 Suggestions for Further Studies

5.2 Summary

This study investigated effects of Activity-Based teaching strategy on academic achievement and retention in Basic Science Concepts among Junior Secondary two students. It also investigated the effects of gender-related differences on students' academic achievement in the concept of measurement when taught using Activity-Based methods and Lecture methods.

The sample comprised a total of 118 JSS 2 Basic Science students drawn from two Junior Secondary Schools in Giwa Education Zone.
They were selected by simple random sampling technique.

A 40-item multiple choice instrument, the Basic Science Achievement Test (BSAT) with a reliability co-efficient of .979 was used to collect relevant data which were analyzed using t- test statistical package. The results obtained were presented and discussed in chapter four. This study has the following major findings.

5.3 Major Findings

At the end of the study, the following findings were made:

(1) there is a significant difference in the academic achievement of students taught Basic Science concepts using Activity-Based teaching strategy (Experimental group) and their counterparts who were taught same concepts using the lecture method (control group). The experimental group achieved significantly higher than the control group.

(2) there is a significant difference between the retention level of students taught Basic Science concepts using Activity-Based teaching strategy and those taught same concepts using lecture method. The students exposed to Activity-Based teaching strategy

retained the taught concepts significantly better than their counterparts exposed to Lecture method.

(3) there is no significant difference in academic achievement between the male and female students taught Basic Science concepts using the Activity-Based teaching strategy, thus Activity-Based teaching strategy is gender friendly.

5.4 Conclusions

From the findings of this study, the following conclusions were drawn:

(1) Teaching strategy that teachers employ in science teaching has significant effects on student's achievement.

(2) Activity-Based teaching strategy facilitates effective learning of Basic science concepts.

(3) Students that were taught Basic Science concepts using Activity-Based Teaching Strategy retained the learned concepts significantly better than those taught the same concepts using conventional Lecture Teaching Strategy.

(4) Neither the male nor the female students performed significantly better than the other when Basic Science concepts were taught to them using either the Activity-Based Teaching Strategy or the conventional lecture method. Both teaching methods appear to be gender friendly.

(5) Lecture method of teaching science appear to be inferior to Activity-Based teaching strategy in the teaching of Basic science concepts as they affect negatively the student's academic achievement and retention of the learned science concepts.

5.5 Recommendations

On the basis of the findings and conclusions reached in this study, the following recommendations are made:

(1) The teaching of Basic Science should be conducted in such a way that students effectively learn and retain the concepts presented to them. The use of the Activity-Based teaching strategy seems to be relevant in achieving this goal. It should therefore be incorporated into the teaching of Basic Science at the secondary school level.

(2) In service training programmes for Basic science teachers in form of seminars, workshops and conferences should be conducted on how to use Activity-Based teaching strategy in teaching of Basic Science concepts.

(3) During this study, it was discovered that gender does not play a significant role in the learning of Basic science concepts using both the Activity-Based teaching strategy and Lecture method of instruction. Curriculum planners should take this into consideration in curriculum planning.

5.6 Limitations

This study has some limitations which include the following:

1. The restriction of the study to only 2 secondary schools under Giwa Education Zone of Kaduna State, made the scope of the generalization that can be made from this study fairly narrow.
2. The study is also limited to only government owned schools because of the uniformity in syllabi and some level of teachers qualifications.
3. Most government-owned schools are equally equipped by the government for practicals and transmission of science process skills and acquisition of meaningful learning.

5.7 Suggestions for Further Studies

This study may be expanded or extended in the following ways:

1. a similar study should be carried out focusing on the teaching of metric and quantities using Activity-Based teaching strategy with a view to finding out if similar or different results as in this study may be obtained.
2. there is a need to conduct similar studies to investigate effects of teaching strategies notably, the guided discovery method, the problem solving method, concept mapping method etc on the teaching of Basic Science concepts.

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Lecture method of teaching science, although it is referred as "talk and chalk" I is embraced for easy coverage of the syllabus and effective getting across a large audience at the same time. Lecture method also is easy to plan and at the same time cheap to plan, local resources and improvisation are easily reached.

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APPENDIX I

EFFECTS OF ACTIVITY-BASED TEACHING STRATEGY EXPERIENCES ON THE ACADEMIC ACHIEVEMENTS CONCEPTS AND RETENTION IN BASIC SCIENCE CONCEPTS AMONG JUNIOR SECONDARY TWO STUDENTS IN GIWA EDUCATION ZONE OF KADUNA STATE

STUDENTS

SECTION A:

Name of School ____

Class: ____

Science or Arts Student: _____________________________________

Sex: Male [ ] Female [ ]

Age: ____

SECTION B: ACHIEVEMENTS TEST

Instructions:

i. Answer all the questions.

ii. Each question is followed by four options lettered A to D. find out the correct option for each question and shade in pencil on your answer sheet, answer space which bears the same letters as the option you have chosen. Give only one answer to each questions.

The Basic Science Achievement Test (BSAT)

1. How many centimeter makes one meter? (a) 10cm (b) 100cm (c)1,000cm (d) 10,000cm
2. How many meters are in one kilometer? (a) 100m (b) 10m (c) 10,000m (d) 100,000m
3. Ali's container is 250ml while Amina's is 10ml, how many times will Amina's container goes to fill up Ali's container? (a)10ml (b) 25ml (c) 30ml (d) 100ml
4. State the formula for calculating relative density?

   (a) $\frac{\text{Population area}}{\text{Size}}$ (b) $\frac{\text{Area}}{\text{Size}}$ (c) $\frac{\text{Size}}{\text{Area}}$

   (d) $\frac{\text{Population Size}}{\text{Area}}$
5. A man made 5 ridges in 60 minutes, in 4 hours how many ridges will be make? (a) 20 (b) 65 (c) 100 (d) 500
6. 8 students in JSS2 heights are 1.60m, 1.20m, 1.40m, 1.30m, 7.1.10m, 1.12m, 1.70m and 1,20m calculate the average height of the members of the class.

   (a) 13.28m (b) 14.30m (c) 16.15m (d) 13.60m
7. A man discovers the distance 10 meters in 70 minutes. How many meters will he discover in 280 minutes? (a) 28m (b) 30m (c) 60m (d) 20m

8. Calculate the average weight of 10 students in JSS2 whose weight are 35kg, 40, 36, 34, 45, 38, 37, 33, 40 and 35kg. (a) 37.3kg (b) 40kg (c) 39.4kg (d32.6kg

9. A maize plant is adding 2cm a day in growth, how many cm will the maize plants added in 3 weeks? (a) 40cm (b) 42cm (c) 48cm (d) 45cm

10. A boy with fever is running temperature of 12 degree in 5 minutes how many degrees will be his temperature in 60 minutes?
(a) 120^{o}C (b) 144oC (c) 200^{o}C (d) 150oC

11. We have over _____ bones ion our body? (a) 20 (b) 200 (c) 28 (d) 150

12. The heart is divided into ________chambers? (a) 6 (b) 4 (c) 2 (d) 8

13. The percentage of carbon dioxide in the air is?
(a) 0.03% (b) 00.03% (c)21% (d) 78%

14. What is the temperature for a normal individual?
(a) 37^{o}C (b) 32^{o}C (c)120^{o}C (d) 80^{o}C

15. A car speed 60km per hour, how many kilometer will it cover in 5 hours? (a) 10km (b) 250km (c)200km (d) 500km

16. In year 2000, a woman of 40 years old give birth to a son, how old is the woman by year 2015 ? (a) 55yrs (b) 65yrs (c) 80 (d) 75yrs

17. A man was born in 1960, what will be his sage by 2012
(a) 52yrs (b) 80yrs (c) 100yrs (d) 40 yrs

18. The unit of force in the S.I. system is ? (a) kg (b) gm (c) Newton (d) Mass

19. How many kobo in N50 ? (a) 100k (b) 500k (c) 5000k (d) 500,000k

20. Eight (8) into 8 places is? (a) 34 (b) 64 (c) 84 (d) 104

21. How many weeks in one month? (a) 6 (b) 4 (c) 10 (d) 8

22. How many 10 Naira notes will give you 200 Naira ? (a) 30 (b) 10 (c) 20 (d) 1000

23. If half a circle is 180^o, full circle is? (a) 320^o (b) 120^o (c) 360^o (d) 380^o

24. Three (3) girls are given 18 oranges, how many will each get? (a)6 (b) 10 (c) 9 (d) 3

25. A man and his son are 60 and 10 years old respectively, how old was he when he gave birth to his son ? (a) 30yrs (b) 50yrs (c) 70yrs (d) 20yrs

26. How many tens in hundred ? (a)15 (b) 10 (c) 20 (d) 15

27. How many grammes in one kilogramme? (a) 100 (b) 200 (c) 20 (d) 10

28. If 52 week make one year, how days in one year? (a) 320 (b) 365 (d) 65 (d) 366

29. A man born in 1902 and died in 2002, how long did he lived? (a) 80yrs (b) 100yrs (c) 102yrs (d) 104yrs

30. A civil servant worked from 1918 to 1960, how many years did she served? (a) 42yrs (b) 10yrs (c)30yrs (d) 40yrs

31. A bag of rice weighs 350kg how many bags will weigh 3500kg? (a) 12bags (b) 2bags (c) 10bags (d) 20bags

32. How many 12 in 36 (a) 2 (b) 3 (c)10 (d) 6

33. How many 10 in 120? (a)10 (b) 15 (c)12 (d) 18

34. There are_________hundreds in 123 ? (a)1 (b) 3 (c)2 (d) 4

35. If ¼ of circle is 90^o calculate a circle ? (a) 360^o (b) 260^o (c) 160^o (d) 60o

36. Calculate the speed, if a car covers 50km in one hour?

    (a) 2km in 1.2 minutes (b) 1km in 1.2 mins

    (c) 3km in 1.2mins. (d) 4km in 1.2mins.

37. A child weigh 1kg a week, what will be his weight in 2 months?
    (a) 8kg (b) 10kg (c)20kg (d) 50kg

38. This < sign represent? (a) greater than (b) Less than (c) little than (d) fewer than

39. The > sign represent? (a) Greater than (b) Less than (c) More than (d) Bigger than

40. How many centilitres in one litre? (a) 10cl (b) 100cl (c) 20cl (d) 200cl

APPENDIX 2

BASIC SCIENCE ACHIEVEMENT TEST

Name of School ____

Class: ____

Science or Arts Student: ____________________________________

Sex: Male [ ] Female [ ]

Age: ____

1.	=A=	=B=	=C=	=D=	=E=	26.	=A=	=B=	=C=	=D=	=E=
2.	=A=	=B=	=C=	=D=	=E=	27.	=A=	=B=	=C=	=D=	=E=
3.	=A=	=B=	=C=	=D=	=E=	28.	=A=	=B=	=C=	=D=	=E=
4.	=A=	=B=	=C=	=D=	=E=	29.	=A=	=B=	=C=	=D=	=E=
5.	=A=	=B=	=C=	=D=	=E=	30.	=A=	=B=	=C=	=D=	=E=
6.	=A=	=B=	=C=	=D=	=E=	31.	=A=	=B=	=C=	=D=	=E=
7.	=A=	=B=	=C=	=D=	=E=	32.	=A=	=B=	=C=	=D=	=E=
8.	=A=	=B=	=C=	=D=	=E=	33.	=A=	=B=	=C=	=D=	=E=
9.	=A=	=B=	=C=	=D=	=E=	34.	=A=	=B=	=C=	=D=	=E=
10.	=A=	=B=	=C=	=D=	=E=	35.	=A=	=B=	=C=	=D=	=E=
11.	=A=	=B=	=C=	=D=	=E=	36.	=A=	=B=	=C=	=D=	=E=
12.	=A=	=B=	=C=	=D=	=E=	37.	=A=	=B=	=C=	=D=	=E=
13.	=A=	=B=	=C=	=D=	=E=	38.	=A=	=B=	=C=	=D=	=E=
14.	=A=	=B=	=C=	=D=	=E=	39.	=A=	=B=	=C=	=D=	=E=
15.	=A=	=B=	=C=	=D=	=E=	40.	=A=	=B=	=C=	=D=	=E=
16.	=A=	=B=	=C=	=D=	=E=	41.	=A=	=B=	=C=	=D=	=E=
17.	=A=	=B=	=C=	=D=	=E=	42.	=A=	=B=	=C=	=D=	=E=
18.	=A=	=B=	=C=	=D=	=E=	43.	=A=	=B=	=C=	=D=	=E=
19.	=A=	=B=	=C=	=D=	=E=	44.	=A=	=B=	=C=	=D=	=E=
20.	=A=	=B=	=C=	=D=	=E=	45.	=A=	=B=	=C=	=D=	=E=
21.	=A=	=B=	=C=	=D=	=E=	46.	=A=	=B=	=C=	=D=	=E=
22.	=A=	=B=	=C=	=D=	=E=	47.	=A=	=B=	=C=	=D=	=E=
23.	=A=	=B=	=C=	=D=	=E=	48.	=A=	=B=	=C=	=D=	=E=
24.	=A=	=B=	=C=	=D=	=E=	49.	=A=	=B=	=C=	=D=	=E=
25.	=A=	=B=	=C=	=D=	=E=	50.	=A=	=B=	=C=	=D=	=E=

Marking Scheme to the 40 Question

1.	(b)	21.	(b)
2.	(a)	22.	(c)
3.	(b)	23.	(c)
4.	(d)	24.	(a)
5.	(a)	25.	(b)
6.	(a)	26.	(b)
7.	(a)	27.	(a)
8.	(a)	28.	(b)
9.	(b)	29.	(b)
10.	(b)	30.	(c)
11.	(b)	31.	(c)
12.	(b)	32.	(b)
13.	(a)	33.	(c)
14.	(a)	34.	(a)
15.	(b)	35.	(a)
16.	(a)	36.	(b)
17.	(a)	37.	(a)
18.	(c)	38.	(a)
19.	(b)	39.	(b)
20.	(b)	40.	(b)

APPENDIX 3

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject:	Basic Science
Mode of Teaching:	Activity-Based
Group:	Experimental Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Metric System
Time/Duration:	80 minutes (double period)
Date:	17th May, 2011
Average Age of Students:	14 years
No. of Students:	40
Instructional Material:	Tape rule, bathroom scale, spring balance, clinical thermometer, measuring cylinder, height scale, a stopwatch, wall clock etc
Behavioural Objectives:	By the end of the lesson, students should be able to

a. Define the S.I unit of standard in measurement

b. Identify each measuring instruments and their uses

c. Rehearse different types of international system of unit

d. Give the smallest units and largest unit.

Previous Knowledge:	The students are familiar with the different types of measuring instrument e.g. wall clock, tape rule etc at home and school.

Introduction: The teacher introduced the lesson by informing the students the day's topic as metric system in measurement, all teacher arrange these instruments.

Presentation of Lesson: The teacher divided the students into three groups of thirteen, thirteen and fourteen i.e. (13, 13 and 14) to observe the measuring arranged by the teacher, that students should carefully feel them, attempt to read any writing they come across.

Step I: The teacher ask the students to say something on instruments they observed.

Step II: Teacher explains the international system of units abbreviated to S.I unit is accepted all over the world that we are going to use them in measurement.

Step III: Groups is taught S.I unit of length is metre symbol (M)

Rehearsal 10 millimeters = 1 centimetre

10 centimeter= 1 decimeter

10 decimeter = 1 metre

100 metres = 1 kilometer

Symbol for kilometer = Km

Step IV: Drill them on S.I unit of mass is kilogram symbol for kilogram = Kg

Step V: S.I unit of time is second, symbol for second (S)

The unit of volume is litre

One litre = 1000 cubic centimeters

One cubic centimeter = 1 millimeter

Symbol for millimeter = Ml

Step VI: Unit of temperature is degree Celsius i.e. (^0C)

Evaluation: The teacher evaluated the lesson by asking the students the following questions:

a. What is S.I unit?

b. State the importance of measurement

c. Draw the instrument used in measuring length

Assignment: Each group should draw a wall clock and label fifteen minutes to nine (10 minutes).

Conclusion: Teacher gives note to students on S.I. Unit

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Metric System

Time/Duration: 40 minutes (single period)

Date: 19^{th} May, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Material: Tape rule, bathroom scale, spring balance, clinical thermometer, measuring cylinder, height scale, a stopwatch, wall clock etc

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

a. Define the S.I unit taught to them on the last class.

	b.	Re-identify each measuring instruments
	c.	Mention the uses
Previous Knowledge:		Students have been introduced to the topic.
Introduction:		The teacher introduced the lesson by informing the students the day's topic as metric system in measurement, all teacher arrange these instruments.
Presentation of Lesson:		
	Step I:	Teacher ask them to go to their groups as of the previous day.
	Step II:	Teacher re-emphases on the S.I. units
	Step III:	Students rehearse 10 millimeter = 1 centimeter
	Step IV:	Teacher drill them again
	Step V:	Teacher gives them again S.I unit of liquid = litre
Evaluation:		The teacher evaluated the lesson by asking the students the following questions:
	a.	Name the measuring unit of length
	b.	State the importance of measurement
	c.	List four (4) measuring instruments you know
Conclusion:		Continue with note copying

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject:	Basic Science
Mode of Teaching:	Activity-Based
Group:	Experimental Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement of Length

Time/Duration: 80 minutes (double period)

Date: 24th May, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Material: Metric rule, tape rules, sticks of different length, length of the classroom, pillars of the school building etc.

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

a. Define the S.I unit of length
b. Mention the appropriate instrument for measuring length
c. Measure some length using metre rule, tape rule etc
d. Record and calculate the length

Previous Knowledge: The student have learnt, S.I unit of different measuring units, they have seen different measuring instruments.

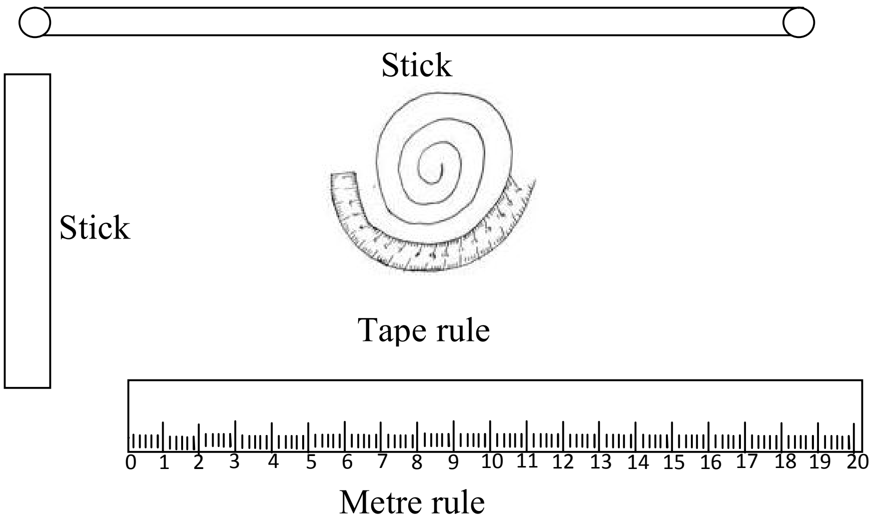
Introduction: The teacher introduced the lesson by informing the students the day's topic as measurement of length, together with the students arrange the instruments.

Presentation of Lesson:

Step I: To their groups, the teacher gives them the tape rule, metre rule, sticks of different length, show them pillars and length of classroom.

Step II: Activities by the students, they measure the sticks, pillars of the classroom, with tape rule and metric rules given to them.

Step III: students measure their sticks in their books while the teacher goes round checking their procedures of measurement.



Step IV: Students after measuring and recording calculate their scores in their books, while the teacher check whether they are using the appropriate unit.

Step V: Draw the materials they used in measurement

Evaluation: Teacher evaluates the lesson by asking the students the following questions.

a. Define S.I unit of length
b. Name the appropriate instrument for measuring length
c. Give the names of the materials you measured and the corresponding instrument used
d. A car speed 60km per hour, how many kilometer will it cover in 5 hours.

Assignment: 1. Measure the height of your fathers building
2. Calculate the pillar of the school hall

Conclusion: Teacher gives not to the students to copy.

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject:	Basic Science
Mode of Teaching:	Activity-Based
Group:	Experimental Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement of Length
Time/Duration:	40 minutes (single period)
Date:	26th May, 2011
Average Age of Students:	14 years
No. of Students:	40
Instructional Material:	Metric rule, tape rules, sticks of different length, length of the classroom, pillars of the school building etc.
Behavioural Objectives:	By the end of the lesson, students should be able to:
a.	Define S.I unit of length
b.	Mention appropriate instrument for measuring length
c.	Measure some lengths
Previous Knowledge:	The student have learnt, S.I unit of different measuring units, they have seen different measuring instruments.
Introduction:	The teacher introduced the lesson by informing the students the day's topic as measurement of length, together with the students arrange the instruments.

Presentation of Lesson:

Step I: Back to their groups, teacher gives them tape rule for measurement.

Step II: Activities by the students

Step III: Let them record in their books

Step IV: Students do calculation

Evaluation: Teacher evaluates the lesson by asking the students the following questions.

a. Define S.I unit of length

b. Mention the appropriate instrument for measuring length

c. List the materials you measured

Conclusion: Teacher gives note to copy.

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement in Liquids

Time/Duration: 80 minutes (double period)

Date: 31st May, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Materials: Beaker, measuring cylinder, burettes, conical flasks, funnels, round bottom flask water etc

Behavioural Objectives: By the end of the lesson students will be able to:

1. Mention these apparatus

2. Write down their uses
3. Use them and measure liquids and calculate

Previous knowledge: Students have been taught measurement of length

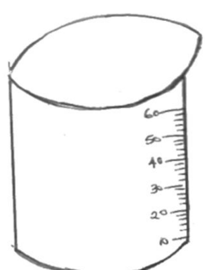
Introduction: Teacher introduces the lesson by writing the topic on the chalk board and brings out the apparatus.

Presentation:

Step I: Teacher leads the students to mention the names of the apparatus and explains on how to measure with these apparatus.

Step II: Teacher continues by explaining the graduation of these apparatus, uses the unit of liquid is in litre and cm^3

Step III: Students in their group's measure liquid given to them possibly water using the apparatus given to them.



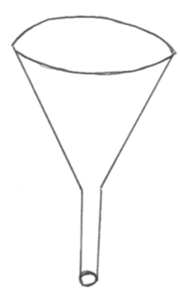
Beaker

Measuring Cylinder

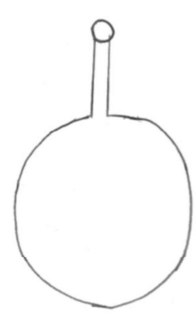
Measuring Jug

Pipette

Burette



Funnel



Round Bottom Flask

Step IV: Step records the results of their measurement and calculates in their books.

Step V: Teacher checks their work at the process of the measurement.

Evaluation: Teacher evaluates the topic by asking the following questions:

1. How many centimeters in one litre?
2. How many deciliter in 2 litres
3. Calculate the litres for each boy if 10 litres of 5alive drink was given to 20 boys.

Assignment: How many litres are there in 5000 deciliter

Conclusion: Teacher gives note to students to copy

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement in Liquids

Time/Duration: 40 minutes (single period)

Date: 2^{nd} June, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Materials: Beaker, measuring cylinder, burettes, conical flasks, funnels, round bottom flask water etc

Behavioural Objectives: By the end of the lesson students will be able to:

a. Name the apparatus
b. Mention their uses

c. Use them to measure

Previous knowledge: Students have been introduced to the topic.

Introduction: Teacher introduces the lesson by writing the topic on the chalk board and brings out the apparatus.

Presentation:

Step I: Teacher briefly revise the last topic

Step II: Explain the graduation on the apparatus.

Step III: Students on their own, measures some liquid e.g. water, kerosene etc.

Step IV: Students lists the materials they measured.

Evaluation: Teacher evaluates by asking the following questions:

a. How many centiliters in one litre

b. How many deciliters in 2 litres

c. Calculate how many litre in 5000 deciliters

Conclusion: Teacher correct their answers and gives note to copy.

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Weight

Time/Duration: 80 minutes (double period)

Date: 7th June, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Materials: Students themselves, stone bowl of sand, scale bathroom scale etc.

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

1. Measure members of their group
2. Calculate the average weight of group members
3. Calculate the weight of the bowl of sand

Previous Knowledge: Students have been taught measurement of liquids

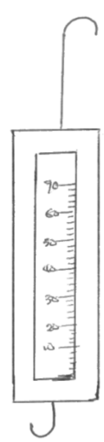
Introduction: Teacher introduce the lesson by writing the topic on the chalkboard as measurement of weight

Presentation:

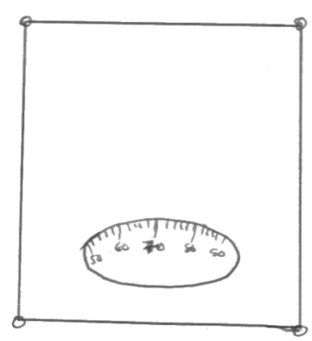
Step I: Teacher set the apparatus to each group show the students what to do or how to measure.

Step II: Teacher lead the students handle apparatus given to each group.

Step III: Students activities, they measure each members of the group and record in their books.



Spring Scale



Bathroom Scale

Step IV:	Teacher checks the student's procedures in the measurement of the weight.
Step V:	Students record and calculate their results in their book for teacher to mark.

Evaluation: Teacher evaluates the topic by asking the following questions:

1. What is the weight of the biggest pension in the group
2. State method of calculating average weight
3. What is the weight of the sand in the bowl

Assignment: Calculate at average weight of 30kg, 20kg, 25kg, 35kg and 10kg

Conclusion: Teacher gives note to the students to copy

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject:	Basic Science
Mode of Teaching:	Activity-Based
Group:	Experimental Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement of Weight
Time/Duration:	40 minutes (single period)
Date:	9th June, 2011
Average Age of Students:	14 years
No. of Students:	40
Instructional Materials:	Students themselves, stone bowl of sand, scale bathroom scale etc.
Behavioural Objectives:	By the end of the lesson students should be able to:

a. Measure some group members

b. Calculate their average weight

c. Calculate the eight of sand in bowl.

Previous Knowledge: Students have been taught measurement of liquids

Introduction: Teacher introduce the lesson by writing the topic on the chalkboard as measurement of weight

Presentation:

Step I: Teacher draws some apparatus on the chalkboard.

Step II: Show students how to measure

Step III: Teacher explain how to handle the apparatus

Step IV: Teacher leads the students to measure some class members and calculate.

Step V: Teacher calculates the weight of sand in the bowl.

Evaluation: Teacher asks the following questions:

a. Measure the next child to you and record.

b. Show the method of calculating average weight

c. What is the weight of the sand in the bowl.

Conclusion: Teacher gives note on the topic.

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

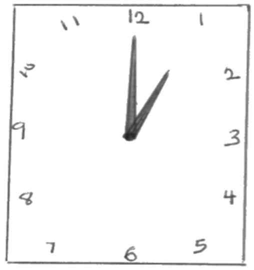
Class: JSS II

Topic: Measurement

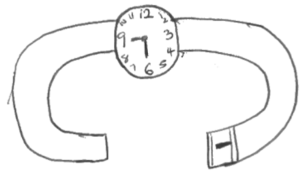
Unit Topic:	Measurement of Time/Periodic
Time/Duration:	80 minutes (double period)
Date:	14th June, 2011
Average Age of Students:	14 years
No. of Students:	40
Instructional Materials:	Calendar, wristwatch, wall clock, table clock etc
Behavioural Objectives:	By the end of the lesson students should be able to
1.	Mention how many days in one week
2.	How many months in one year
3.	Record their age and calculate the average
Previous Knowledge:	Students have learnt measurement of weight.
Introduction:	Teacher revises the last topic by asking questions on their previous knowledge.

Presentation:

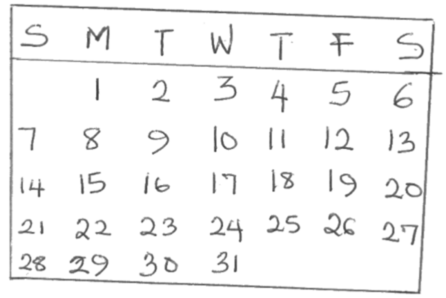
Step I:	Teacher presents the lesson by giving each group their own material.
Step II:	Students calculate the time and record their book
Step III:	Students recite 60 second make 1 minute, 60 minutes makes one hour till they reach 365 days makes one year.
Step IV:	Students count calendar for one year and divided in weeks etc
Step V:	Teacher checks their procedure to see whether they are doing the right things.



Wall Clock



Wristwatch



Calendar

Evaluation: Teacher evaluates the lesson by asking questions on the topic as follows:

1. How many days in one week, and months in one year
2. Calculate the average year of the members of your group
3. Draw a wall clock on the chalkboard, label and tell the time.

Conclusion: Teacher gives not to students to copy.

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Time/Periodic

Time/Duration: 40 minutes (single period)

Date: 16th June, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Materials: Calendar, wristwatch, wall clock, table clock etc

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

a. Mention how many seconds, minutes in one hour?

b. How many hours in one day?

c. How many days in one week?

Previous Knowledge: Students have been introduced to the topic.

Introduction: Teacher revises the last topic by asking questions on their previous knowledge.

Presentation:

Step I: Teacher draws the clock on the chalkboard

Step II: Students are asked to calculate the time

Step III: Students recite 60 seconds make 1 minute, 60 minutes make I hour, till one year is reached.

Step IV: Students count calendar for one year and divided in weeks.

Step V: Teacher checks their procedures.

Evaluation: Teacher evaluates the lesson by asking questions on the topic as follows:

a. How many seconds in one minute?

b. Recite the time as 60 seconds makes one minute till one year?

c. How many days in one year?

Conclusion: Teacher revises the topic and gives note to copy.

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement and Calculation of Money

Time/Duration: 80 minutes (double period)

Date: 21st June, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Materials: Money in different denomination. Paper money and coins.

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

1. Count money from lower to higher denomination
2. Divide certain amount of money to certain number of people
3. Count money to one million naira

Previous Knowledge: Students have been taught about time keeping

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

Step I: Teacher brings out some money and show to the students

Step II: Student activities

Step III: Students handle the money, counted and record

Step IV: Count five thousand naira from two hundred naira notes, and record the number of two hundred naira involved.

Step V: Count twenty thousand naira from five hundred naira pieces of five hundred naira involved.

Evaluation: Teacher asks questions from the topic

1. How many thousands are there in twenty pieces of five hundred naira
2. Divide thirty thousand naira to ten brothers how much will each brother get.
3. Each loaf of bread is two hundred naira, how many loaves five thousand buy

Assignment: Divide 1 million naira to one hundred people in a community

Conclusion: Teacher gives note to the students to copy

LESSON PLAN FOR EXPERIMENTAL GROUP

Subject: Basic Science

Mode of Teaching: Activity-Based

Group: Experimental Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement and Calculation of Money

Time/Duration: 40 minutes (single period)

Date: 23rd June, 2011

Average Age of Students: 14 years

No. of Students: 40

Instructional Materials: Money in different denomination, paper money and coins.

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

1. Identify money from lower denomination to higher one.
2. Divide certain amount of money to themselves.
3. Count money to thousand.

Previous Knowledge: Students have been introduced to the topic.

Introduction: Teacher writes the topic on the chalkboard.

Presentation:

Step I: Teacher brings out some money and show to the students.

Step II: Students activity with the money.

Step III: Students count and record.

Step IV: Students keeps the money in hundreds

Step V: Students divides the money.

Evaluation: Teacher asks questions from the topic.

1. How many hundred naira in two thousand?
2. Divide five thousand to ten people?
3. How many soaps will Ali buy for fifty naira, if a soap is ten naira?

Conclusion: Teacher revises the topic and gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject: Basic Science

Mode of Teaching: Lecture Method

Group: Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Metric System

Time/Duration: 80 minutes (double period)

Date: 18^{th} May, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Define the S.I unit of metric system
2. Mention S.I unit of different measurement
3. Read some metric system

Previous Knowledge: Students hearing about metric system

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard as S.I unit

Presentation:

Step I: Teacher presents the lesson by telling the student the topic as we use them on our daily calculations.

Step II: Teacher explains the meaning of S.I unit as international system unit

Step III: Teacher continues to explain the different S.I unit of different measurement

Step IV: Teacher lists the different measurement where S.I unit are involved they are length/distance, weight, time, liquid etc.

Step V: Teacher explains that the S.I unit of length is metre and kilometer = M or Km

Weight is gramme = g

Time is second

Liquid is litre

Evaluation: Teacher asks question from the topic as follows:

1. Define S.I unit
2. Mention the S.I unit of different measurement
3. Read the metric system of length and weight

Conclusion: Teacher gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject:	Basic Science
Mode of Teaching:	Lecture Method
Group:	Control Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Metric System
Time/Duration:	40 minutes (single period)
Date:	20^{th} May, 2011
Average Age of Students:	14 Years
No. of students:	40
Instructional Materials:	Chalk and Chalkboard
Behavioural Objectives:	By the end of the lesson students should be able to:
1.	Define the S.I unit of metric system
2.	Mention S.I unit of different measurement
3.	Read some metric system
Previous Knowledge:	Students have been introduce to the topic.
Introduction:	Teacher introduces the lesson by writing the topic on the chalkboard as S.I unit
Presentation:	
Step I:	Teacher presents the lesson by telling the student the topic as we use them on our daily calculations.
Step II:	Teacher explains the meaning of S.I unit as international system unit
Step III:	Teacher continues to explain the different S.I unit of different measurement

Step IV: Teacher lists the different measurement where S.I unit are involved they are length/distance, weight, time, liquid etc.

Step V: Teacher explains that the S.I unit of length is metre and kilometer = M or Km

Weight is gramme = g

Time is second

Liquid is litre

Evaluation: Teacher asks question from the topic as follows:

1. Define S.I unit
2. Mention the S.I unit of different measurement
3. Read the metric system of length and weight

Conclusion: Teacher gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject: Basic Science

Mode of Teaching: Lecture Method

Group: Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Length

Time/Duration: 80 minutes (double period)

Date: 25th May, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Mention the apparatus for measuring length

2. Measure some poles, pillars, building

3. Read the metric system of length

Previous Knowledge: Students have been taught S.I unit as standard of measurement.

Introduction: Teacher introduces the lesson by writing the topics on the chalkboard.

Presentation: Step I: Teacher presents the lesson by writing the metric system of length on the chalkboard.

Step II: Teacher continue by explaining the following

10 millimeters	=	1 centimeters
10 centimeters	=	1 decimeter
10 decimeter	=	1 metre
100 metres	=	1 kilometer

Step III: Teacher reads/recites the metric system while students were watching.

Step IV: Teacher explains that the S.I unit of length is metre/kilometer

Step V: Teacher explains that this is the acceptable system all over the world.

Evaluation: Teacher asks questions as follows

1. Mention the apparatus for measuring length?
2. Measure some poles, pillars, buildings and record them in S.I unit of length?
3. Read metric system of length from beginning to end

Conclusion: Teacher gives students note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject:	Basic Science
Mode of Teaching:	Lecture Method
Group:	Control Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement of Length
Time/Duration:	40 minutes (single period)
Date:	27^{th} May, 2011
Average Age of Students:	14 Years
No. of students:	40
Instructional Materials:	Chalk and Chalkboard
Behavioural Objectives:	By the end of the lesson students should be able to:
1.	Mention the apparatus for measuring length
4.	Measure some length
5.	Read metric system in length
Previous Knowledge:	Students have been taught S.I unit as standard of measurement.
Introduction:	Teacher introduces the lesson by writing the topics on the chalkboard.
Presentation: Step I:	Teacher presents the lesson by writing the metric system of length on the chalkboard.
Step II:	Teacher explains on the chalkboard.
Step III:	Teacher recites the metric system on length.
Step IV:	Teacher mentions the S.I unit as in metre/kilometer
Step V:	Teacher explains the worldwide acceptability of S.I Unit.

Evaluation: Teacher asks questions as follows

1. What is the apparatus for measuring length?
4. Measure poles, pillars etc?
5. Read metric system of length.

Conclusion: Teacher gives students note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject: Basic Science

Mode of Teaching: Lecture Method

Group: Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Time

Time/Duration: 80 minutes (double period)

Date: 1st June, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Mention S.I unit of time
2. Read their time
3. Recite metric system of time from second to years

Previous Knowledge: Students have been taught measurement of length.

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

	Step I:	Teacher present the lesson by telling to the students the S.I unit of time as second.
	Step II:	Teacher reads 60 second make 1 minute 60 minutes make 1 hour till finally 365 days = 1 year
	Step III:	Teacher explains the S.I of time is second and symbol is second.
	Step IV:	Teacher leads the students to recite the metric system of time
	Step V:	Teacher explains that time varies on the earth, depending on the position of that continent on the earth.
Evaluation:		Teacher ask questions on the topic
	1.	Mention the S.I unit of time
	2.	Call some students to tell their time from their respective watch
	3.	Recite the metric system of time
Conclusion:		Teacher gives students note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject:	Basic Science
Mode of Teaching:	Lecture Method
Group:	Control Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement of Time
Time/Duration:	40 minutes (single period)
Date:	3rd June, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Mention S.I unit of time
2. Read the clock drawn on the chalkboard
3. Recite metric system of time.

Previous Knowledge: Students have been introduced to the topic.

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

Step I: Teacher present the lesson by telling to the students the S.I unit of time as second.

Step II: Teacher tells the students how to calculate time.

Step III: Teacher explains the S.I of time is second and symbol is second.

Step IV: Teacher recites the metric system.

Step V: Teacher explains that time varies on the earth, depending on the position of that continent on the earth.

Evaluation: Teacher ask questions on the topic

1. Mention the S.I unit of time
2. What is time for closing for the day's class?
4. Recite the metric system of time

Conclusion: Teacher gives students note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject:	Basic Science
Mode of Teaching:	Lecture Method
Group:	Control Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement of Time
Time/Duration:	80 minutes (double period)
Date:	8th June, 2011
Average Age of Students:	14 Years
No. of students:	40
Instructional Materials:	Chalk and Chalkboard
Behavioural Objectives:	At the end of the lesson students should be able to:

1. Mention S.I unit of weight
2. Measure some of stones given to them
3. Calculate the average weight of some class members

Previous Knowledge:	Students have been taught measurement of time
Introduction:	Teacher introduces the lesson by writing the topic on the chalkboard.
Presentation: Step I:	Teacher presents the lesson by telling the students the S.I unit of weight as gramme
Step II:	Teacher drills the students on metric system of weight as follows:

10 milligrams	=	1 centigramme
10 centigrammes	=	1 decigramme
10 decigrammes	=	1 gramme
100 grammes	=	1 kilogramme

Step III: Teacher explains the S.I unit symbol and how we can convert the bulky 5000 grammes to 5 kilogrammes.

Step IV: Teacher explains how to measure the stone on the chalkboard by drawing a stone assume the weight and calculate.

Step V: Students were asked of their assumed weight, about (6) six students assumed weight were recorded on the chalkboard and calculated.

Evaluation: Teacher asks questions from the topic as follows:

1. Mention the S.I unit of weight
2. What is the weight of 4 stones weighing, 10, 8, 12 and 10
3. Calculate the average weight of Ali, Ada, Chichi and Amina weighing 15, 16, 14 and 10

Conclusion: Teacher gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject: Basic Science

Mode of Teaching: Lecture Method

Group: Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Time

Time/Duration: 40 minutes (single period)

Date: 10th June, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

Behavioural Objectives:	At the end of the lesson students should be able to:
1.	Mention S.I unit of weight.
2.	Recite Metric system of weight.
3.	Metric system apparatus.
Previous Knowledge:	Students have been introduced to the topic.
Introduction:	Teacher introduces the lesson by writing the topic on the chalkboard.
Presentation: Step I:	Teacher presents the lesson by telling the students the S.I unit of weight as gramme
Step II:	Teacher recites metric system of weight
Step III:	Teacher explains the S.I unit symbol and how we can convert the bulky 5000 grammes to 5 kilogrammes.
Step IV:	Teacher explains how to measure the stone on the chalkboard by drawing a stone assume the weight and calculate.
Step V:	Students were asked to read/recites from the back of their exercise books.
Evaluation:	Teacher asks questions from the topic as follows:
1.	Mention the S.I unit of weight?
2.	Mention your weight if you know?
3.	Three people weighed 40kg, 30kg and 20kg. What is their average weight?
Conclusion:	Teacher gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject:	Basic Science
Mode of Teaching:	Lecture Method
Group:	Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Liquid

Time/Duration: 80 minutes (double period)

Date: 15th June, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Mention S.I unit of volume
2. Measure some volume of liquid
3. Calculate volumes of liquid in the class

Previous Knowledge: Students have been taught measurement of weight

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

Step I: Teacher tells the students the S.I unit of volume as or litre.

Step II: Teacher tell the students that

10 millimeters make		1 centiliter
10 centiliter	=	1 deciliter
10 deciliter	=	1 metre etc

Step III: Teacher tells the students about gallon of water is about 4 litres the bigger gallon is about 15 litres

Step IV: Teacher explains how to measure these volumes in liquids from 10 millimeters and emptied to into a bigger litres.

Step V: Teacher calculates the 4 litres of liquid into deciliters that we are to get 40 deciliter.

Evaluation: Teacher evaluates the lesson by asking questions from the topic as

1. Mention the S.I unit of volume
2. How many litres are there in 5000 decilitres of oil
3. Calculate 10ml, 15ml, 2.8ml, 2.2ml

Conclusion: Teacher gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject: Basic Science

Mode of Teaching: Lecture Method

Group: Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement of Liquid

Time/Duration: 40 minutes (single period)

Date: 17th June, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Mention S.I unit of volume
2. Recite volume metric system
3. Read the graduated cylinder drawn on the chalkboard.

Previous Knowledge: Students have been introduced to the topic.

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

Step I: Teacher tells the students the S.I unit of volume as or litre.

Step II: Teacher tell the students that

10 millimeters make		1 centiliter
10 centiliter	=	1 deciliter
10 deciliter	=	1 metre etc

Step III: Teacher tells the students about gallon of water is about 4 litres the bigger gallon is about 15 litres

Step IV: Teacher explains how to measure these volumes in liquids from 10 millimeters and emptied to into a bigger litres.

Step V: Teacher calculates on the chalkboard as five litres make on gallon.

Evaluation: Teacher evaluates the lesson by asking questions from the topic as

1. Mention the S.I unit of volume
2. Recite the metric system of volume.
3. On the chalkboard, show me five litres of measuring cylinder.

Conclusion: Teacher gives students note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject: Basic Science

Mode of Teaching: Lecture Method

Group: Control Group

Class: JSS II

Topic: Measurement

Unit Topic: Measurement in money

Time/Duration: 80 minutes (double period)

Date: 22nd June, 2011

Average Age of Students: 14 Years

No. of students: 40

Instructional Materials: Chalk and Chalkboard

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

1. Identify the value of money from lower to higher denomination
2. Count certain amount of money.
3. Divide and arrange money to one million naira

Previous Knowledge: Students have been taught measurement of volume

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

Step I: Teacher presents the topic by writing some amount of money on the chalkboard.

Step II: Teacher writes out some certain amount of money on the chalkboard for the students to calculate.

Step III: Teacher asks the students to copy down certain amount from the chalkboard and share to certain number of students.

Step IV: Teacher asks the students to tell how many two hundred naira are there in five thousand naira.

Step V: Teacher asks students to tell how many five hundred naira makes twenty thousand naira.

Evaluation:		Teacher asks questions from the topic as from the topic as follows:
	1.	How many ten naira are in hundred naira note
	2.	How many fifty naira in five thousand naira note
	3.	Divide five hundred thousand among ten students
	4.	How many one thousand naira notes are in five hundred thousand naira
Conclusion:		Teacher gives note to copy.

LESSON PLAN FOR CONTROL GROUP

Subject:	Basic Science
Mode of Teaching:	Lecture Method
Group:	Control Group
Class:	JSS II
Topic:	Measurement
Unit Topic:	Measurement in money
Time/Duration:	40 minutes (single period)
Date:	24^{th} June, 2011
Average Age of Students:	14 Years
No. of students:	40
Instructional Materials:	Chalk and Chalkboard
Behavioural Objectives:	By the end of the lesson students should be able to:

1. Mention any amount of money they know
2. Count the amount of money in 20 pieces of five hundred naira notes.

3. Tell how many thousand naira make one million.

Previous Knowledge: Students have been introduced to the topic.

Introduction: Teacher introduces the lesson by writing the topic on the chalkboard.

Presentation:

Step I: Teacher writes some amount of money on the chalkboard.

Step II: Teacher writes out more amounts on the chalkboard and calculates.

Step III: Teacher asks the students to copy down certain amount from the chalkboard and share to certain number of students.

Step IV: Teacher asks the students to tell how many thousands in twenty pieces of five hundred naira.

Step V: Teacher divide ten pieces of one thousand naira notes to twenty students.

Evaluation: Teacher asks questions from the topic as from the topic as follows:

1. Mention some amount of money you know?
2. Divide one thousand to five people.
3. How many thousands make one million naira?

Conclusion: Teacher gives note to copy.

APPENDIX IV

Basic Science Achievement Test (BSAT) Raw Scores For Pilot Study Reliability

Warnings

The covariance matrix is calculated and used in the analysis.

Case Processing Summary

	N	%
Cases Valid	30	100.0
Excluded[3]	0	.0
Total	30	100.0

Listwise deletion based on all variables in the procedure,

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.979	.979	2

Item Statistics

	Mean	Std. Deviation	N
GSS Kudan	31.0000	3.85066	30
GSS Giwa	30.8000	3.73612	30

Inter-Item Correlation Matrix

	GSS Kudan	GSS Giwa
GSS Kudan	1.000	.959
GSS Giwa	.959	1.000

The covariance matrix is calculated and used in the analysts.

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	30.900	30.800	31.000	.200	1.006	.020	2

The covariance matrix is calculated and used in the analysis.

APPENDIX V
A Post Test Raw Score of Basic Science Achievement Test (BSAT) in School First Experimental Group

S/N	Age	Sex	Scores over 40
1	13	Female	31
2	14	F	30
3	14	F	29
4	14	F	36
5	14	F	30
6	14	Male	32
7	13	M	30
8	13	M	30
9	13	M	29
10	14	M	30
11	14	M	29
12	14	F	30
13	14	F	30
14	14	M	29
15	14	M	30
16	13	F	29
17	14	F	31
18	14	M	30
19	14	M	32
20	14	M	35
21	14	Female	34
22	14	F	33
23	14	F	30
24	13	F	30
25	14	M	29
26	14	M	30
27	14	M	36
28	14	M	29
29	14	M	30
30	14	M	32
31	14	M	31
32	13	F	34
33	14	F	36
34	14	F	31
35	14	F	32
36	13	F	30
37	14	F	34
38	14	F	36
39	13	M	35
40	14	F	32

Post Test Raw Scores of Basic Science Achievement Test Control Test (BSAT) Control Group

S/N	Age	Sex	Scores over 40
1	14	Female	20
2	14	F	19
3	13	F	22
4	14	F	20
5	14	M	18
6	14	M	17
7	14	M	21
8	14	M	20
9	13	F	21
10	14	F	23
11	14	F	18
12	14	F	20
13	14	F	16
14	14	F	23
15	14	F	20
16	14	M	23
17	14	F	20
18	13	F	21
19	14	M	19
20	14	M	18
21	14	Female	21
22	14	F	23
23	14	F	23
24	14	M	25
25	14	M	17
26	13	M	20
27	14	F	19
28	14	F	19
29	14	F	23
30	14	F	24
31	14	M	22
32	14	M	20
33	13	M	23
34	14	M	19
35	14	F	20
36	14	M	22
37	14	F	22
38	14	M	18
39	14	F	21
40	14	F	20

Post-post Test Experimental Group Raw Scores of Basic Science Achievement Test (BSAT)

S/N	Age	Sex	Scores over 40
1	14	Female	31
2	14	F	28
3	14	F	34
4	14	F	36
5	13	F	29
6	13	M	32
7	14	M	33
8	14	F	30
9	14	M	34
10	14	F	35
11	13	M	29
12	14	M	34
13	14	M	32
14	14	M	34
15	14	M	31
16	14	F	33
17	14	F	35
18	14	F	37
19	14	F	35
20	14	F	36
21	14	Female	33
22	14	F	35
23	14	M	30
24	13	F	36
25	14	M	33
26	13	M	35
27	14	F	32
28	14	M	37
29	14	M	30
30	13	F	33
31	13	M	36
32	14	M	34
33	14	M	38
34	14	M	33
35	14	F	34
36	14	F	35
37	14	F	37
38	14	F	37
39	14	M	38
40	14	F	36

Post-Post Test control group Raw Scores for Basic Achievement Test (BSAT)

S/N	Age	Sex	Scores over 40
1	14	Female	19
2	14	F	18
3	13	F	19
4	14	M	20
5	14	M	19
6	14	M	20
7	13	F	20
8	14	F	19
9	14	M	17
10	14	M	18
11	14	M	18
12	14	F	20
13	13	F	17
14	14	F	21
15	13	F	21
16	14	F	18
17	14	M	19
18	14	F	20
19	14	M	19
20	14	F	20
21	14	F	19
22	13	M	15
23	13	F	20
24	14	M	19
25	14	M	20
26	14	M	19
27	14	F	22
28	14	F	19
29	14	F	20
30	14	M	17
31	14	M	18
32	13	F	17
33	14	M	18
34	14	M	21
35	14	M	20
36	13	M	23
37	14	F	22
38	14	F	17
39	14	F	19
40	13	F	20

APPENDIX VI

JUNIOR SECONDARY BASIC SCIENCE SCHEME OF WORK

i. Health of the family

ii. Growth and development

iii. Energy and appliance in the home/forms of energy

iv. Continuity of life

v. Care of the child

vi. Energy and appliance in the home.

The theme according to year groups is as follows:

JSS1: Basic Science Curriculum Themes

- Characteristics of living things.
- Characteristics of animals
- Human beings as intelligent animals
- Know your body
- Feeding
- Health of the family
- Classification of matter
- Grouping of organisms
- Activities of living things
- Observing samples of non living components
- Classification of non living things

- Measurements
- States of matter
- Air
- Water
- Man and space

JSS 2: Basic Science Curriculum Themes

- The functioning of human body –movements, excretory system, respiratory system, circulatory system, digestive system.
- Growth and development.
- Energy and appliances in the home – Forms of energy
- Ecology – specific habitat studies, including land and aquatic
- Physical and chemical changes
- Elements, compounds and mixtures
- Further investigation of air and water
- Hydrogen
- Energy
- Measurement

JSS3: Basic Science Curriculum Themes

- Food storage.
- Sense organs.
- Reproductive.

- Health.
- Continuity of the family.
- Care of the child.
- Energy and appliances in the home.
- Resources from the living components in the environment.
- Chemical symbols, Formulae and equations.
- Atomic structure.
- Metals and non - metals.
- Activity series.
- Acids bases and salts.
- Energy conversion and transfer.
- Energy and work
- Kinetic theory
- Man in space