EFFECT OF ACTIVITY AND CONVENTIONAL TEACHING METHODS ON STUDENTS' PERFORMANCE AND RETENTION IN AGRICULTURAL SCIENCE IN SENIOR SECONDARY SCHOOLS, KADUNA STATE, NIGERIA

BY

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ZARIA, NIGERIA

MARCH, 2021

DECLARATION

I hereby declare that this dissertation titled‘Effects of activityand conventional teachingmethods onStudents performance and retention in agricultural science in senior secondary schools in Kaduna State Nigeria’ 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 higher degree.

_____ _____

Charles Sunday Ayuba **Date**

CERTIFICATION

This dissertation titled “Effects of Activity and ConventionalTeaching Method on Students Performance in Agricultural Science in Senior Secondary Schools in Kaduna State Nigeria” By Charles Sunday AYUBA meets the requirements governing the award of master’s degree (M Ed) in Educational Foundations and Curriculum Department of Ahmadu Bello University Zaria and is approved for its contribution knowledge and literary presentation.

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DEDICATION

This work is dedicated to my lovely wife Mrs. Gloria Charles Ayuba and to my children Grace, Bright, Praise and Othniel Charles for their encouragement and support.

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ABSTRACT

The study investigated the effect of Activity and conventional teaching methods on students' performance and retention in Agricultural Science in Senior Secondary Schools in Kaduna State Nigeria. Five objectives were used to carry out the study. These include to determine the effect of Activity-Based method of teaching on students' performance in Agricultural science in senior secondary schools in Kaduna State, ascertain the retention ability of students' taught Agricultural Science using Activity-Based method and those taught using Conventional teaching method in Senior Secondary Schools in Kaduna State, The objectives were transformed into five corresponding research question and hypotheses. The research adopted the quasi-experimental design of pre-test, post-test. The sample size for the study comprised 244 SSII Agricultural Science students' selected using purposive sampling techniques. The instrument used for data collection in the study was a structured Agricultural Science performance test (ASPT) designed by the researcher. The instrument consisted of forty-five (45) multiple-choice test items. The drafted instrument was validated by the researcher supervisors and two experienced Agricultural Science experts one from Amadu Bello University and Kaduna State Ministry of Education. The validated instrument was pilot tested using test-retest, the data collected from the pilot study were analysed using Pearson product-moment correlation coefficient and a reliability coefficient of 0.70 was obtained. The data collected were subjected to statistical analysis using both descriptive and inferential statistical techniques. Frequency and percentage were used to analyse the bio-data of the respondents', while the mean and standard deviation was used to answer the research questions. Independent sample t-test was used to test the hypotheses at 0.05 level of significance. Findings from the study among others revealed that the performance of students' taught Agricultural Science using Activity-Based teaching method was significantly better than those taught using conventional teaching method, that the students' taught Agricultural Science using Activity-Based teaching method retain the learned concepts for a long time than their counterparts taught using conventional method, The study concluded that Activity-Based method of teaching has a facilitating effect on the performance of students. The following recommendations were made among others, that teachers of Agricultural Science should explore Activity-Based method to their advantage in enhancing effectiveness in the classroom teaching and consequently engender student better performance, the teaching style by Agricultural Science teachers should be based on guiding, directing and facilitating while students' should do the real work by themselves. This would enable them to discover new ideas and skills in solving problems.

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List of Abbreviations

ABM	Activity Based Method
ASPT	Agricultural Science Performance Test
ANCOVA	Analysis of CO-Variance
BEC	Basic Education Curriculum
CAI	Computer Assisted Instruction
CAT	Chemistry Achievement Test
CG	Control Group
EG	Experimental Group
FRIN	Forestry Research Institute of Nigeria
GAT	Geometric Achievement Test
GNC	Groundnut Cake
JSCE	Junior Secondary Education Curriculum
MDG	Millennium Development Goal
NEEDS	National Economic Empowerment Development Strategy
NEPA	Nigeria Electric Power Authority
NERDC	Nigerian Education Research and Development Council
NIFOR	National Institutes for Oil Palm Research
NTI	National Teachers Institutes
NUT	Nigeria Union of Teachers
PVS	Pre-Vocational Studies
Q_{1a}	Pretest of Experimental Group
Q_{1b}	Pretest of Control Group

Q_{2a}	Post-Test of Experimental Group
Q_{2b}	Post-Test of Control Group
Q_{3a}	Retention Test of Experimental Group
Q_{3b}	Retention Test of Control Group
SATEWF	Students attitudes to Essay Writing in French
SSCE	Senior School Certificate Examination
SS II	Senior Secondary Two
SSS	Senior Secondary School
STAN	Science Teachers Association of Nigeria
TPD	Teachers Professional Development
T TTP	Technical Teachers' Training Progamme
WRC	Water Retention Capacity
WSIP	Whole School Improvement Programme
X_1	Treatment of experimental Group
Y	No Treatment in Control Group

Operational Definition of Terms

Activity Based Approach: is the process whereby learners are actively involved or engaged in the learning process rather than passively absorbing lectures

Concept Map: Is a special form of web diagram for disentangling a concept and making it clearer to the learner.

Ethnoscience Instructional Method: Is a method that allows learners to critically re-assess cultural belief that are in tandem with scientific concepts.

Inquiry Approach: It's a provoking creative method in which students, out of curiosity and on their own or under the guidance of a teacher, probe, investigate, and interpret relevant issues to the problems with a view if providing solutions through reflective thinking.

Performance: is the capacity to achieve when one is tested on what he/she has been taught.

Problem Solving Approach: it is a skill that requires finding a solution that is unique and resolving to identify the problem.

Resources: Are materials that aid learning or make learning permanent or concrete.

Retention: is the ability to remember what one has learnt in a later time.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture is the mother and nurse of all other activities because when agriculture flourishes all other things would flourish when agriculture fails civilization fails. Agriculture is an indispensable tool for National development because of the role it plays in science and technology. No nation can afford to allow her teeming population to shy away from learning of Agricultural Science. Nigerian government recognizes the importance of the subject that is why it allows the subject to be taught at all level of education. Agricultural science was introduced into the curriculum content of secondary school because of its educational value and relevance to the needs of the individual learners, national value and the society as a whole.

Given the high value placed on Agricultural science at the Nigerian Senior Secondary School curriculum and the need to teach it effectively through an effective method is indisputable. A few of the problems affecting the teaching and learning of Agricultural science are the meaningfulness of the content, the sustainability of the methods and probably, the teacher who handles both the content and method. A student cannot learn agricultural science effectively without going through some experiences in science,). Agricultural science teaching can only be result oriented when students are willing and the teachers are favourably disposed using appropriate methods and resources. Efforts have been made to diagnose the problem associated with the teaching and learning of agricultural science to proffer solutions that will lead to better performance. To this end, the importance of improving the teaching method of agricultural science in senior secondary school towards students' better performance was emphasized. Research on the methods of teaching in Nigerian schools revealed that the

Conventional teaching method is known as the teacher-centered approach of teaching is commonly used. Bclaji in Upelle (2013) said that this method (conventional teaching method.) does not allow for active participation of students, the incidence in senior secondary school has resulted in poor performance in both internal and external examination. This necessitated the need for a more effective and result oriented method.

Correct use of an appropriate teaching method is critical to successful teaching and learning. Knowledge of how teaching methods affect students learning may help educators to select methods that improve teaching quality, effectiveness, and accountability to the learner and the public. It may also help them keep up with information technology and globalization. Effective teaching focuses on instruction that promotes students involvement on activity-based learning which is superior to so many other teaching methods, sequel to this, there is a widespread concern among parents, stakeholders in the educational sector and the general public about the method used in teaching agricultural science at the secondary school level in Nigeria. Teachers are now being requested to move away from convention teaching model (approach) and embrace the activity-based teaching strategies.

Activity-based teaching method makes students active participants, aids retention of materials learnt, builds confidence, helps students maximize their potential and favours intrinsic motivation. Activity-based learning strategies are being used with increasing frequency as a means to engage students in their learning. The use of activity-based learning in the classroom spans a continuum, ranging from the occasional use of problems for students to solve the extensive use of discussions problems or other activities in a class. The activity-based teaching method is more effective than the traditional method because it results in better long-term retention than the traditional method of teaching. The activity-based instructional method promotes instruction in the

three domains of knowledge. It enables students to handle concrete material which reduces the abstract nature of the concept learned. The activity-based teaching method involves the use of discussion, demonstration, enquiry, problem solving, discovery and so on.This makes learning more meaningful and when concepts are meaningfully learned, it enhances retention and heightens student's performance academically.

Discussion teaching method is an essentially activity – based approach which actually involves students talking over subjects from various point of view, with the teacher playing the role of a guide in the learning situation, properly directing questions to elicit appropriate response and information. The teacher does not dispense knowledge or communicate information but plays the role of a moderator in the learning process. This method is predicated on the fact that some knowledge has already been acquired by assimilation, discovery, demonstration, and problem solving. Here, the learner discusses ideas, considers other people ideas and applies appreciation that enable him evaluate and relates to his own experience and make judgments, formulating his own ideas and adding something new to his own.

Furthermore, Demonstration method can be said to be the illustration or display or directions on the operations of something or procedure involved in a process action, activities or the act of teaching. It is a teaching method that is utilized by both teachers and students in agricultural science classroom. It is used by agricultural science teachers who want to show the students how a particular farming practice is carried out or done. Demonstration teaching method is a skill that can be learnt and taught, it involves showing by offering example of how something works or the steps involved in a process.

Another teaching method is inquiry teaching method which is an activity-oriented, thought-provoking creative method in which students out of curiosity and on their own, or under the guidance of the teacher, probe investigative, interpret relevant

issues and problems to provide solution through reflective thinking and rational decision – making which this method develops in the inquirer. This method gives students the ability to be able to retain what the have been taught in the classroom.

The concept "retention" is the ability to retain and consequently remember items/things learned or experienced by an individual at a later time. 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. Umoru-sule (2009) suggested that students may acquire more knowledge in the short term when taught conventionally but are likely to retain knowledge longer when taught with the activity-based teaching method.

The successful teaching and learning of Agricultural science depend on the appropriate teaching methods that will be result-oriented, promote student's involvement, maximize their potential, builds confidence and aid retention of materials learnt. Hence, there is need to find out the best way of presenting agricultural science instruction in schools to improve the performance of students.

1.2 Statement of the Problem

Poor performance of students in both internal and external examinations and the inability of secondary schools graduates of agricultural science to produce students without the needed skills for critical thinking and problem solving, in particular, has been blamed on the way and manner in which the subject is taught in secondary schools in Nigeria. To this backdrop agricultural science graduates who are supposed to be job creators have become job seekers.

Many of the teachers adopt conventional lecture method to overcome the bulky agricultural science syllabus before the Senior School Certificate Examination (SSCE)

stipulated time and this does not give room for the proper understanding of the subject. On the other hand, some student complained that some of their teachers are teaching practice students and National Youth Corps Members and as such do not keep to their teaching period while other students openly reject the subject with the erroneous belief that it is meant for their grandfathers in the countryside, sometimes use to punish errant students and too difficult to assimilate as it required a lot of memorization.

It is as a result of this problem that, the researcher was prompted to investigate the effect which activity-based teaching method can have on the students' performance on their retention of agricultural concept in senior secondary school in Kaduna State, Nigeria.

1.3 Objectives of the Study

The study has the following objectives to:

1. determine the effects of activity teaching method on students' performance in Agricultural science in senior secondary schools in Kaduna State.
2. ascertain the retention ability of students taught Agricultural science using activity-based teaching method and those taught by Conventional teaching method in senior secondary schools in Kaduna State.
3. determine the performance of the students taught Agricultural science concepts using activity discussion teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State.
4. examine the performance of the students taught Agricultural science concepts using activitydemonstrationmethod and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

5. findout the performance of students taught Agricultural science concepts using activity inquiry method and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

1.4 Research questions

This study sought to answer the following questions

1. What is the effect of activitymethod and Conventional teaching method on students' performance in agricultural science in senior secondary schools in Kaduna State?
2. What is the effect of activity method on retention ability level of students in agricultural science in senior secondary schools in Kaduna State?
3. What is the performance of students taught Agricultural science concepts using activity-based discussion teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State?
4. To what extent does activity demonstrationmethod affectthe performance of students taught Agricultural science concepts in senior secondary schools in Kaduna State?
5. What is the performance of students taught Agricultural science concepts using activity inquirymethod and those taught using Conventional teaching method in senior secondary schools in Kaduna State?

1.5 Hypotheses

the following null hypotheses were formulated and tested at 0.05 significant level

1. There is no significant difference in academic performance of students taught Agricultural science using activity method and those taught using conventional teaching method.
2. There is no significant difference in the retention ability of students taught agricultural science using activity method and those taught using conventional teaching method.
3. There is no significant difference in the performance of student taught Agricultural science concepts using discussion teaching method and those taught using conventional teaching method.
4. There is no significant difference in the performance of students taught Agricultural science concepts using demonstration teaching and those taught using conventional teaching method.
5. There is no significant difference in the performance of student taught Agricultural science concepts using inquiryteachingmethod and those taught using conventional teaching method.

1.6 Basic assumptions

The study has the following basic assumptions

1. Those students taught Agricultural science concepts using activity method performed significantly better than those taught usingconventional teaching method.
2. Those students taught Agricultural science concepts through activity method retain concept longer than those taught using conventional teaching method.

3. Those students taught Agricultural science concepts using activitydiscussion teaching method performed significantly better than those taught using convention method.
4. Those students taught Agricultural science concepts performed better when taught using activitydemonstrationmethod than those taught using conventional teaching method.
5. Those students taught Agricultural science conceptsperformed better when taught using activityinquirymethod than those taught using conventional teaching method.

1.7 Significance of the Study

The result of this study is expected to be significantly beneficial to several people. These include the following teachers, curriculum planners and developers, educators, Agricultural science teacher, educational administrators, government, students, society and researchers. It will also increase the teachers' level of awareness and understanding of the use of most of the instructional techniques and effectiveness of each of the two strategies being investigated in the study.

The work will be published in journal paper, conference and executive workshop where researchers will be able to access information for further research. the work will be used to train teachers in workshops on the benefit of activity based teaching method.

Findings from this study will also provide teachers with feedback on the teaching competences in most commonly used teaching methods as a basis for improvement in their instructional practice so that they can enhance students' performance.

Curriculum planners and educators need empirical data on the overall teaching methods and activity-based teaching competence of agricultural science teachers in secondary schools to facilitate proper curricular policies and programmes for effective teaching and

learning. The findings from this study will also help to improve and change students' negative attitude towards agricultural science subject to increase their performance in agricultural science.

The findings from this study will hopefully create the awareness and serve as an eye-opener to educational administrators to the use of learner-centered activity-based teaching methods which incorporate students' interactivity in class this can significantly help improve learner attitudes towards agricultural science classes and learning generally.

The government especially (Ministry of Education) may use the findings of this study to design pre-service and in-service, orientation courses and in-service courses for teachers in agricultural science and other science subjects and in repositioning agricultural sector as a sure way of eradicating extreme poverty and hunger.

The students will be introduced to various skills in agricultural science that will be of benefit and reduce idleness thereby; changing students' negative attitudes towards agricultural science and increasing students' performance. The researcher would be able to get a plethora of information when conducting research and be able to find new areas for further research work. This work will expose some hidden advantages of agricultural science in the field of earth science and applied science.

The society will also benefit from this finding by equipping the students with various skills in agricultural science. This will not only reduce crime but add to the development of society at large. There would be employment opportunities for the youths and this would make them stay away from committing crimes that would disrupt the peace of the community. The study will enlighten policymakers on how to see the possibility of creating employment for youths in areas of Agricultural business. With the current situation of the country, policymakers can utilize the research work to develop

skills in the young ones so that they can be creative in areas of agricultural science (farming). Publishers will have standard and genuine work to publish to add and enrich the knowledge of some people around the country and the worldPublishers will also have information to write on.

Curriculum developers would be able to bring in new ideas into the educational system. Since education is dynamic and curriculum is not static, this work would create good information that would be of help to complement the existing information in the curriculum. Employer of labour will also benefit from this work through creating employment for the youth in areas of agro-allied industries.

1.8 Scope of the Study

The study examined the effect of activity-based teaching method particularly discussion, demonstration and inquiry teaching method and Conventional teaching method of teaching on academic performance and retention of students in agricultural science in Kaduna State. The study is limited to senior secondary schools SSII students from the twelve (12) Educational Zones of Kaduna State offering agricultural science.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This study investigated the effect of the activity-based teachingmethod on students' performance and retention in agricultural science in senior secondary school in Kaduna State. This chapter reviewed related literature under the following subheadings: Introduction, Conceptual framework, Historical background of Agricultural Education in Nigeria, Curriculum of Agricultural Science, Resources for the implementation of Agricultural Science Curriculum, Review of Activity Based method, Review of Activity Based method of Teaching Agricultural Science, Discovery method, Inquiry method, Project method, Demonstration method, Problem-solving method, Discussion method, Field trip method, Laboratory method, Lecture method (conventional teaching method.), Effects of activity-based teaching method on agricultural science, Effect of Activity Based Teaching Methods on performance, Effects of activity-based teaching method on Retention, Theoretical frame-work, Overview of Similar Studies (Empirical Studies), Implication of Reviewed Literature on the present study and Summary of Literature Review.

2.2 Conceptual Frame-Work

2.2.1 Concept of Agricultural Education

Effective teaching of Agricultural Science depends on the availability method employed by the teachers at a different level on a different concept. Ameh and Dantani (2012) said the methodology is very vital in any teaching-learning situation; "the method adopted by the teacher may promote or hinder learning; it sharpens mental activities which are the bases of social power or may discourage initiatives and curiosity thus making self-reliance and survival difficult". In this study, therefore Activity-based

teaching method will be employed in the teaching of Agricultural Science especially to teach these topics like livestock management, Animal nutrition and Range and pasture management. To see its effect on the academic performance of students.

This Activity-based teaching method, if carried out effectively, develop skills like Team-working communication, Design, Leadership, Project management, Research, problem-solving, reflection and life-long, learning in the students. These activities, are based on real-life experiences, can help students to apply the same in their practical life and hence prepare students for future life. In Activity-based teaching method, the teacher is a facilitator, motivator, guide and a coach not a sage on the stage. (Stoblein, 2009). Hull (1999) noted that "The majority of students in Nigerian schools are unable to make corrections between what they are learning and how that knowledge will be used". One of the reasons is that teachers do not contextualize their teaching/learning process. The activity-based teaching method is helpful to contextualize the students' learning.

2.2.2 History of Agricultural Education

Early efforts in agricultural education and vocational technical education deserve mention. In 1887, the education ordinance provided for increased government grants-in-aid for agricultural and industrial technical education activities. Bonny Boys High School, Hope Wedel Training Institute, Calabar, in 1900 and Nasarawa School in 1909 benefited from vocational technical subjects introduced, namely carpentry woodwork, typing, tailoring and painting. After some years, other institutions such as Railway, Ports Authority, NEPA, Mining Companies and Agriculture were in need of skilled men to handle their various operations.

In Nigeria, it is not specifically known what the earliest form of teaching of agriculture was. This is because what is today known as Nigeria is a collection of independent groups who had very little culture among themselves. However, literature

shows that the teaching of agriculture in the country pre-dates the introduction of formal education by European Missionaries. Fafunwa in Abelega, (2009) reported that the teaching of practical agriculture was an important aspect of the African traditional education system before colonial intervention. He explained that agriculture was taught through the attachment of a learner to understudy a master-farmer. Okeke in Mc Grath, (2012) described this teaching approach as functional and practical, leading to social responsibility, skill acquisition, self-reliance, and sound work ethics, spiritual and moral values. Olaitan in Anyanwu, (2008) on his part described this form of teaching as strict training through observation and imitation of a traditionally competent farmer. He noted that in this system serious attention was paid to teaching students all they needed to know about the chosen occupation and instilling in them the spirit of discipline and perseverance. For this reason, Fafunwa in Abbey, (2011) worried about the short existence of this approach even though he admitted that teaching was not done in an organized manner as obtainable in formal schooling

The nature and scope of the teaching of agriculture in Nigeria took a different turn with the introduction of Western education in the country in 1842. From this period the teaching of agriculture classroom and in the field, when Nigeria got her independence in 1960, it was realized that the existing agricultural education system did not augur well for her agricultural and economic development. Specifically, it was observed that instead of producing highly motivated and highly skilled farmers, the system produced graduates who loved white collar jobs and lacked essential farming skills.

2.2.3 Curriculum of Agricultural Science.

Between 2005 and 2007, the Nigerian Educational. Research and Development Council (NERDC) in response National and global reform in the social-economic sectors coupled with the Millennium Development Goals (MDG) vision Statement and the National Economic Empowerment Development Strategy (NEEDS) developed a 9-year Basic Education Curriculum (BEC) to facilitate the achievement of the combined objectives of these laudable programmes. The curriculum was subsequently approved for use in all Nigerian Primary and Junior Secondary Schools starting from September 2008. This development also necessitated having changes in the senior secondary Education Curriculum (SSEC). A new one was equally developed. These curricular changes brought about consequential changes in Agricultural science as a subject at these levels (Fasisi, 2014).

The 9 years Basic Education Curriculum (BEC) and the new Senior Secondary School Education Curriculum (SSEC) are tailored towards current needs for national development. The new senior secondary education curriculum (SSEC) has a structural link with the contents of the present Junior Secondary School curriculum (JSSC). The main thrust, among others, is to achieve job creation, poverty alleviation, empowerment of the citizens through quality education and value reorientation to impart Agricultural skills on students in senior secondary school (NERDC, 2011).

One of the subjects affected by the restructuring is Agricultural Science. Previously the subject could be offered by any students in senior secondary school (SSS) whether he/she was in the Arts commercial or Science class. With the new curriculum, only science students can offer the subject of greater importance however, is the classification of agriculture under pre-vocational studies (PVS) with Home Economics and Entrepreneurship at the Junior Secondary School level. At the Senior Secondary school

level, 34 new subjects were introduced as Trade/Entrepreneurship subjects. Two of these are from Agricultural science namely: Animal Husbandry and fisheries. Teachers of Agricultural science have the task of handling these new subjects. (Federal Ministry of Education, 2014).

Agricultural Science as a concept is a body and a process of inquiry. It is geared toward problem-solving to enhance the living standard of man. (Pehe, 2013). According to Shenaifi (2013), agricultural science is intellectual activity came on by human that is designed to discover information about the natural world in which we live and to discover how this information can be organized to benefit human race; Curriculum refers to the content and those processes designed to bring about learning educational value. By this definition, the curriculum is considered to include both what is to be thought and by what means it is to be thought (Welton in Yunusa, 2008). The agricultural science; is spiral in nature in which the same concept is developed from SS1 through SS3 in increasing scope and defaults with advancing years. The agricultural science curriculum is also thematic in approach; themes that cut across, all the science are used as major topics of study.

Animal production is one of the seven themes in which agricultural science curriculum is based, the objective of the themes as an influence in the curriculum include showing or exposing the students to occupations and opportunities in the field of agricultural science. The themes cover all the following content areas Agricultural ecology, Agricultural Engineering, Forestry, Ornamental plant, Crop protection, Animal Science and Agricultural economics and extension in the SS2 syllabus. (Mwiria, 2008).
The agricultural curriculum is patterned to embrace learning by doing. This will enable students to produce food and other agricultural products for themselves and other communities within which they found themselves. The curriculum is viewed in the high

of the competencies bestowed on learners Okoro, in Modebelu, (2012). The agricultural curriculum formulators expected graduate of the subject in secondary schools to be able to plan their farms keep relevant record and employed the best agricultural practices in their farms. However, the effective teaching and learning of agriculture in secondary schools need to review and probably, over hail to accommodate emergent issues in modern economics that Nigeria proudly finds itself in over the years (Goliath, 2008).

According to Iwuji (2012), the purpose of teaching is to ensure that the students learn to practice what they are taught. Teachers teach to impart knowledge and skills to students. Knowledge, however, is a complex issue, which can be conveniently broken down into three areas or domain according to bloom taxonomy of education objectives namely.

1) Cognitive domain - These deals with the recall and remembering of information, understanding and reorganization of information, the use and application of learnt information to other situations.
2) The affective domain which deals with the attitudes and teachings, for example, honesty, cooperation, neatness and openness are positive attitudes, which fall in this area of knowledge.
3) Psychomotor domain: this deals with skills of manipulation, the use of hand especially in practical work e.g. the ability to use farm tools well, major volumes, view microorganisms from a microscope and so on. The contribution of agricultural education to the national economy is so enormous and this leads to its integration into the curriculum under the 6,3,3,4 education program of Nigeria.

2.2.4 Resources for the Implementation of Agricultural Science Curriculum

Real-life experiences provide the most direct type of learning, but they are difficult to supply in the traditional classroom. Most experience in the classroom occurs through verbal symbolism – written and spoken words. (Jamie, 2006) These classroom

experiences may be easier for teachers to supply, but they may be more difficult for many students to understand. Verbal symbolism depends on the ability to conceptualize and think in the abstract, while the impact of firsthand experience is immediate and concrete. Various multisensory resource materials – texts pictures, games, and simulation can substitute for firsthand experience and enhances understanding so they are an integral part of the learning activity.

According to Jamie (2006), the type of resource material to be used, a teacher must consider it in light of the purpose of the learning activity. The resource material must be suited to the objective and purpose whether it is subject matter mastery, skills improvement or valuing. Although resources materials can stimulate and maintain student interest, they are not meant merely to entertain the students. Unless students are properly guided, they became distracted by the attention-getting aspects of the resource materials and lose sight of their educational significance.

The more senses that are involved in the learning process, the easier it is for the student to learn. The difference in learning styles must also be taken into account. Some students can learn a body of information by simply reading an assignment or listening to the teacher, others need additional stimuli and experiences involving hearing, seeing and manipulating the subject matter (Danladi, 2009). The experienced teacher will be able to use a variety of resources materials in multimedia approach in any subject to vary the learning experiences. All students have different interest and abilities that determine what they attend to and learn. But what they learn also depends on the ability of the teacher to capture the attention and spark their interest through the use of appropriate resource materials. The need of each learning situation determines the resource materials the teacher uses.

Educational games and simulation are instructional resources - Teacher can use these resources to make their teaching more learners – centred. Games and simulations are not new in education. They were used to teach military personnel strategic planning since the 1600s and become a common method of teaching in business and medical education in the late 1950s.

Games and simulation have several educational benefits. Academic games may help to achieve four purposes (Mezieobi, Fubara and Mezieobi 2008).

a. The practice already – acquired knowledge and skill

b. Identify gaps or weaknesses in knowledge or skills

c. Serve as a summary activity or review and

d. Develop new relationship among concepts or principles Simulations bridge the gap between the classroom and the real world with a complex evolving problem, simulation can uncover student misconceptions and understandings of the content and they can also provide feedback on students problems solving strategies.

Students were more interested in learning and had greater retention when games and simulation were used compared to conventional classroom instruction (Mezieobi, Fubara and Mezieobi 2008).Computer Software Programme is easy to use and available at no cost. Teacher's participating in the e-book agree that incorporating technology into the curriculum is the next logical step in education and workplace properness. The e-book curriculum project has proven to be both an exciting new venue for agriculture students and an ideal professional development activity that has helped teachers become more effective and efficient (Onuoha, 2012).

Agricultural Education Magazine – The focus of the magazine is to be a "hands-on" practical approach Journal, Articles should share specific steps one can take to make teaching and learning in and about agriculture more efficient, enjoyable and effective.

The best articles for the magazine are ones that have a clear point and share practices that can be used in the "real world" or teaching agriculture such as motivating students to learn, developing students for careers, thinking critically, enhancing diversity and so on (Onumelu, 2014).

Power of the Internet- information is everywhere. The internet is a virtual warehouse of information but finding information may seem like looking for a needle in a haystack. The teacher should continue to improve their internet search skills and learn to sift through the information. Teachers can then help their student find meaningful information on the internet. Google and Yahoo – search also both allow searching for images, news, and much more. You can use advanced search features to help locate specific types of images. The images search (Techniques A1 or artificial insemination) had both a drawing and photo or artificial insemination in the top ten images. Be careful when searching for images. There is a possibility of accidentally finding inappropriate images. (Sullivan, 2005). As teachers and students improved high search skills will be able to find better information faster. This will give them the time for those other important activities involved with teaching and learning agricultural education.

Text Book as Resource Materials - Non-teaching learning material has greater potential in promoting students achievement of content than a textbook. Their proper selection and use are essential. Authors and publishers carefully plan textbook and supplementary materials to promote ease of use in demonstrating teacher and student accountability. No doubt, that students achieve higher standardized test score if the proper textbook is selected and used in a class as a teaching-learning tool (Iwegbu, 2014).

Curriculum Resources (Environmental programmes) - Getting agricultural teachers to include environmental education in their curricula is a natural fit because the subject

matter is so closely related. Agricultural education is a great place to start developing environmental literacy because environmental topics already exist within agriculture curricula. Through increasing agriculture teacher overall environmental literacy students involvement in environmental events and activities, and awareness of resources available to agricultural educators can help contribute to creating a more sustainable future (Duru, 2011).

Human Resource (Teachers) - Active learning strategies provide a highly effective environment. When students interest and motivation are peaked, learning will inevitably take place. In smaller classrooms, not all active strategies can be successfully implemented. Teachers should plan lessons according to the number of students, materials needed and allocated time in larger classes, classroom management especially off-task behaviours, can pose concerns. Teachers should plan for increased lesson planning, evaluation and students learning and participation. (Duru, 2011).

Other Agricultural Resource Materials include - Farmland for Arable crop production, the building of Animal houses like that of ruminant and poultry farm, growing of pasture for feeding of Ruminant animals and experimental purposes.Range pole, Gunter's chain, measuring tape, prismatic compass, theodolite, and arrow's or pin, offset stuff and beacon or pillars for surveying and planning of farmstead. Animal by-products such as hide and skin, wool, Horn, milk and egg, meat, blood, dung, bone, feather and animal tail. (Iwena, 2012).

2.3 Concept of Activity Based Method

Activity – Based Method of Teaching, as defined by Jiang (2011) is a teaching method in which students are engaged in the learning processes. In Activity – Based Method of Teaching, in the words of Harfield, Davies, Hede, Panko and Kenley (2007) "students actively participate in the learning experience rather than sit as passive

listeners". Learning activities if based on "real-life experience" help learners to transform knowledge or information into their knowledge which they can apply in different situations. Harfield, Davies, Hede, Panko and Kenley (2004) by quoting Prince (2007) say that Activities – Based Method is different from the Conventional teaching method of teaching on two points. First, the active role of students and second, collaboration among students. Suydam, Marilyn and Higgins in Mohammed, Niaz, Maqsood, Faiza and Sher (2012) defined Activities – Based Method as the learning process in which "students are actively involved in doing or in seeing something done." According to the Activity-Based teaching method "frequently involves the use of manipulative materials". Meaningful learning, according to Mohammed, Niaz, Maqsood, Faiza and Sher (2012). Activities – Based Method helps learners to "construct mental models that allow for 'higher-order' performance such as applied problem solving and transfer of information and skills".

In Activities – Based Method the learner examines learning requirements and thinks how to solve a problem on hand. The students do not learn about the content. Rather they learn about the process to solve the problem. As they go towards the solution of the problem, they also learn about the content. The effective teaching-learning process is not possible without students' motivation. Hake in Mohammed, Niaz, Maqsood, Faiza and Sher (2012) argued that students' motivation by engaging them in interactive-activities is an effective and useful method of teaching complex concepts. He highlights the importance of different activities related to the concepts being presented. Activities – Based Method theory is a cognitive-learning theory which is a "constructivist" learning theory (Hein, Stößlein 2009). According to the constructivist view of learning each person "constructs" their knowledge and learning process based on previous experience. This theory asserts that learning takes place when the psychological environment of an

individual interacts with a particular structure. For construction students, it is imperative to have a variety of activities in an active classroom.

Conventional teaching methods are not suitable for tactile learning because tactile learning needs direct experience and involves manipulation of materials (Kolb, in Mohammed, Niaz, Maqsood, Faiza and Sher, 2012). According to constructivism, teachers cannot transfer their knowledge to the students (Domin, 2007). For meaningful learning to be taking place, learners require to experience an event. Hull (1999) noted rightly that "The majority of students in Nigerian schools are unable to make connections between what they are learning and how that knowledge will be used".

One of the reasons is that one does not contextualize ones teaching/learning process. Activities – Based Method is helpful to contextualize the student's learning. In the active-learning classroom students are active learners not the passive receivers. According to Stoblein (2009), this approach provides a way to integrate learning within students' knowledge, and, by exposing them to a variety of activities, helps them learn how to learn. He described Activities – Based Method as a "successful teaching model" in the field of science. These activities, if carried out effectively, develop skills like Team-working, Communication, Design, Leadership, Project management, Research, Problem-solving, Reflection and Life-long learning in the learners. These activities, are based on real-life experiences, and can help students to apply the same in their practical life and hence prepare them for future life. In activity-based teaching /learning environment, the teacher is a facilitator, motivator, guide and a coach not a sage on the stage (Stößlein2009). There is a famous saying of Confucius about the success of the students' learning that is given below. "Tell me, and I will forget, show me, and I may remember, Involve me, and I will understand."

According to Chickering and Gamson in Mohammed, Niaz, Maqsood, Faiza and Sher, 2012) “students must talk about what they are learning, write about it, relate it to past experiences, and apply it to their daily lives. They must make what they learn part of themselves”. Students’ motivation is high if these activities are personally relevant to the students.

An activity-based teaching method is an integration of discovery, problem-solving, demonstration, laboratory, field trip, project and so on. It is a modified or refinement of the above method (Okediji, 2014) in the activity-based teaching method a problem is posed to the students. He devises a means of solving the problem some of the strategies a student has used to solve the problem may or may not work, it is more of a trial and error method. Weaker students may drop when their first attempts fail to live the high achiever to continue. The activity-based teaching method offers an opportunity to both low and high achiever to carry on with learning tasks. In an activity-based teaching method , the teacher gives clues, suggestions and asks leading questions when enabling the students to find a solution to the problems Bature, in Upelle (2013). The activity-based teaching method as the name suggests is a process whereby learners are actively engaged in the learning process rather than “passively” absorbing lectures. It is based on the core premise that learning should be based on doing hands-on experiment and activities rather than just listening only. The activity-based teaching method involved reading, writing, discussion practical activities, and engagement in solving problems, analysis, synthesis and evaluation. Activity base method is also defined as any strategy that involves students in doing things and thinking about the things they are doing if a child is allowing exploring the learning environment by themselves and provided an optimum learning environment then learning becomes joyful and long-lasting (Wikipedia, 2012).

An activity-based teaching method the teacher only acts as a facilitator and learners are at the centre of the learning process by their high involvement in practical activities and discussion (Wikipedia, 2008). It is the mode of learning guided by the assumption that

i. Significant learning takes place when the subject matter is perceived by the learners as relevant to their purpose.
ii. Much significant learning is acquired by doing
iii. Learning is facilitated by the learners' responsible participation in the learning process
iv. Self-initiated learning involving the whole person – feeling as well as intellect is the most present and lasting type of learning (Okwudishy, 2011).

The activity-based teaching method is based on the premise that students learn best when they are actively involved in the learning process. The activity-based teaching method is derived from two basic assumptions, that learning is by nature and active endeavour aid and that different people learn in different ways according to (Azuka, 2013).

Research shows greater learning when students engage in active learning according to Murable in Okwudishy, (2011) activity-based teaching method offers the following benefits. Reinforces course content, develops team-building skills, enhances learner's self-esteem, promotes participatory learning, allows for creative problem solving and promotes the concept of discovery learning. Other benefits are that it energizes and invigorates the participants, strengthens learners, bond, offers variety that accommodates diverse learning styles, allows for practical application of course content, enhances communication with diverse learning, offers an enjoyable and exciting learning

environment, helps improve learners retention and motivation, provides an avenue for learners recognition and reward and promotes fun.

As against the conventional approach, the author observed active in the teaching and learning processes, the students discover the concept in agricultural science under the guidance of the teacher; retention and recall of concepts are enhanced. Hence students taught using this method hardly forget concepts (Brent, in Iwuji 2012).

An activity-based teaching method according to Wikipedia (2008) is an umbrella term that refers to several models at the instruction that focuses the responsibility of learning on the learners. According to Stoblein (2009), learning is not a spectator sport as students do not learn much just listening to the teacher, memorizing prepackaged assignments; and spitting out answers. They must talk about what they are learning, write reflectively about it, relate it to past experiences and apply it to their daily lives. They must make what they learn as part of themselves. It has been suggested that students who actively engage with materials are more likely to recall information.

According to Emaiku (2012), contemporary research on effective teaching focuses on instruction that promotes students involvement and activity. The new instructional pedagogy requires teachers to move away from lecturing and move towards activity-based learning. Most teachers in the school system often teach agricultural science by the "telling method". This involves making lesson notes, passing on the information to the students and then evaluating the students. The teacher becomes very active while the students are very "passive". This does not lead to lasting learning on the part of the students. Students do not easily understand and comprehend the lesson taught. These make students forget the lesson taught and therefore perform poorly in their examination. The activity-based teaching method implies the strategies where the students touch, feel, participate, discover, reason, deduce and interpret facts and ideas in

the learning process. This could be achieved using the following strategies (method) in agricultural classroom.

2.3.1 Strategies Activity-based teaching method s of Teaching Agricultural Science

Methods are ways used in teaching concepts/materials to students. The choice of method to be used depends on what is to be taught (content-skills, attitudes and values) who is to be taught and the expected level of competence. Effective teaching and learning of Agricultural science concepts require an understanding and effective application of different instructional strategies and methods. This is necessary for the achievement of the desired learning outcome. (Fasasi, 2013). In this research work, the Activity-based teaching method of teaching Agricultural Science concepts is examined. It is said to be learner-friendly. Learners are at the centre of the learning process by their high involvement in practical activities and discussion. The activity-based teaching method is an integration of discovery method, inquiry method, field trip method, project method, problem-solving method, discussion method, experimental method, demonstration method, concept mapping method, ethno science instructional method, computer-assisted instruction and so on. (Okediji, 2014).

Discovery Method (Strategy)

Thus is an instructional method which allows the students the independence to use his mental processes to contribute to knowledge understand hitherto difficult concepts generalizations principles or provide answers to problems suited to the attainment of instructional objectives with minimal guidance from the teacher. This method involves students selecting problems related to the instructional objectives, the students asking questions collecting, analyzing and interpreting the data with that would

help them solve the problem or achieve the instructional objective as well as apply their findings or generalizations to novel situations (Mezieob, Fubara and Mezieobe, 2008)

Meizieobi,Fubara and Mezieobi (2008) outline some merit and demerits of discovery method. These include

Merits of discovery method

1. It provide the learners with opportunity to find out things for themselves
2. It is an accord with the adventurous nature of children and so provides them and adult with sample opportunity to explore things on their own.
3. It inculcates in the learners the scientific process of investigating phenomena in their environments.
4. It encourages active participation of the learner in the teaching-learning process and enables the learners to acquire the skills of learning, remembering and retention as against rote memorization and forgetting.

Demerit of discovery method

1. It is time consuming
2. It cannot be used for a large class, in terms of number of students. This is because effective teacher supervision will be difficult to achieve.
3. It place considerable amount of burden on the students since it is learner-centered.

As the name suggests, discovery approach is a method where the learner is guided by the teacher to discover facts and concept in agricultural science through observations and organized activities. Bature, in Upelle (2013). In this approach, the teacher provides the necessary teaching materials and guides the students to carry out some activity which would lead the students to arrive at a new knowledge. Such discovery activities could be done individually or in groups of few students (Brock andLopus, in Mohammed, Niaz, Maqsood, Faiza and Sher, 2012). This approach enables students to actively participate

in the learning process and discover things for themselves. For example, to teach the students soil the teacher should allow the students to find out the types of soil in their locality and the type of crops that thrive well in their locality. According to Brunner in Iwuji (2012), the approach enables students to get firsthand experience in getting fact, concepts and principles and processes by using mental processes and manipulating scientific equipment and materials. Brunner in Iwuji (2012) believed that a child who is exposed to the heuristics of discoveries get 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 students investigative process
iv. Discovery learning aids memory of the child

There are two types of discovery methods of teaching namely guided and unguided discovery methods. However, both approaches involve students in finding things for themselves. Finally, discovery method is one of the best methods of teaching that involves mental skills for learning by students through observing, measuring and by doing (Abubakar in Upelle 2013)

Inquiry Method (Approach)

This method which enables the students to think, makes them know the why and how of things and think out an alternative solution to problems which may arise from their findings. The use of the inquiry method in the classroom allows students to deepen their understanding of ideas, issues and wants having examined and interpreted the information in a formal way (Longvwam, Pwaspo and Makanjuola, 2014)

In the inquiry method, the teacher involves the students in activities of collecting, assembling and investigating of information. The information gathered is essentially

used in answering questions discussing issues that have been identified in the class. The use of inquiry demand that students should work beyond the classroom for opinion fact and data. This may help them towards constructing a better picture and understanding of the problem being investigated, (Okam in longvwam, Pwaspo and Makanjuala, 2014)

The merit of the inquiry method

1. It inculcates in the learners reflective thinking through exposure to inquiry-oriented processes and skills as well as issues and problem requiring a solution.
2. It enables learners to solve a personal societal problem, thereby, making living and surviving successfully in a complex society.
3. It arouses the curiosity of the learners, stimulates their interest and makes them actively involved in the teaching-learning process.
4. It fosters self-reliance which is consistent with one of the laudable Nigerian National objectives of building a self-reliant Nation.

Demerit of inquiry method

1. The planning of a good lesson is not easy
2. It is time-consuming and as a result, the content is rarely in-depth
3. The construction of test questions relative to the inquiry method is difficult (Fasasi, 2012)

Inquiry method is an activity-orienteded, thought-provokingng creative method in which students out of curiosity and on their own, or under the guidance of the teacher, probe investigative, interpret relevant issues and problems to provide solution through reflective thinking and rational decision – making which this method develops in the inquirer (Peter and Ubah, 2014).

According to Akinola (2014) inquiry is also called by different names like problem-solving, critical thinking, reflective thinking, reflective inquiry and inductive

thinking. It is, however, defined as a technique in which the students find answers to questions, problems or riddles during the learning processes. It involves probing, finding out, investigating, analyzing, synthesizing, discovering, evaluating, questioning and thinking. This can be done by teachers and students by locating and gathering information from many sources like reading materials audio materials, specimen and communist resource.

Oloyede (2007) maintained that the inquiry method is more suitable for "intuitive and creative children who are full of enthusiasm". Mohammed (2007) believed that a child who is exposed to inquiry gets three (3) benefits these are:

i. Make students independently or in groups to find solutions to the problem.

ii. Inculcates reflective thinking in the students and critical thinkers.

iii. Inculcates spirit of creativity in the students.

Project Method (Approach)

Is a planned educational activity in which learners investigate a particular material, concept or phenomenon on their own. A project method may involve a single learner or group of learners. Project can be carried out within and outside the school and often have time specification. At the secondary school level, teachers may assign topic for project to students or groups of students. They may also be asked to choose from a list of topics. (Fasasi, 2014).

This method nurture cordially among learners and encourages originality and creativity. Groups for this method must be representative of the whole class in tiers performance such as excellent performance,average performance and below average perform. The project must be meaningful. This involves three major stages, namely, planning implementation and evaluation. The teacher provides necessary guidance in term of procedure.

Concepts that can be taught and learnt using project method in agricultural science include

1. Experiments involving the determination of component of soil.

2. 3-4-5 method in farm surveying

3. Preparation of farm profit and loss account

4. Animal Husbandry (Fasasi, 2012)

Merit of project method

1. It narrows the gap created between students due to individual differences

2. Learners are allowed to express their skills independently or within the group.

3. It helps in developing leadership qualities in learners

4. It motivates and helps to improve students interest in the concept

5. It also improves student investigational skills

Demerit of projects method

1. It is time consuming

2. It may not be helpful for lazy students who may shy away from participating actively in the exercise

3. Individual assessment of members of the group may be difficult.

4. It could be expensive (Fasasi, 2012)

Project method is used by teachers to individualize instructions Usually it is given to individual or small groups. Here, students are required to look for topic of special interest to them and investigate solutions using projects (Iwuji, 2012) project is one of the activity – based on science teaching strategies which local resources can be effectively utilized in teaching process. According to Givain Kabugi (2013). Project is derived from the educational idea of one of the great educators John Dewey, an American. Dawey argued that education should not prepare a child for future that is

unknown, but rather that it should fit him rightly into the 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 neighborhood. Later, the followers of Dawey further developed this idea into what is called in schools “The project method”. Put it in another form a school project is the cooperative study of real life situation over situation by either a class or the whole school, usually under the expert guidance of a teacher sometimes students obtain topic for the project work from the sources available. The teachers are expected to guide them where necessary. The project method could take a week, month, or even some years, (Orodho, 2012).

According to Yusuf (2012), project method of teaching referred to a task or large scale exercise given to the students which they may work over an extended period of time. There are two main functions that project may perform. They are

i. Helping the students to learn through problem solving
ii. Providing the teacher a base for assessing students’ learning originality and creativity.

Demonstration Method (Approach)

It is a teaching method in which teachers interact with instructional materials while the students watch. Apart from the teacher, students can also make displays in the presence of their colleagues. It is a good way of showing technical handling of agricultural tools,machines and equipment (Fasasi, 2013).

Another example is the displaying of diseases from crop and infected ones for comparison. It can be carried out by a single teacher alone or by a student or group of students. It is especially useful when specimens or materials cannot go round the students individually. Demonstration can be useful in teaching and appraising many skills and examining attitudes and values. Videotapes and pictures can show plant

infestation, deformities, and symptoms of diseases in livestock that cannot be described verbally. (Fasasi, 2013).

The shift in classroom dynamic catches the attention of learners. The use of various senses increases what is remembered by learners. Most of the activitiescarried out in our schools by teachers are through demonstration lessons. It can equally be used to show experiments requiring precision. Beyond this, it is a major method in agriculturalextension in term of result demonstration.

Merit of demonstration method

1. It helps in time management since time spent on trial and error is reduced.
2. It minimizes destruction of materials or equipment through improper handling of accidents.
3. It is useful in pointing out and correcting mistakes made in previous exercises carried out by the learners themselves.
4. It often attracts the rapt attention of students
5. It is cost effective especially if the equipment isnot expensive.

Demerit of demonstration method

1. Despite the display, students may still not be able to carry out the experiments on their own.
2. It is often ineffective in large classes because of poor visibility from a distance and distraction.
3. Achievement of psychomotor objectives through observation from a distance is often difficult if not impossible.
4. It limits the number of leaners who can really benefit from the exercise. (Hayne, 2007)

Demonstration method can be said to be the illustration or display or directions on the operations of something or procedure involved in a process action, activities or the act of teaching. It is a teaching method that is utilized by both teachers and students in agricultural science classroom (Ngesa, 2006). It is used by agricultural science teachers who want to show the students how a particular farming practice is carried out or done. Yusuf (2012) said demonstration is a skill that can be learnt and taught, it involves showing by offering example of how something works or the steps involved in a process. Yusuf (2012) said it is often used in sciences, technical and vocational subjects.

According to Abdullahi in Stanley (2007) demonstration involves showing a particular procedures or skills to the students who 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 can go round for each individual in the class. The teacher or some groups of students usually carry it out. The approach is used to motivate the students, teach certain techniques or skills, theory, practice and so on., introduce a lesson, and enhance improvisation of instructional materials.

Problem – Solving Method (Approach)

Ita teaching method where the central and essential characteristic is solving problem. It is student-centered. It starts with identification of a problem by the students or the teacher or from a true-to-life experience. The students then have the task of finding facts that will assist in solving the problem. The teacher offers minimum guidance. It is often taught as the best method of teaching agriculture. The learner passes through the stages below in arriving at a solution.

1. Identification of the problem requiring solutions

2. Definition and delimitation of the problem
3. Collection of necessary data required to the problem
4. Formulation of hypothesis for solution
5. Testing of the hypothesis
6. Checking whether the result leads to the solution otherwise the procedure is revised and the process repeated until the problem is solved or he gives up.

The teacher offers minimum guidance at every stage of the process (Fasasi, 2014)

Merit of problem-solving method

1. It assists students to be logical, creative and analytical in their thought and decisions
2. It provides opportunities to handle individual differences among learners
3. Learning is enhanced when learners are able to link their class work to true-to life situation
4. It arouses and develops the interest of the learners in their problem listed for solution
5. Abstract concepts which may be beyond common sense reasoning could be tackled effectively

Demerit of problem solving method

1. It is time consuming
2. It couldbe boring is used often
3. It may not appeal to all students because the problem may not be of interest to some of them. (Mezieobe, Fubara and Mezieobe, 2008**)**

Ossai (2012) 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. Obudo in Upelle (2013) expressed the opinion that the techniques allow students to learn from their successes and failures and culminates into real comprehension of fact since it permits students to participate during teaching and learning process.

In problem solving approach, students are encouraged to figure out the process for meeting their learning goals. Using this technique, students are no longer told what to do or how to study. On the contrary, they are encouraged to decide for themselves hence, they are challenged to think. However, this does not minimize the role of the teacher, as a facilitator, he must value those learners' thoughts and prompt them to inquire with questions such as why? And what does this mean? (Okam, 2012). On the role of a teacher in problem solving, (Okam, 2012) enumerates the following

1. Moderate motivation of the student
2. Encourage divergent thinking
3. The teacher should present concept as a whole
4. The teacher should regulate the difficulty level of the problem
5. The teacher should involve the students' activity in the process of solving problem.
6. The teacher should inculcate in his student the practice of solving problems.
7. The teacher should not provide complete answer to the problem

According to Inekwe and Hassan in Upelle (2013), to teach problem solving skill successfully, 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.

Discussion teaching method (Approach)

This is a participatory method in which learners express their opinion about an issue. It is a process of learning in which an issue or topic is reviewed by learners from different perspectives and solution are arrived at through participants analysis and synthesis. The teacher even though involved, must not dominate the discussion.

Discussion may be promoted in various ways with the,teacher as discussion leader. The most frequently used model is for a teacher to act as the leader of the discussion. He may vary this method by asking two or more students to lead the discussion of the problem or topic. A problem or topic for the lesson is presented for discussion and the teacher helps to direct the learners' views towards the lesson objectives. It encourages student's active involvement in learning while the teacher acts as a moderator in the learning process (Mezieobi, Furara and Mezieobi, 2008)

Merit of discussion method

1. It encourages active participation of learners in the classroom which aids learning.
2. It helps in achieving attitudinal change among learners.
3. It aids in problem solving
4. It encourages constructive thinking by learners
5. It encourages cordiality among students and between them and their teachers

Demerit of discussion method

1. It requires a lot of time
2. If it is not well directed, the original focus of the discussion may be lost
3. Meaning, contributions are achieved when participants are knowledgeable enough about the topic under discussion
4. It is only useful among mature students

Discussion teaching method is an essentially activity – based approach which actually involves students talking over subjects from various point of view, with the teacher playing the role of a guide in the learning situation, properly directing questions to elicit appropriate response and information. The teacher does not dispense knowledge or communicate information but plays the role of a moderator inthe learning process (Maduabum in David, 2007). This method is predicated on the fact that some knowledge has already been acquired by assimilation, discovery, demonstration, and problem solving. The student now brings to bear on his findings his own assessment. Here the learner discusses ideas, considers other people ideas and applies appreciation that enable him evaluate and relates to his own experience and make judgments, formulating his own ideas and adding something new to his own (Korau& Hassan, 2010).

Discussion teaching method is learner centered based on the philosophy that knowledge arises within the person and not from external sources. While teacher moderates the discussion. Advantages of discussion teaching method are as follows

i. It stimulates exchange of ideas and encourages unity of purpose among pupils.
ii. It develops leadership and fellowship skills as group member learn to control the discussion and listen to the opinion of others
iii. It stimulates ethical thinking
iv. It encourages every member of the class to participate

Field Trip Method (Approach)

This is a method that exposes learners to direct or real-life experience. It is a most appropriate method for use in agricultural science. It allows learners to discover knowledge in a real-life situation. Learners are taken to natural life settings on the field or for excursion in agro-allied industries such as commercial fish ponds, cocoa drinks industries etc or agricultural research industries such as forestry research institute of

Nigeria (FRIN) in Ibadan. National Institutes for oil Palm Research (NIFOR) in Benin and so on. Trip can also be made to forest reserves, dams, lakes, sea and natural sites of educational importance. The setting makes learning more interesting. It allows learners to make useful observations and collect information, which cannot be obtained within the classroom. Experiences acquired during field trip endure and are not easily forgotten. (Fasasi, 2012)

Merit of field trip method

1. It provides first-hand learning experience for students
2. It helps to arouse the interest of students in the concepts being taught
3. It exposes students to various learning experiences on a single trip
4. It practically reinforces what has been taught in the classroom
5. It promotes interaction among the students
6. It aids retention of information since such experiences are easily recalled.

Demerit of field trip method

1. It is time consuming and encroaches into other lesson periods which may bring conflicts among teachers
2. It is expensive especially in terms of transportation and other expenses
3. It could be risky especially if it involves travelling. Instances of accidents have been recorded
4. It could be a waste of time and resources if not well planned.

Field trip method is an important component of teaching especially science. It is trip or excursion taken outside the classroom for observation and obtaining of specific information. If well planned, it affords the students opportunity to become activity engaged in observing, classifying, studying and manipulating objects (Abdullahiin Stanley, 2008).

According to Yusuf (2012) field trip is a very valuable method of teaching as it provides the most realistic means for the study of real things and real process. She pointed out that the usefulness of field trip lies in the basic fact that they provide the most realistic means for the study of real things and real processes and meeting real people or experts in their actual environment. They enable students to gain first-hand information, provide opportunities for them to see and if possible touch and feel what they have heard. It affords the students the opportunity of employing various senses in the process of learning. This makes topic or concepts and principle taught more vivid and retention better.

Laboratory/Experimental Method Approach

Laboratory/experimental method refers to the performance of practical activities experimental procedure and demonstration within the confine of a place called laboratory. It involves activity based hand-on classroom interaction with materials within the four walls of the room and in which close to true0to-type interaction take place (Ige, and Fasisi, 2009). According to them such activities include:

i. Soil experiments for example sedimentation experiment, Riddle's experiment, soil capillary determination of water Retention (Holding) capacity (WRC). Rock identification and reaction to acid and so on.

ii. Formation of rations for livestock involving the grinding and mixture of feed stuffs such as fish meal, bone meal, maize, groundnut cake (GNC) oystershell, wheat offal, vitamins and so on

iii. Identification of simple farm tools and equipment such as secateurs, shears, hand trowels, dibbers, garden fork, candlers, theodolite, range poles.

iv. Crop species identification and symptoms from crop specimen

Merit of Laboratory/experimental method

1. Interaction with real objects motivates learners
2. The environment for the practical is conducive and can be controlled for instance the laboratory may have air condition or ceiling fan
3. Learners have the opportunity to closer interactions with materials
4. It is easier to detect lazy students
5. It gives the teacher enough opportunity to assess effective and psychomotor learning outcomes of students

Demerit of Laboratory/experimental method

1. Materials are easily damaged
2. Limited skills acquisition is achieved
3. It is less effective for large classes.

Laboratory/experimental method is a teaching method that engages students in direct experience and focuses reflection in order to increase knowledge, develop skills, and clarify values. In laboratory method learners cooperate and learn from one another in a more semi-structured approach. Instruction is designed to engage students in direct experiences which are tied to real world problems and situations in which the instructor facilitates rather than directs students'progress. It involves a number of steps that offer students a hands-on collaborative and reflective learning experience which helps them to fully learn new skills and knowledge (Haynes, 2007)

Merit of laboratory method

1. It minimizes destruction of materials or equipment through improper handling or accident
2. It is cost effective especially if the equipments are expensive.

3. It is useful in pointing out and correcting mistakes made in previous exercises carried out by the students themselves.
4. It helps in time management since time spent on trial and error is reduced.

Demerit of laboratory method

1. Achievement of psychomotor objectives through observation from a distance is often difficult if not impossible
2. It is often ineffective in large class because of poor visibility from distance and distractions
3. Despite the display, students may still not be able to carry out experiment on their own

Yusuf (2012) said laboratory method is an activity carried out by particular students or group of students as to make personal observation of processes, products or events. This method is mostly used in the teaching and learning of science subjects. Abdullahiin Stanley (2007) stressed out that laboratory method is an activity performed by individual or group of students for the purpose of making personal observation or processes, products or event. It has been used in teaching science as

i. A means of verifying principle, laws or theories
ii. Practicing one or more cognitive skills such as ability to observe, classify measure, interpret data etc
iii. Determine the relationship between causes and effects.

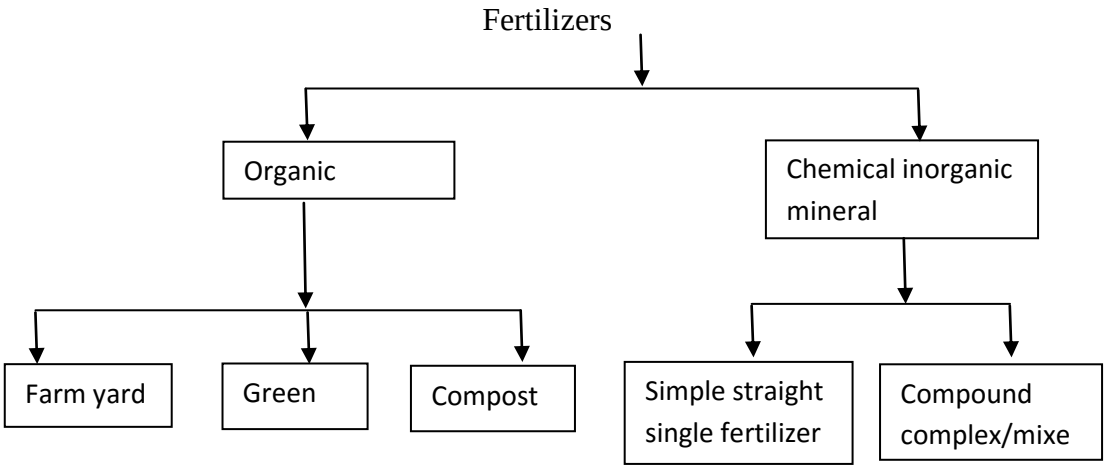
Concept mapping method

Concept mapping also known as cognitive mapping, is an instructional mode that was developed by Novik in 1972. The definition of concept mapping by Nwanyanw in Mezieobi, Fubara and Mezieobi (2008) According to them, concept mapping is an instructional mode in which the relationship or inter-relationship of a new concept/idea

with existing or already known concept is presented diagrammatically in hierarchical order. It took its relevance from the psychological principle to the effect that meaningful or efficient learning takes place when knowledge is based on already existing or prior one or relates to or can be accommodated by the learners' cognitive structure. Manhood, Biemer and Love in Mezieobi, Fubara and Mezieobi (2008) very simple described the concern of concept mapping when they noted and aptly too, that cognitive or concept mapping demands that students anchor new learning with the old at increasing higher level. Concept mapping is a special form of a web diagram for disentangling a concept and making it clearer to the learner. Concept mapping is the strategy employed to develop a concept map. It consists of cells or nodes containing a concept, item or question to be broken down into more understandable steps or sub-divisions and joined together with links or arrows indicating relationship. Concept mapping was develop by Novak and his associate at Cornell University in 1972 (Fasasi, 2014). According to Nzewi in Fasasi (2014) for the construction of concept maps students should be guided by the following.

1. Note the keywords phrase or ideas from lessons or text
2. Arrange them in a hierarchy
3. Draw circles around the concepts
4. Connect the concept using arrows or lines
5. Provide examples if possible at the end of each branch.
6. Cross-link hierarchies or branches where possible.

For example in teaching the concept of fertilizers, a simple concept map shown below would be used.



The concept map shows that fertilizers can be grouped into namely organic fertilizers called (Manures) and chemical fertilizers called (in organic or mineral fertilizers). Organic fertilizers are also sub-divided into farm yard, manure, Green manure and compost while chemical fertilizers are sub-divided into simple fertilizer also called straight or single fertilizers and compound fertilizer also called complex or mixed fertilizers.

According to Hey Kinchin and Lygo-Baker (2008), concept mapping is a relatively new way to visualize complex subject matter. The technique of concept mapping was first developed in the 1960s and 1970s by American educator and research scientist Joseph D. Novak while at Cornel University in Ithaca New York. During this time Novak developed an effective way to strengthen the process for his students performing research. Novak discovered that representing thoughts visually often helped students to effectively associate ideas without being inconvenienced by writing them down in lengthy formats. The diagram used to visualize these relationships among various concepts is called a concept map. Within concept map, network are drawn that consist of nodes, which represent concepts connecting lines or links represent a

particular relationship between two concepts. Linking words, phrases, and symbols, used to describe relationship between nodes often appear on links. Concept maps are generally, but not always created so they are read from the top downward. Some concept maps are simple designs that examine one central theme and only a few associated topics. Other concept maps contain complex structures that describe multiple themes and relationship (Opoh, Effiom and Edinyang, 2014).

Merit of concept mapping method

1. It helps students to a holistic understanding of concepts
2. It helps to emphasize major aspects of a concept
3. It helps to simplify difficult concepts and reduce student's anxiety
4. It can be used to teach any subject or discipline
5. It aids recall and retention of concept learnt

Demerit of concept mapping method

1. Learners understanding of the concepts may be limited to what is represented in the concept map.
2. It may misled the learners if the constructor does not have a proper understanding of the concept or how to construct a concept map
3. The accuracy of a concept map is affected by many factors such as previous knowledge of the constructor his/her understanding of the concept, amount of information available to him and so on.

Conventional teaching method. Approach

Conventional teaching method of teaching involves transmission of information from the teacher to the learner. The teacher reads out the note for the learner as he explains to them. The method is mainly teacher – centered and the learner's activity is listing and taking note (Kabugi, 2013). According to Orji (2007), lecture method is

regarded as a process whereby the teacher delivers verbally a prepared body of knowledge to his students who listen and jot down points from the teacher. It is basically teacher – centered approach which encourages one way communication, though it can be used to communicate to a large crowd of students orally or through electronic media like radio or television. However the major disadvantage of lecture method is that it makes the student passive participants in the teaching learning process. This eventually leads students to being spoon – fed with information and does not encourage independent and creative thought in the student, and therefore does not accommodate individual differences of student. It also hampers teacher – student relationship.Obeka (2010) said lecture method of teaching emphasizes "Talk and chalk" to the teaching. More than 70% of information and principles are delivered as lecture. 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 one – way flow of information, from the teacher who is always active to the students who are also passive. In its true nature lecture approach is not effective for agricultural science teaching (Abdullahi, in Upelle (2013).

According to Hesson and Shed (2007) Conventional teaching method is a method or approach in which students simply obtain information from the teacher without building their engagement level with the subject being taught? The approach is least practical, more theoretical and memorizing. It does not apply activity – based learning to encourage students to learn real life problem based on applied knowledge. Since teacher controls the transmission and sharing of knowledge, the teacher may attempt to maximize the delivery of information while minimizing time and effort. As a result, both interest and understanding of students may get lost (Ayeini, 2011). To address such short falls, Zakaria, Chin and Daud, (2010) specified that teaching should not merely focus on

dispensing rules, definitions' and procedures for students to memorize, but should also actively engage student as primary participants. Adunola (2011) agreed with them that the method employ in teaching agricultural science will make students develop negative attitude to agricultural science subject rather than foster positive attitude. He lighted the hardships of farm work and policy more than anything else the real attitudes of teachers toward manual labour too.

Apori, Zinah and Annor in Kabugi (2013) looked at factors that influenced the teaching approach such as students characteristics their past and present achievement, feedback from teachers, peers and future of the current classroom learning environment, student participation in the learning create motivational influence along with future expectation and intention, learning style of the students have been found to influence the educational process and student opportunity to learn. Hardre, Sullivan and Crowson, (2009). As a result of the disadvantages of the lecture method, teachers are now being requested to move away from it and embrace the activity – base method of teaching.

2.4 Effect of Activities Based Method on Agricultural Science Concept

Agricultural Science provides a natural link between home and school and the means through which students understand the world around them and explore the wider implication of science in relation to man. The specific objective to be achieved for agricultural science in the curriculum as Stated in the Nigerian Educational Research and Development Council, (NERDC, 2007) includes to provide students with the basic knowledge in agricultural science concepts and principle through efficient selection of content and sequential agricultural science content, show agricultural science and its inter – relationship with other subjects, provide a course which is complete for students not to proceeding to higher education while at the same time provides a reasonable adequate foundation for a post-secondary school Agricultural Science course. Literature

is however replaced with evidence that Nigerian students do not only find agricultural science subjects very difficult but also uninteresting and that the few students that enroll for agricultural science sometimes perform poorly as exemplified in their consistent poor performance in school certificate examination. The factors that hinder agriculture science achievement include student's lack of interest and negative attitude towards agricultural science, teachers related factors like poor teacher preparation, inadequate qualified agricultural science teachers, inadequate materials and poor teaching methods (Usman andMemeh, 2007).

Livestock management, animal nutrition and rangeland and pasture management are among the topic that made up theme five Animal Science of the SSII syllabus of agricultural science curriculum. Agricultural science education with it related branches such as Livestock management, Animal Nutrition, Rangeland and Pasture Management was designed to lay a solid foundation for vocational agriculture that is proposed to teach students to acquire relevant occupation skills, that will make them to be productive farmers,. The teaching of agricultural science education in Nigeria secondary schools was first initiated in 1967. The curriculum in agriculture was jointly developed by the Nigeria Educational Research Development Council (NERDC) and West Africa Examination Council (WAEC) (Koori, 2009). The main objectives of introducing the teaching of Agricultural science include:

1. Encouragement of students in the use of their hands.
2. The appreciation for dignity of labour
3. Familiarity with biological processes and thereby instilling rationality in the students.
4. Increasing self-sufficiency and self-reliance in food production. Students to produce part of their food needs and improve their diet and thus minimize the cost of feeding in their secondary schools.

According to Okorie (2009) these objectives are far fetch, thus is as a result of the Conventional teaching method of teaching employed by most teachers teaching in senior secondary schools in Nigeria. That did not put into consideration the students' activity in teaching and learning process, which has led to high rate of failure in both internal and external examination in public schools;Unemployment has become a hydra-headed problem resulting in increasing real threat to national security inform of terrorism, kidnapping, rape, assort thugery and so on. This approach to teaching and learning must therefore change to face the challenges. The more students are taught using activity-based the more strategy it will help them put into practice what they were taught especially in areas of Animal science (Husbandry) which comprise livestock production, fishery, animal nutrition and rangeland and pasture management, the more jobs they will create leading, and ultimately improved students standard of living (Farauta and Amuchu 2013).

According to Modubelu and Duvie (2012) students taught Agricultural science concepts using activity-based teaching method performance significantly better and retain concepts for a longer time than their counter part taught the same concepts using conventional teaching method.

Hussain, Anwar and Mojoka (2011) reached on the conclusion about the effect of activity based method that Activity-based teaching method is more effective to teach Agricultural science concepts at secondary school level as compared to Conventional teaching method of teaching. However,Lieux (2001) and Zumbach et-al (2004) found no significant difference in knowledge acquisition between students who learned through Activity-based teaching method and those who were taught through conventional teaching method.

In similar research carried out by Dochy et-al (2003) and Martenson et-el (1985) that on long term retention assessments' student taught using Activity-based teaching method performed better than students taught using conventional teaching method. Gallagher and Stephen (1996) found no significant difference on short term retention assessment between activity-based teaching method and conventional teaching method.

2.5 Effect of Activities Based Method on Performance

Performance is the accomplishment of a given task measured against preset known standard of accuracy, completeness, cost and speed. In a contract, performance is deemed to be the fulfillment of an obligation, in a manner that releases the performance from all liabilities under the contract (Anene, Okediji and Igbkwe, 2014) Academic performance is a term used to indicate how well students are doing in their studies and classes, it generally refers to how a student is accomplishing his or her tasks and studies (Anon, 2012).

Receiving feedback about their academic performance can help students identify their strengths and weaknesses in the classroom. In turn, students can improve their overall performance based on a teacher's feedback. Certainly the most well-known indicator of academic performance, are students' grades or scores in their classes and overall tenure. Grades are most often a tallying or average of assignment and test scores and may often be affected by factors such as attendance and instructor opinion of the students. (Anene, Okwudishu and Igbokwe, 2014)

Bandara in Suleiman (2011) activity-based enhances better performances and understanding of concept. Academic performance is defined as a measure of what a person has accomplished after exposure to educational programmed. Research conducted by Akinola (2014) on the effect of inquiry method and the essential benefits of inquiry approach, has shown that students exposed to inquiry instructional method performs

higher than those students whom were taught the same concept using subjects matter approach. A similar study carried out by Jiang (2011) found that students who were taught using activity-based teaching method of teaching performed significantly better on both basic and clinical sciences. According to Akinola (2014) in educational institution, success is measured by academic performance, or how well students deal with their study, how they cope with or accomplish different tasks given to them. As an outcome of education, academic performance refers to the capacity to achieve when one is tested on what one has been taught (Otoo, 2007) which relates to curriculum content, the learners' intellect, and have depends on the learners' competence. Livingstone (2012) also referred to performance as academic achievement or scholastic functioning. Academic performance of students, especially at the secondary school level is not only a pointer to the effectiveness or otherwise of schools but to them by their teacher, and the extent to which a student, teacher, or institution has achieved their educational goals which is the major determinant of the future of youths in particular and nations in general (Osei-mensah 2012).

Performance in school is evaluated in a number of ways, including examinations as a factor of quality education Adams in Yaboah, (2014). Academic performance is measured in terms of examination marks, the grading of which concerns the ability of individuals to use the knowledge and skills acquired. For regular grading, students demonstrate their knowledge by taking written and oral test, performing presentations, turning in homework and participating in class activities and discussions. Performance results are shown in the form of letters or number grads and side notes that describe how well a student has done, which also allows students to be ranked and sorted on a scale that is numerically obvious, and also as a means of holding teacher and school accountable for the components of each and every grade (Poha, 2013).

Students are also evaluated by their performance on standardized tests geared towards specific ages and based on a set of achievement objectives that students in each group are expected to meet. In the past, academic performance was often measured more by year than today and teachers' observations made up the bulk of the assessment, today's summation or numerical method of determining how well a student is performing is a fairly recent invention (Poha, 2013).

Erdogan, Bayram and Deniz (2008) suggested that there is a close relationship between students' attitudes towards academic subject and their overall achievement. Literature review on this area revels that there are two main contributing factors to students' academic performance these are psychological and sociological factors. Psychological factors refer to the internal elements of individual including emotional and cognitive domains, while a sociological factor refers to external factors such as socio – environment and friendship. However, both factors are inter-related and dependable.

Most past students tended to discuss the subject in a specific context. For instance, a study of academic achievement carried out by Ariffin (2007) focused on individual's learning style and how it affects his/her academic achievement in research conducted. Livingstone (2012) on effect of inquiry method and the essential benefits of inquiry approach, shows that students exposed to inquiry instructional method performed/scores higher than those students who were taught the same concept using subject matter approach (Conventional approach). In a similar study carried out by Doucet, Purdy, Hakumah and Langille (1998) and Blake, Hosokawa and Riley (2000) found that students who were taught through activity-based approach performed significantly better on both basic and clinical science. (Mohammed, Niaz, Maqsood, Faiza and Sher, 2012) completely agreed with their findings.

Shymansky, Kyle and Alport in Sulieman (2011) presented a meta-analysis of the effect of these inquiry society curricular on the student performance and found that the curricular enhanced students science achievement and processes inquiry-base instruction in the literature has closely related by associated with other teaching methods.

According to Blair and Simon in Suleiman (2011), anything that aid learning should improve students' performance while things that lead to confusion, or interference among learning materials decrease the speed and efficiency of learning and accelerate forgetting. Interference may exist in several forms such as retroactive inhibition, or emotional inhibition. Retroactive inhibition result, when things are learned, the result of that learning usually occurs after the passage of time.

Adoption of conventional lecture method by most teachers in order to overcome the bulky syllabus before the senior school certificate examination (SSCE) affects student's performance and retention.Researchers believe that in conventional lecture method theory is thought as an absolute knowledge hence pupil centered activity for developing scientific reasoning skills and process are lacking. It is also known to cause lack of interest and poor performance in school as opined by (Njuku, 2007).

Doucet (1998) and Blake (2006) found that students who were taught through activity-based teaching method performed significantly better on both basic and clinical science, Verhoeven (1998) partially while Dochy (2003) completely agreed with their findings. Berkson (1993) and Colliver (2000) could not find any evidence to maintain the superiority of activity-based teaching method over traditional method of teaching. Gallegher and Stepien, (1996) found no significant difference on 'short term retention' assessment between students of Activity-based learning and traditional students. Norman and Sehmidt (1992) in Dochy (2003) and Martension (1985) that no long-term retention assessment between students of Activity-based learning performed better than traditional

students. Hung, Jonassen, and Liu (2008) referred Eisenstaedt (1990) that traditional students refrained more than Activity-based learning students in the real test conducted immediately. However, retention rate of traditional students declined fast as compared to Activity-based learning. In higher order thinking skills Activity-based learning students performed significantly better than traditional students in one of the study conducted by Polanco (2004) to investigate the impact of Activity-based learning on students' academic achievement in mechanic. Selelton and Smith (1998) conducted a research study on biomedical students and found better performance of the biomedical students of Activity-based learning in the achievement test than their counterparts. Gallagher (1992) noted remarkable improvement in the result of Activity-based learning students than their counterparts and viewed that Activity-based learning is one effective method of developing problems solving processes and skills.

Coulson and Osburne (1984), Blumberg and Michael (1992), Norman and Sehmidt (1992), Ryan, Schmidt and Vanfermolen (2007) and Schmidt (2006) reached on the similar conclusion about the impact of Activity-based learning that it enhances better performance of students.

Factors affecting students' performance

Methodology is very vital in any teaching-learning situation. The method adopted by the teacher may promote or hinder learning. It may sharpen mental activities which are the bases of social power or may discourage initiative and curiosity thus making self-reliance and survival difficult (Njoko, 2007). Katsina (2010) reported that Nigerian union of Journalist NUJ raised alarm over the recent poor performance of secondary school students across the country in the West African Examination Council and National Examination Council Examinations. The story is not different in higher institutions.

There has been ongoing debate among educators, academics and policy makers on what should be the determinants of student's performance.Students' poor performance in academic work and their behaviour are manifestations of the problems associated with the staffing of the schools inadequate facilities and funding (Nwagwu, 2012).

Nababa (2010) opined that one of the serious problems associated with Nigeria educational development is poor teaching caused by unqualified persons (quacks) employed to teach in the nations' schools. A teacher according to Agada (2009) is first, one who is embodied with all characteristics of goodness, honesty, commitment and dedication with the purpose of impacting knowledge to pupils. Learning environment institution in Nigeria according to Ibrahim (2009) has overwhelming decay in infrastructure; there is adequate learning facilities that cannot cope with the present number of enrolment in most institutions. In addition, Edwin (2009) noted the deplorable State of education and declared that whole situation is in mess and in shambles. This is because education has become politicized and toyed with.

With political and social instability, economic recession and consequent government inability to adequately fun education the quality of graduates has become questionable and of grave national concern. Nigeria education is currently in crisis. There is less money to spend on teaching research and community services. Schools complain of underfunding while the government accuses schools of inefficient utilization of available resources. (Babalola, 2012).

Other factors that affect students' performance include lack of hard work and discipline on the part of students previous schooling, parents education, family income and self-motivation. For example, the students' aptitude is the most important determinant of his or her learning. In a study of high school students it was found that students' performance was significantly correlated with academic environment and service received (Karemera in Anene, Okwudishu and Igbokwe, 2014).

2.6 Effect of Activity-based teaching method on Retention

The ultimate target of educational endeavors' 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 (Iwuji, 2012) Retention is defined as the ability of one to remember what he has learned in the later time, it takes place when learning is coded into memory. This appropriate coding of incoming learning, or incoming information provides the index that may be consulted, so that retention takes place without elaborate search ability retains and consequently remembers what one has experienced or what we have in memory (Oyedokun, in Suleiman, 2011).

According to Abbass, (2008) anything that aid learning should improve retention while things that decrease the speed and efficiency of learning and accelerates forgetting interference may exist in several forms such as retroactive inhibition, or emotional

inhibition. Retroactive inhibition result when things are learned, the result of that learning usually occurs after a passage time. In the intervening period many other things are learned. These interpolated learning interfere with the memory of the original materials and the interference is known as retroactivity inhibition (Suleiman, 2011).

Bilgin (2006) pointed on the basis research that one of the factors that hinder retention is teaching approach, he said learners taught through lecture method or approach retain 70% of the information from the first ten minutes of the lecture and only 20% of the information from the final ten minutes, and four months after a lecture base course they retain only 8% more than the learners who have never taken the course. Bredder, (1985) conducted a study to examine the effect of laboratory activity on the learning of students in science at elementary level. The results of the study reflected 14% improvement by students in activity based approach compare to lecture method. According to Emaikwu (2012), when students were taught using strategies that enhanced communication with diverse learning offers an enjoyable and exciting learning environment helps improve learners retention and recall of concept are enhanced. Hung, Jonassen and Lin (2008) ascertained that students taught through Conventional teaching method retain more than students taught through activity-based teaching method in his recall test conducted immediately. However, retention rate of lecture method declined fast as compared to activity-based students. In one of the studies conducted by Polancoin Mohammed, Niaz, Maqsood, Faiza and Sher, (2012) students taught through activity-based teaching method retain concept and perform better than students taught through lecture method in external examination.

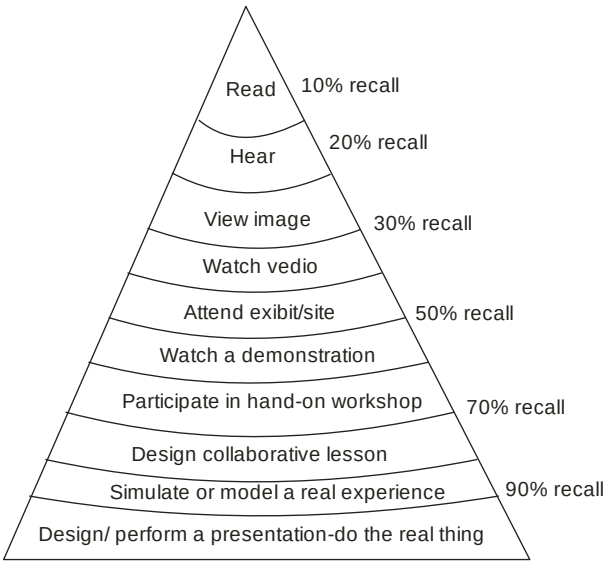
In activity based method learners remembered or recall concept taught better than their counterpart who are taught by teacher-centered methods because it encourages the learners to search for relevant knowledge rather than the lecture method. Activity-based

teaching method monopolizes the transmission of information to the learners. As such research evidence on teaching methods maintains that this teaching method is effective in improving student's academic performance and aid retention (Elvis, 2013).

Activity based method of teaching has been proven to be relatively effective on students' ability to master and then retain important concepts compared to conventional lecture method (Daniel and Bimbola, 2010). There is a famous saying of Confucius about the success of the students' learning that is 'Tell me' and I will forget, show me, and I may remember, involve me, and I will understand'

According to Chiekering and Gamson Muhammed, Niaz, Maqsoon, Faiza and Sher (2012) "students must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily lives. They must make what they learn part of themselves". Students motivation is high, if these activities are personally relevant to the students.

There is research evidence which shows that students will retain limited knowledge if they are involved passively in teaching-learning process Mckeachie 1998 the same is indicated in the Dale's cone of experience developed Dale 1969 shown below



Dale's cone of experience on retention of concept taught.

Source principle of teaching *http//teacherworld.com/potdale.htm/z*

People generally remember 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say and write and 90% of what they do.Learning activities provides opportunities for experience learning which involves links between the thinking and the doing. It is assumed that students who handle the learning activities successfully have learnt the concept to perform that particular activity (Muhammed, Naiz, Maqsoon, Faiza, and Sher, 2012)

2.7 Theoretical Frame Work

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. Brunner (1961) and Piaget (1980) in Iwuji (2012), postulate that students create their own maps and theories of the world. The constructivist's 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 theory, students engage their minds very actively in constructing meaning out of their interaction with the environment. They make their own connections between experiences and the words other people or 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 the make sense of their environment not necessarily to explain it of course, but certainly to use it to their advantage.To this the researcher is of the view that if these traits in students can be properly nurtured and directed towards learning

through activity based method of teaching, learning will be more meaningful and fruitful.

The theory of constructivism views the act of knowledge acquisition as a self-constructive process of cognitive organization on the part of the learners. Piaget viewed learning as an ongoing process of self-regulated behaviours which balance the acts of assimilation and accommodation. Assimilation, Piaget asserted, is the learners' active organization of experience through which ideas and experiences that march learners current understandings are incorporated into an existing cognitive structure. Accommodation on the other hand is a reflective behaviour through which learners change their cognitive structure in the face of experiences which do not mash with their existing understandings.

The relationship between this theory and the present study is that Activity-based learning is a cognitive learning theory which is basically a constructivist learning theory (Stoblen, 2009). According to constructivist view of learning each person constructs their own knowledge and learning processes based on previous experience. This theory asserts that learning takes place when psychological environment of an individual interacts with a particular structure for construction students it is imperative to have variety of activities in an active classroom. Active classrooms are requirements for construction education (Panko, 2005) conventional teaching method are not suitable for tactile learning because tactile learning need direct experience and involve manipulation of materials (Muhammed, Naiz, Maqsood, Faiza and Sher, 2012).

According to constructivism, teachers cannot transfer their knowledge to the student (Domin, 2007) for meaningful learning to take place, learners require to experience an event. Hull in Muhammed, Naile, Maqsood, Faiza and Sher (2012) noted that "the majority of learners in our schools are unable to make connections between

what they are learning and how that knowledge will be used". One of the reasons is that we do not contextualize our teaching learning process. Activity-based teaching method is helpful to contextualize the learners learning.

This theory is relevant to the present study because the theory emphasizes on active involvement of students in activities and for students to be self-reliant and creative. It also allows retention of things learnt in the classroom. The theory is directly in line with the study because students can learn how to do things themselves and think about things how to enhance their learning. Activity based method is one of the method which involves the students in the learning process, placing less emphasis on transmitting knowledge and more on developing students science process skills based on the fact. It is assumed that activity based teaching method will aid better learning, enhance retention level of the students and change the perception of students towards agricultural science.

2.8 Empirical Studies

The studies which were carried out by other researchers and are relevant to this study were also looked into, and these include the following.

David (2007) investigated the effect of activity-based teaching method on academic achievement of slow- learners in chemistry. The study was conducted in public secondary school in SabonGari Local Government Area of Kaduna State, the population of the study comprised all senior secondary school SS I students in 17 schools with a population of 2,646 comprising 1473 male and 1271 female students. The sample for the study was 115, 80 male and 35 female drawn from two schools. The research design is quasi-experimental and control group and experimental group. All the null hypotheses were tested at 0.05% level of significance using t-test statistic.

The finding of the study revealed that slow-learners exposed to activity-based instruction performed significantly better in their academic achievement test given to them that signified that the Null hypotheses one was rejected, while null hypotheses two was retain because the academic achievement test given to both male and female showed less differences in the mean scores.Based on the conclusion, the study recommended that the use of the activity-based teaching approach should be encouraged among chemistry teachers in the classroom and indeed in all science subjects as it affords all category of students' opportunity to make contact with learning materials as they interact with them.

This is relevant to the present study because the aim was focused on students' academic achievement. It complements the present study towards improving students' performance in Nigeria through application of activity-based teaching method for better performance, enhancing understanding and productivity by the students. Although the study is relevant to this present study, the researcher carried out the study in a different subject area and population. The researcher never made enquiry to investigate the ability of slow learners, but to only investigate the effect of activity-based teaching method on students' performance and retention.

In a similar study carried out by Ameh and Dantani (2011) titled "Effects of lecture and demonstration methods on the academic achievement of students in Chemistry in Nasarawa Local Government Area of Kana State". The study was conducted with fifty eight (58) Chemistry students (boys and girls) in the senior secondary schools one (SSI) from two randomly selected schools were involved in the study. Necessary data were collected and the validated reliable data was analyzed using t-test as In a significant level of 0.05.

The results obtained reveled that students perform better in Chemistry when taught using the demonstration method as compared to the lecture method, the boys and girls are better in academic achievement when taught using demonstration method than when lecture method was used. The demonstration method shows equality in the performance of boys and girls. Hence the adoption of demonstration method in the teaching of Chemistry and science in general is hereby recommended.

This is relevant to the present study because the aim was focused on students' education, and it complements the present study towards improving students' academic performance and productivity by learners. Although the study is relevant to this present study, the researcher carried out the study in a different subject area and investigated the effects of Activity-based teaching method particularly discussion, demonstration and inquiry strategies and their retention ability.

In another related study carried out by Hassain, Majoka and Anwer (2011) titled Effect of peer group activity-based learning on students' academic achievement in Physics. The purpose of the study was to examine the effect of peer group activity-based based learning on academic achievement of secondary schools students. In the study, an achievement test pretest/post covering seven chapters was used as measuring instrument depending upon pre test scores, 88 science students of 10th class were divided into two equal group (n=44) named as experimental group and control group. The experimental group was taught with peer group activity-based teaching method and the control group was taught by traditional lecture method. Both groups were taught for a period of 4 weeks (40 minutes period per day). The post test was administered at the end of treatment. The pretest and posttest scores of the experimental and control groups served as data for this study.

The analysis of data revealed that on the whole, experimental group showed a better performance than controlled group. Furthermore the experimental group performed significantly better than the control group in the domain of knowledge, comprehension and application, but no significant difference was found in both comparisons, groups in skills development. Hence, the ultimate results of the study indicated that peer group activity-based learning was more effective for teaching of Physics as compared to traditional lecture method of teaching at secondary schools level.

This is relevant to the present study because the aim was focused on students' academic achievement. It complements the present study towards improving students' performance in the world at large through application of activity-based teaching method for better performance enhancing understanding and productivity by students. Although the study is relevant to this present study, the researchers carried out the study in a different subject area, population and country. The researcher only made enquiry to investigate the effects of activity-based teaching method particularly discussion demonstration and inquiry on students' performance and retention.

In another related study carried out by Rahman, Khalil, Jumam Ajmal, Malik and Sharif (2011) "impact of discussion teaching method on students' performance" at Allama Igbal Open University Islamabad' Pakistan. This study was undertaken to investigate the effectiveness of teaching methods in the subject of Social Studies. Teaching is an art of assisting students to learn. All good teaching is characterized by proper teaching method. The study was experimental in nature and a pretest posttest control group design was used. The sample of the study consisted of 62 students of grade 10th. The students were grouped into control and experimental groups equally. Both groups were pretested. Two teaching methods along (discussion and lecture methods) were used in the study.

The experimental group was taught with discussion teaching method along with lecture while the control group was taught with lecture method only. Four lessons were selected in the subject of Social studiesduration of the lesson was 45 minutes. The experiment was continued for one month. Pretest and posttests were developed for the topic. The results of pretests revealed that there was no significant difference in the mean score of both experimental and control groups, while the result of the posttests revealed that there was significant different in the mean score of bothexperimental and control groups.

The results of the study indicated that mean score of the experimental group was higher than the control group. It was concluded that discussion teaching method was more effective than lecture method. The study recommended that teachers may prefer discussion teaching method in teaching of Social studies.

This study is relevant to the present study because it focused on changing both researchers and students behaviour towards teaching and learning process and enforced participatory approaches in classroom teaching. The study also complements the present study towards improving student's performance in the world through application of activity based teaching approach. The study is relevant to this present study. The researcher carried out the study in a different country and only used students as his sampled and Agricultural science performance Test as instrument for data collection.

In a study carried out by Suleiman (2011) titled "Effects of inquiry Teaching method on Academic achievement, Retention and Attitudes towards Chemistry among Diploma students in Kano State Polytechnic". The study was conducted in KanoState Polytechnic, specifically Diploma II students were the population of the study consisted of all 206 National Diploma II Science Laboratory Technology students of 2008/2009 session of 96 male and 110 female students. Quasi experimental design was used for the

study. The entire four null hypotheses were tested at 0.05% level of significance using t-test statistic to test the null hypotheses.

The findings revealed that there is significant difference in the mean scores of the experimental group and control group in favour of the experimental group, that there is no significant difference in the mean scores of male and female students when exposed to inquiry teaching method in Chemistry, there is significant difference in the mean scores of experimental and control groups in favour of the experimental group. There is a significant change in students' attitude towards Chemistry after exposure to inquiry method of instructions via Chemistry achievement Test (CAT). The first, third and fourth null hypotheses were rejected because the t-values were more than the p-values and the second null hypotheses was retain as the t-value was less than the p-value. The study concluded those students' performance better and score higher in Chemistry Achievement Test (CAT) when taught using Activity-based teaching strategy.

Based on the conclusion, the study recommended that the teaching of Chemistry should be conducted in such a way that students effectively learn and retain the concepts presented to them. The use of inquiry method seems to be appropriate in that respect it should, therefore be incorporated into the main stream of pedagogy in the teaching of Chemistry in polytechnic and colleges of higher education. Equal opportunity should be given to both male and female in the choice of the subjects of study. In-service training programmes for science teachers in form of seminars, workshop and conferences should focus more on how to use inquiry method of instructional strategies in the teaching of chemistry concept.

Similarly the present study was focused on student's performance, it complements the previous studies or efforts made towards improving students' academic performance in Nigeria through finding appropriate teaching strategy that will better or

enhance understanding and productivity by the learners. Although this study is relevant to this present study, the researcher carried out the study in a different subject and the researcher never made enquiry to know the attitudinal disposition of the learners but the researcher was able to only investigate the effects of teaching strategy on students' performance and retention.

Iwuji, (2012) investigated the effects of activity – based teaching strategy on academic achievement and retention in Basic Science concept among Junior Secondary school students in Kaduna State. The study was conducted in public JuniorSecondary School in Giwa educational Zone of Kaduna State. The population of the study comprised of 12 public schools with the total population of 1333, 547 male and 786 female. The sample of the study was 80 students, 37 male and 43 female from two public schools. The experimental group was GSS Kwangila and control group was GSS Basawa. The research design was quasi – experimental design with pretest, posttest, post posttest experimental and control group. All the three null hypotheses were tested at 0.05% level of significance using t-test statistic.

The findings of the study among others revealed a significant difference in the post-test performance score of student taught Basic Science using activity-based approach. That there was significant difference in the post post-test scores of the experimental and the control groups in favour of the experimental group. Thus implies that the experimental group retained the learning concept better than the control groups. There is no significant difference in the post test mean scores of the male and the female students exposed to activity-based teaching approach. This implies that the activity-based approach is gender friendly.The first and the second null hypothesis were rejected because the t-values were more than the P-values and the third null hypothesis was retained as the t-value was less than the P-value. The study concluded that

studentsperform better and score higher in Basic science achievement test when taught using activity-based teaching approach.

Based on the conclusion, the study recommended that the teaching of Basic Science should be conducted in such a way that students effectively learn and retain the concept 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. During the 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 planner should take this into consideration in curriculum planning.

This is relevant to the present study because the aim focused on student's education. The study complements the present study towards improving students' performance in Nigeria through the application of activity-based teaching method for better performance and better understanding and productivity by the learners. Although this study is relevant to this present study, the researcher carried out the study in a different subject area and made enquiry to know the level of male and female retention ability of the students.

In a similar study carried out by Muhammaed, Niaz, Maqsood, Faiza and Sher (2012) titled "Impact of Activity-Based Teaching on students' Academic Achievement in Physics at Secondary School in Pakistan". The aim of the study was to investigate the impact of activity-based teaching on the students' achievement in physics at secondary level. Thirty lessons were selected from 9^{th} class physics for the study. All the science students of secondary schools of Khyber Pakhtunkhwa, studying physics at the 9^{th} grade, constituted the population. A sample of 50 students were randomly selected from GovernmentSecondary schoolBehzadicharkkotkohatpretest-posttest control group design

of experimental research was selected for the research study. Two MCQS type achievement tests were used as research tools for the data collection. Experimental group was taught with the help of activities whereas the control group was taught the same lessons through traditional method of teaching for the period of six (6) weeks t-test was used to analyze the data. The result showed that the activity-based teaching is more effective for the development of higher order skills in the students.

This is relevant to the present study because the aims was focused on students' education, and it complements the present study towards improving students' academic performance in the world through the application of activity-based teaching method for better performance and productivity by learners. Although the study is relevant to this present study, the researcher carried out the study in a different country and subject area but the researcher was able to investigate the effect of activity-based teaching method on students' performance and retention.

In another related study carried out by Salina and Khan (2012) titled transition from lecture based to Activity based teaching through whole school improvement inGilgitbaltistan Pakistan. The study was conducted in two whole school improvement programme (WSIP) project school in Gilgit district from public and private education of Pakistan. A case study approach was used in qualitative paradigm and context, input, process and product model was used in data collection and analysis to evaluate the input given by professional development Teacher (PDTs) and outcomes of the program. Two head teachers, ten teachers, twelve students participated from both sample schools in the study. The focus was on one of the areas from the whole school improvement programme (WSIP) model. "Quality of teaching and learning" The study revealed that many positive changes have occurred in the domain of teaching/learning as a result of whole school improvement programme. These include teachers planning lesson with

clear objectives and activities, and they were reflecting on their executed lessons to find strengths, weakness and alternativeness to overcome them. They were applying activity based teaching in a conductive learning environment by involving students in teaching and learning. They were also enriching the curriculum by using low-cost, no-cost and existing resources in their schools to develop students' relational understanding and for student central teaching. Head teacher of schools were supportive in using activity based teaching. As a result of thesepractices teachers and students changed their behaviour towards teaching and learning process and enforced participatory approaches in classroom teaching. The study also revealed that there were factors which supported or hindered the transition from lecture to activity based teaching and both sample schools. Besides these factors changes were noted in the practices of head teachers, teachers and students in teaching and learning practices in favour of activity based teaching.

This study is relevant to the present study because it focused on changing both researchers and students behaviour towards teaching and learning process and enforced participatory approaches in classroom teaching. The study also complements the present study towards improving students' performance in the world through application of activity based teaching approach. The study is relevant to this present study. The researchers carried out the study in a different country and only used students as his sampled and Agricultural Science performance Test as instrument for data collection.

In a similar study carried out by Azuka (2013) titled "Activity-based learning strategies in Mathematics". The study seeks to investigate the difficulties which students experience when learning mathematics. The teaching and learning of mathematics in Nigerian schools have been in a dismal State as both the students and teachers experience difficulties in the processes. The result of this is poor performance in students

in school and public examinations. One major factor affecting students' performances in mathematics is the pedagogy of the teachers. Most teachers in Nigerian school system have been using traditional or Conventional teaching method of teaching. These methods have been revealed by researchers as being in effective. Hence, there is now a need for a paradigm shift from the traditional method of teaching to effective learning method including activity-based learning. But many teachers have the problem on how to identify and use the effective strategies for activity-based learning in the classroom.

This paper is focused on the strategies of achieving activity-based learning in the mathematics classroom. The strategies include discovery approach of teaching, appropriate practical work, use of teaching aids, cooperative learning or small group learning, and discussion in class.

The paper concludes that teachers of mathematics should move away from traditional method to activity-based learning strategies. This is relevant to the present study because it focused on students' education; the study complements the present study towards improving students' academic performance in the world through finding appropriate teaching method that will enhance better understanding and productivity by the learners. Although this study was conductedin a different subject and used discussion, demonstration and inquiry strategies of activity based method of teaching Agricultural science.

In a study carried out by Azuka, Durojaiye, Okwuoza and Jakayinfa (2013) "Title Attitude of Primary School Mathematics Teachers towards the use of Activity Based Learning methods in Teaching Mathematics in Nigerian Schools. Two hundred and twenty four (224) primary school teachers made up of Sixty (60) male and one hundred and sixty four (164) females were sampled using purposive sampling from Abia State of Nigeria. Four research questions and three hypotheses guided the study. Sample

frequency counts, percentages, t-test and analysis of variance were used to analyze the data. The result of the study showed that primary school mathematics teachers are positively disposed to the use of activity based learning methods in the sense that they understand and prefer to use it in schools. The study also showed that teachers agreed that Activity based learning is very significant to the students learning experiences. The study further identified lack of materials and time as the major impediment to activity Based learning in Nigeria schools. The study further showed that gender and years of experience of the teachers do not affect the attitude of primary school mathematics teacher towards the use of activity based learning in schools. However, the study showed that there is a significant difference in the primary school mathematics teachers' attitude towards the use of Activity Based learning between the University degree graduate and College of Education graduate teachers.

This study is relevant to present study because it focused on improving student performance for the country through the application of activity-based teaching method of approach for enhancing better performance understanding and productivity by the learners. Although this study is relevant to this present study, the researchers carried out the study in a different subject area and Senior Secondary school students were his population. The researcher never made enquiry to know the attitudinal disposition of teachers towards the use of Activity based learning methods. But was able to investigate the effects at activity based teaching methods on student's performance and retention.

In another related study carried out by Elvis (2013) titled "Teaching methods and students' academic performance in South Africa" The objective of the study was to investigate the differential effectiveness of teaching methods on students' academic performance. A sample of 109 undergraduate students from the colleges' Department of Economic and Business Science was used for the study. Using the inferential statistic

course students' assessment test scores were derived from the internal class test prepared by the lecturer. The differential effectiveness of the three teaching method on students' academic performance was analyzed using the General Linear Model based univariate (ANOVA) technique. The F(2, 106) statistics (=10.125;$p<0.05$) and the turkey HSD hoc result indicate significant differences on the effectiveness of the three teaching methods. The mean results demonstrate that teacher-student interactive method was the most effective teaching method followed by student-centered method while the teacher-centered approach was the least effective teaching method. It was recommended that teachers should increase their knowledge of various instructional strategies in order to keep students engaged and motivated throughout the learning process.

This is relevant to the present study because it focused on students' education. The study complements the present study towards improving students' academic performance in the world through finding appropriate teaching method that will enhance better understanding and productivity by the learners. Although this study is relevant to the present study, the researcher carried out the study in a different country and uses post primary students for the population of study.

Mishra and Yadav (2013) investigate the "effect of Activity-based approach on achievement in science of students at elementary stage" the study was carried out with the following objectives to find out the effect of effect of Activity-based approach on achievement in science of class VII students, the research design was experimental type of study while the tool for measurement was teacher male achievement test assigned to measure student performance in science.

The findings showed that the experimental group perform better in science test than the control group when exposed to treatment and the performance of the

experimental group are better regarding as the knowledge, understanding and application based items. It was also concluded that Activity-based approach enhances achievement in sciences of class VII students. It was recommended that teachers must be equipped with knowledge and skill of implementing Activity-based approach in school through pre-service and in-service programme.

This study is relevant to the present study because it focused on student's education. The study complements the present study towards improving students academic performance in the world through finding appropriate teaching method that will enhance better understanding and productivity by the learners. Although this study is relevant to the present study the researcher carried out the study in a different country and uses past primary students for the population of the study and Agricultural science performance Test as instrument for data collection.

Upelle (2013) also investigated the effects of activity-based teaching method on JuniorSecondary school II student's attitude and performance in Geometry in Markudi metropolis of Benue State. The study was conducted in public JuniorSecondary school in Markurdi metropolis of Benue State. The research design was quasi experimental design with pre-test post-test experimental and control group was used to test for null hypotheses one and two while attitude scale questionnaire was used to measure the attitudinal change of students. The population for the study was all JSS II students in Makurdi metropolis schools which comprises of 18 secondary schools with a population of 3,412 students of JSS II. Six schools were randomly selected from the 18 schools the study sample made up of 396 male and 327 female. All the null hypothesis were tested at 0.05% level of significance using t-test statistic to compare the performance of student taught using traditional lecture method and activity based method.

From the findings all the three null hypotheses Stated were rejected because all the t-calculated was higher than the t-critical at 0.05% level of significance when the students were exposed to activity-based and traditional method of approach in their geometry achievement test (GAT).

Based on the conclusion, the study recommended that teachers of Mathematics should ensure that activity-based teaching method of teaching made use of in geometry and all other aspects of mathematics for better productivity and improvement in students' achievement. Teaching style by mathematics teacher should be based on guiding directing and facilitating while students should do the real work by themselves. This would enable them to discover new ideas and skills of solving mathematics (geometry) problems.

This study is relevant to the present study because it focused on students' education. The study complements the present study towards improving students' performance in the country through the application of activity-based teaching method for enhancing better performance, understanding and productivity by the learners. Although this study is relevant to this present study, the researcher carried out the study in a different subject area and the researcher never made enquiry to know the attitudinal disposition of students towards the subject. But the researcher was able to investigate the effects of activity-based teaching method on students' performance and retention.

In another study carried out by Borode, (2014) titled "Effect of lecture and activity based method on the attitude of JuniorSecondary school students to essay writing in French". This study sets out to examine the effect of lecture and activity-based teaching method s on the attitude of junior secondary school students' in Essay writing in French with the purpose of finding out which of the methods could promote higher positive attitude in students towards essay writing in French. The population for the

study was 2319 JuniorSecondary school students in Ekiti State and the sample consisted of 120 students from six mixed secondary schools. The study adopted the quasi-experimental research design which focused on students' attitude towards essay writing in French. A questionnaire on students' attitude to essay writing in French (SATEWF) was used for data collection. Data were analyzed using mean, standard deviation and analysis of co-variance. The study eventually revealed that activity-based teaching method of teaching had a higher positive effect on the attitude of students than lecture method. Therefore, teachers of French should make use of activity-based teaching method of teaching essay writing.

This is relevant to the present study because the aim was focused on student education. The study complements the present study towards improving students' academic performance in Nigeria through the application of activity-based teaching method for better performance and better understanding and productivity by the learners. Although this study is relevant to the present study, the researcher carried out the study in a different subject area and State and the researcher never made enquiry to investigate the attitude of students towards the subject but the researcher was able to investigate the effect of activity based teaching strategy on students' performance and retention.

In a similar study carried out by Igbal and Rahat, (2014) titled "Effect of activity Based Teaching method in Science" The study was carried out to investigate the effectiveness of activity-based teaching method on the learning of science students in Accama Iqbal open University, Islambad Pakistan. The purpose of this research was to explore the linkage between teaching technique and students learning. In this study, the measuring instrument was used on achievement test. The test was based on two chapters of the text book. Students were divided into two groups, that is experimental and control

groups. Each group was consisted of 25students these groups were equated on the basis of marks achieved by the students in a 4th class science taken by District teacher Educator (DTE) the control group was taught by lecture method and the experimental group was taught by activity – based method. The duration of the teaching for both groups was 30minutes per day for one month. At the end of the treatment, the test was administered. The data of the study comprised up of scores of experimental as well as control group obtained on the post test.

The study revealed that the performance of experimental group was better than the performance of the controlled group of the students furthermore there was significant difference between the performance of the experimental group as compared to the control group with reference to knowledge, comprehension, application skill overall, the findings of the study show that activity based teaching was much effective than the lecture method of teaching at elementary level in science.

This study is relevant to the present study because it focused on changing both researchers and students behaviour towards teaching and learning process and enforced participatory approaches in class teaching. The study also complements the present study towards improving students' performance in the world through application of activity based teaching approach. The study is relevant to this present study. The researcher carried out the study in a different country and only used students as his sampled and Agricultural science performance test as instrument for data collection.

Ja'afar, Abdullahi and Badgal (2014) also investigate the effects of demonstration and lecture methods of teaching Apiculture on performance of Agricultural Science students in Adamawa State University, Nigeria. The study was conducted using two (2) sets of 400 levels students to determine the effects of a combined demonstration and lecture methods of teaching Apiculture on one hand, and

lecture method on another, on performance of learners in the faculty of Agriculture, Adamwa State University, Mubi Nigeria; data was collected by observation of students scores and personal verification of records/files to obtain information on age, gender and qualification at admission of both sets of students, whereas cost of instructional materials were determined through the Departmental invoice. Descriptive statistics, computed cost components and correction analyses were employed in the analyses of the data.

Results revealed that while majority 52% of the conventional students fell within the age of 20 – 25 years, a larger proportion of sasakawa students were within 31 – 35 years. Gender wise make accounted for the buck of the students with 68% and 78% for conventional students and sasakawa students respectively. Inspite of the fact that lecture method had lower cost implication, it was found to be more efficient as a method of instruction among the students than a combined demonstration and lecture methods. The male student slightly (0.456) performed better than their female (0.246) counterparts with both coefficients significant $P<0.05$.

It concluded that application of lecture method of instruction was slightly more efficient than a combined demonstration and lecture method among the agriculture students of Adamwa State University. Also, the male students were found to perform slightly better than the females. While the demonstration and lecture methods be more appropriate at the primary and secondary schools. The lecture method is recommended at tertiary level based on the finding of the study.This study is relevant to the present study because it focused on finding out the test teaching method for teaching Agricultural science at secondary school level in Nigeria.

In a study carried out by Okediji (2014) titled “Effect of Activity-Based Teaching strategy on students’ achievement of secondary school students’ in Chemistry”. The study was conducted in public SeniorSecondary school in Lagos State Nigeria.

The researcher use pre-test, post-test control group quasi-experimental design was adopted using a 2x3x2 factorial matrix. The target population for the study includes the entire senior secondary school class 2 chemistry students in two local governments in Lagos. The null hypotheses were tested at 0.05% level of significance using ANCOVA (Analysis of covariance).

The finding of the study among others revealed that there is significant mean effect of treatment on students' achievement in chemistry. The hypotheses two was retain because there is no significant main effect of gender on students achievement in chemistry because it revealed that the treatment had significant effect on students post-test achievement score in the first hypotheses tested using ANCOVA, whereas the second hypotheses revealed that female group had higher means of 14.23 while lower mean of 13.96 come from the male group. When exposed to activity-based strategy of teaching.

Based on the conclusion, the study recommended that teachers should facilitate the use of activity based teaching strategy in schools to improve their achievement in the subject, there is need for training of pre-service Chemistry teachers on the effective use of activity-based teaching strategy. Government and professional bodies such as STAN, NTI NUT and so on should organize in-service and re-training programmed for teachers on the effective use of activity based teaching strategy in the teaching of chemistry.

This study is relevant to the study because they both aim at focusing on students' performance. The study complements the present study towards improving students' performance in Nigeria through the use of activity based teaching strategy for better understanding and productivity by the learners. Although the study is relevant to this present study, the researcher carried out the study in a different State and subject area. The researcher never made enquiry to know or investigate pre attitudinal test on the

students but was able to investigate the effect of activity-based on students' performance and retention.

2.9 Implications of the Literatures Reviewed to the Present Study

The Implications of the Literatures Review shows that Students learn better when they are consciously involved in the teaching and learning process rather than a situation whereby the teacher is more active in the teaching and learning process than the students. Activity based method of teaching has proved to be better in enhancing students' performance in Agricultural science possibly due to the nature of the strategy whereby the teacher first explains the concept before the students carry out other processes in the teaching and learning situation. Just as an apprentice first takes instruction from his teacher and follows such in the execution of an assignment, so also in this situation. The strategy is found to be better than practice invention whereby students first think about the concept on their own before the teacher finally gives them the correct feedback. Nevertheless, this study has proved that the treatment strategy is better than conventional strategy. This result corroborated the findings of Gurung in Iwuji (2012) that well-designed activity based session help students organized the materials to be studied. Studies show, that, perhaps emphasis should be on total study time but not on the way students study. Much stronger relationship has been found between test scores and time spent organizing the course content than with total study time Dickson and O'Connell in Suleman (2011). The finding is however opposed to Brenda and Robert (2003) who found and argued that conventional lecture method could not be totally ignored.

For quite a long time science teachers have been restless searching for effective instructional strategies and fruitful curriculum materials that would collectively foster the teaching of Agricultural science to the young generation. The findings of most of

these studies concluded that academic performance is enhanced by using effective instructional strategies which recognize actual students' participation.

Harbor – Peter in Upelle (2013) States that activity learning promotes positive attitudes towards the instructional experiences that competitive or individual methodologies shymansky, Kyle &Alport in Suleiman (2011) presented a meta – analysis of the effect of Activity associated curriculum on the students performance and found that the curriculum enhanced students' science achievement and result in better academic performance. Donald in Suleiman (2011) conducted an experiment on the effect of traditional lecture method in teaching two sections of an undergraduate chemistry course on performance of students he discovered that those students taught using activity based method had better performance than those taught with conventional lecture method.

Many studies have been reviewed on the effect of gender on academic performance; some Stated that there is a significant difference in academic performance and attitude among the sexes. However, others found no differences exists in this area. Suleiman (2011) Stated that boys' attitudes towards science were more significantly positive than that of girls especially boys interest in chemistry, physics and earth science. Bunkure (2008) saw no relation between academic performance and sex differences.

2.10 Summary of Literature Review

The summary of the literature review showed that instructional method which involves students' activities enhances better academic performance and better retention ability and changes students' perception on the subject.

The study used two teaching methods one was activity – based method of instruction which is learner – centered. It involved students activities that will make learning of agricultural science more meaningful and purposeful and so to enhance better

students understanding. The other was Conventional teaching method which was teacher- centered. It therefore, revealed importance of using teaching strategies that are participatory and learner centered where learners are trained to take control and direct their learning processes for effective learning. There is need to incorporate in Nigerian educational system the Activity based strategy as one that could help in providing Agricultural science performance needed to bring about better performance.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter examines the methodology used in conducting the study, it is presented under the following sub-headings: Research Design, The population of the study, Samples and sampling procedure, Instrumentation, Validity of instrument, Pilot Study, Reliability of the instrument, Instrument Administration, Data collection Procedure and Data Analysis procedure.

3.2 Research Design

The study adopted quasi-experimental design; specifically, the pretest, posttest, control group was used. This implies that intact classes were used in the study. According to Dianrdo (2008), quasi-experimental research permits the use of intact classes. This design was illustrated bellow

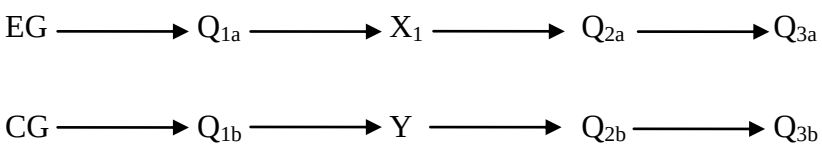


Figure 1 illustration of research design Where

EG is Experimental Group

CG is Control Group

Q_{1a} is Pretest of Experimental Group

Q_{1b} is Pretest of Control Group

X_1 is Treatment of experimental Group

Y is no Treatment in Control Group

Q_{2a} is Post-Test of Experimental Group

Q_{2b} is Post-Test of Control Group

Q_{3a} is Retention Test of Experimental Group

Q_{3b} is Retention Test of Control Group

3.3 Population of the Study

The target population of this study comprised all SSII students in public secondary school in Kaduna State offering Agricultural Science in the 12 educational zones of Kaduna State which stood at fifteen thousand four hundred and fifty-eight students' (15,458) SSII students spread across three hundred and thirty-four senior secondary schools (334) in Kaduna State, With nine thousand one hundred and thirty-five male (9,135) and six thousand three hundred and twenty-three female students' (6,323). Table 1 shows the population distribution of the study.

Table 1 Population of the Study

S/N	E/Zone	No of sch.	No/Male	No/Female	Total
1	Anchau	30	438	268	656
2	B/Gwari	18	578	202	580
3	Gobog	16	236	251	537
4	Godogodo	22	478	362	840
5	Kachia	34	1076	734	1810
6	Kaduna	37	868	528	1398
7	Kafanchan	40	1240	987	2227
8	Lere	13	406	211	617
9	Rigachikun	22	663	301	967
10	S/Tasha	37	1121	869	1990
11	Zaria	31	987	673	1653
12	Zonkwa	34	1203	984	2187
	Total	**334**	**9135**	**6323**	**15458**

Source: Kaduna State Ministry of Education 2018.

3.4 Sample and Sampling Techniques

The sample size for the study comprised one hundred and sixty-six male (166) and seventy-eight female (78) students making a total of two hundred and forty-four SSII Agricultural science students. The sample was arrived at using a purposive sampling technique. This technique according to Cohen, Mahion and Morrison (2007) is an appropriate sampling technique used when conducting experimental research. Hence, four (4) intact classes of SSII students in the public Senior Secondary schools were purposively sampled for the study. These are GSS Sabon Tasha and GSS Narayi as

experimental schools while GSS U/Sarki and GSS T/Nupawa was the sample for the control group. Table 2 presents the sample distribution according to their groups.

Table 2: Sample Distribution

S/No	Schools	Group	M	F	Total
1	GSS S/Tasha	Experimental	35	23	60
2	GSS Narayi		49	13	62
3	GSS U/Sarki	Control	35	16	51
4	GSS T/Nupawa		47	24	71
Total	**4**		**166**	**78**	**244**

Field survey 2018

To control experimental contamination GSS S/Tasha and GSS Narayi are located in S/Tasha Educational Zone while GSS U/Sarki and GSS T/Nupawa are located in Kaduna Educational Zone.

Determination of Homogeneity of the Sample

The sample from the four schools that is experimental and control groups was pre-tested using agricultural science performance test (ASPT) to ensure group homogeneity and group equivalent. The Homogeneity of the sample schools and students were determined by considering their admission requirement, syllabus, availability of instructional materials and resources, availability of school farm, qualify manpower (teachers), students population rate, physical structures among others after the sample has been pre-tested using agricultural science performance test to ensure group equivalent

In trying to establish the homogeneity of sample for the study the researcher picked the schools for the research from `two educational Zones. The selected schools in the Zone used the same curriculum. The infrastructural facilities available for students to learn

were equally supplied. All schools have well – equipped and facilitated classes in terms of seating arrangement and good chalkboard. The teacher's qualities in the schools were alike. Agricultural Science experts in the schools have the same qualification as this make the research fair to avoid any better treatment than others.

3.5 Instrumentation

The instrument for this research consists of the treatment instrument named "Agricultural Science Performance Test" (ASPT). The experimental group and the control group were given a pre-test to ensure homogeneity. The purpose of this test is to measure the performance of the students constituting the sample. The researcher made a thorough study of Agricultural Science Units and the techniques of test construction. The researcher in consultation with agricultural Science subject teachers prepared a lesson plan and constructed a test comprising 45 multiple-choice items. Item 1 – 17 were drawn from livestock management item 18 – 34 were drawn from Animal Nutrition while item 35 – 45 were drawn from Rangeland and Pasture management. These items were based on the selected animal husbandry/science theme. Animal Nutrition, Livestock Management and Range and pasture Management practice topics were taught to both experimental and control group, which was intended to measure the outcome of learners. The student instruments, Agricultural Science Performance Test (ASPT) was a researcher-made test. The test content was based on a table of specification covering all the local level of the cognitive-affective and psychomotor domain of learning. After ten weeks of being exposed to the treatment and two contacts every week. The students were subjected to post-test using Agricultural Science Performance test (ASPT)

Table 3 Item Specification of Agricultural Science Performance Test

UNIT TOPICS	KNOW LEDGE	COMPREHEN SION	APPLI CATION	ANA LYSIS	SYN THESIS	TOTAL	%
Livestock management	1,2,4,5	8,9,10,15	3,7,13,17	12,14,16	6,11	17	38
Animal nutrition	18,20,31 ,34	19,21,28,29	22,23,27	24,25,32	26,30,33	17	37
Range and pasture management	36,37,40	38,45	35,39	41,44	42,43	11	25
Total	**11**	**10**	**9**	**8**	**7**	**45**	**100**

Source: Research field work 2018

Lesson Plan

Sequential Lesson plan was developed by the researcher and used by the regular agricultural Science teacher who was the research assistant for uniformity. The lesson plan for each objective was prepared and the research assistants matched item to their respective instructional guide. The topics were broken down into achievable behavioural objective. The lesson plan was given to two agricultural science teachers for validation; they were requested to examine the following aspect:

1. Clarity and appropriateness of the objective for the students
2. Conformity of the instructional method and appropriateness of the instructional materials.
3. The relevance of student's activities and evaluation questions for the lessons.

3.5.1 Validity of the Instrument

To ensure both face and content validity of the instrument, the drafted lesson plan together with the Agricultural Science Performance Test (ASPT) instrument was given to a senior lecturer in Test and Measurementsection in the Department of Educational Psychology, Senior lecturer in Agricultural education section in the Department of

Vocational and Technical Education and the researcher's two supervisors of the rank of Senior Lecturer in the Department of Educational Foundations and Curriculum, Ahmadu Bello University, Zaria and two experienced Agricultural Science teachers in Kaduna State for comment and suggestions.

3.5.2 Pilot Study

After the instrument was validated by the panel of expert a Pilot Study was carried out in Government Secondary School Romi in Kaduna State. The reason for the choice of Government Secondary School Romi is that the school is believed to be more or less equivalent in standard to the school that is used for this study but was not in any way involved in the main study. Agricultural Science Performance Test (ASPT) with 45 items containing 4 options A – D was administered to 25 students after being exposed to the treatment for 2 weeks.

3.5.3 Reliability of the Instrument

The reliability of the instrument for the study was obtained by subjecting responses of the pilot study carried out in Government Secondary School Romi to a statistical analysis using the Pearson Product Moment Correlation Coefficient. Consequently, a coefficient of 0.69 was obtained. Which is about 0.7 reliability coefficient recommended by Mugenda and Mugenda in Kabugi (2013) an instrument is considered reliable if its reliability coefficient is 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 was considered reliable and fit for the study. For details of this calculation see Appendix E.

3.6 Procedure for data collection

The procedure that was used for data collection involved the use of pre-test treatment, post-test and retention test. The pre-test is the initial stage of test that was administered simultaneously to both experimental and the control groups before treatment. The two groups (Experimental and control groups) were subjected to Agricultural science performance test (A.S.P.T). The Agricultural science performance test (A.S.P.T) was used to generate three types of data viz

1. Pre-test data to ascertain their group equivalence.
2. Post-test data to ascertain their performance
3. Retention test to ascertain the retention ability

The data generated were analyzed with the research questions investigated.

3.7 Treatment Administration

The study sampled from the four schools that is the experimental and control group were pre-tested using Agricultural science performance Test (ASPT) to ensure group equivalents. The experimental group was taught Agricultural science concept for ten (10) weeks using Activity-based teaching method to the control group same concepts were taught using the conventional teaching method for ten (10) weeks also. At the expiration of the ten weeks both groups were post-tested using the same instrument which was reshuffled to make it look different. One week later a retention test was administered to the two groups the experimental group and control group to ascertain their retention ability.

The research instrument was administered to the experimental group by the researcher with the assistance of the class teachers and the research assistance. The students were given numbers to use instead of names. The necessary instructions were presented in the subject and explicitly explained before they began the test. The test was

administered during the normal class period of 60 minutes which is a double period after which the control group was treated the same and enough time (60 minutes) was allotted to the students, students were requested to provide personal data (information) such as school, class and sex which were used to analyze the data.

The research instrument was administered to the control group in the classroom during the normal class period with the assistance of the class teacher and research assistant the students were assigned numbers to be used to replace their names. The needed information was presented to them in writing and 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 requested to provide information to be used for the data analysis. One week later a retention test was administered to the two groups the experimental group and control group to ascertain their retention ability. The treatment administrations to the two groups were as follows. Treatment for both groups lasted for eleven weeks

Week one – both the experimental and control groups were pre-tested using Agricultural science performance test (ASPT) to ensure group equivalent and homogeneity of the groups.

Week two – students in the experimental groups were taught poultry production in the first lesson and system of poultry management in the second lesson. Under livestock management using activity-based teaching method while the control groups were taught using the conventional teaching method.

Week three – students in the experimental groups were taught the system of poultry management II, in the first lesson and incubation of eggs in the second lesson under livestock management using Activity-based while the control groups were taught same concepts using the conventional teaching method.

Week four - students in the experimental group were taught hatching of poultry eggs in the first lesson and poultry management practices in the second lesson under livestock management using Activity-based while the control groups were taught same concepts using the conventional teaching method.

Week five - students in the experimental groups were taught classification of livestock feed in the first lesson and methods of preparing livestock feed/feed ingredient in the second lesson under Animal nutrition using Activity-based while the control groups were taught same concepts using the conventional teaching method.

Week six - students in the experimental groups were taught food nutrients of livestock in the first lesson and food nutrients of livestock II under Animal nutrition using Activity-based while the control groups were taught same concepts using the conventional teaching method.

Week seven - students in the experimental groups were taught Ration formulation in the first lesson and malnutrition in farm Animals under Animal nutrition using Activity-based teaching method while the control groups were taught the same concepts using the conventional teaching method.

Week eight - students in the experimental groups were taught Range management in the first lesson and common grasses and legumes found in Rangeland as the second lesson under Range and pasture management using Activity-based while the control groups were taught same concepts using the conventional teaching method.

Week nine - students in the experimental groups were taught pasture and forage crops in the first lesson and pasture and forage crops II in the second lesson under Range and pasture management using Activity-based while the control group were taught same concepts using the conventional teaching method.

Week ten – post-test was administered to both experimental and control groups in all sampled schools. The instrument contains 45 multiple-choice items to pick the correct option from letter A – D within 45 minutes.

Week eleven – Retention test was administered to both the experimental and control groups after reshuffling the items to test their retention ability result collected were analysed.

3.8 Procedure for Data Analysis

The data collected from the field was subjected to statistical analysis for appropriate interpretations to achieve the set objectives of the study. Both descriptive and inferential statistical techniques were used in the analysis of data. Mean and standard deviation was used to answer the research questions. The inferential statistics of independent sample t-test was used to test all the hypotheses for the study at 0.05 level of significance.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the result of data analysis and discussionand presented based on the following headings description of study variables, response to research questions, hypotheses testing summary of major findings and discussion of findings.

4.2 Description of Study Variables

Table 4 presents the frequency and percentage of students' classification into experimental and control groups and gender.

Table 4: Classification of Students

Group	Frequency	Percentage
Experimental	122	50
Control	122	50
Total	**244**	**100**

Table 4 showed the classification of students into experimental and control groups. A total of 122 students representing (50%) of the students were used as experimental group while 122 students representing (50%) of the students were used as control group. This indicated that both the control group and the experimental group were equally represented.

4.3 Response to Research Questions

The various research questions raised were analyzed using responses to research questions. The mean and standard deviation were used to do the analysis as follows

Research question one: What is the effect of activity based method and Conventional teaching method on students' performance in Agricultural science in senior secondary schools in Kaduna State?

In order to answer this research question, the data collected from the post-test administered on students wereanalyzed using mean and standarddeviation. The summary of the analysis is presented in Table 5.

Table 5: Mean and standard deviation on the effect of activity-based teaching method on students' performance in Agricultural science in senior secondary schools in Kaduna State.

Method	N	Mean	SD	Mean difference
Experiment	122	73.70	23.99	26
Control	122	49.70	19.97	

Table 5 showed the mean score of 73.70 with standard deviation of 23.99 for studentstaught Agricultural science using activity-based teaching method, while the students taught Agricultural science using Conventional teaching method has a mean score of 47.70 with standard deviation of 19.97. This showed that there was a mean score difference of 26 between the experimental and control groups. However, their standard deviation shows that there is high variation in the students scores. This result therefore, implies that the performance of students taught Agricultural science using activity-based teaching method was significantly better than those taught Conventional teaching method in senior secondary schools in Kaduna State.

Research Question Two: What is the effect of activity-based teaching method on retention ability level of students taught Agricultural science using activity-based teaching method in senior secondary schools in Kaduna State?

In order to answer this research question, the data collected from the post-test administered on students wereanalyzed using mean and standard deviation. The summary of the analysis is presented in Table 6.

Table 6: Mean and standard deviation on the effect of activity-based teaching method onretention ability of students taught Agricultural science concepts in senior secondary schools in Kaduna State.

Method	N	Mean	SD	Mean difference
Experiment	122	78.13	24.70	23.45
Control	122	54.68	21.38	

Table 6 indicated the mean score of 78.13 with a standard deviation of 24.70 for students taught Agricultural scienceconcepts using activity-based teaching method; while the students taught Agricultural scienceconcepts using Conventional teaching method had a mean score of 54.68 with standard deviation of 21.38. This showed a mean difference of 23.45 between the experimental and the control groups. However, this implies that the students taught Agricultural scienceconcepts using activity-based teaching method retained Agricultural science concepts for a longer period/time than their counterpart taught Agricultural science concepts using the conventional teaching method.

Research Question Three: What is the performance of studentstaught Agricultural scienceconceptsusing activity-baseddiscussion teaching method and those taught using Conventional teaching method in senor secondary schools in Kaduna State?

In order to answer this research question, the data collected from the post-test administered on students wereanalyzed using mean and standard deviation. The summary of the analysis is presented in table 7.

Table 7: Mean and standard deviation on the effect of performance of students taught Agricultural science conceptsusing activity-baseddiscussion teaching method and those taught the same concepts using conventional teaching method.

Method	N	Mean	SD	Mean difference
Experiment	122	63.04	25.84	16.80
Control	122	46.24	18.08	

Table 7 showed the mean score of 63.04 with standard deviation of 25.84 for students taught Agricultural science concepts using activity-baseddiscussion teaching method while the students taught Agricultural science concepts of 46.24 with standard deviation of 18.08. This showed that there was a mean score difference of 16.80 between the experimental and control groups. However, their standard deviation shows that there is high variation in the students' scores. This result therefore, implies that the performance of students taught Agricultural science concepts using activity-baseddiscussion teaching method was significantly better than those taught using Conventional teaching method in senior secondary schools in Kaduna State.

Research Question Four: To what extent does activity-based teaching method have effect on the performance of students taught Agricultural science concepts in senior secondary schools in Kaduna State?

In order to answer this research question, the data collected from the post-test administered on students were analyzed using mean and standard deviation. The summary of the analysis is presented in Table 8.

Table 8: Mean and standard deviation on the extent in which activity-based teaching method have effect on the performance of students taught Agricultural science conceptsin senior secondary schools in Kaduna State.

Method	N	Mean	SD	Mean Difference
Experiment	122	69.17	23.06	
				15.80
Control	122	53.37	19.43	

Table 8 indicated the mean score of 69.17 with standard deviation of 23.06 for students taught Agricultural science concepts using activity-based teaching method; while the students taught Agricultural science concepts using Conventional teaching method had a mean score of 53.37 with standard deviation of 19.43. This showed that there was a mean scores difference of 15.80 between the experimental and the control groups. However, their standard deviation shows that there is high variation in the students' scores. This result therefore, implies that the performance of students' taught Agricultural science concepts using activity-based teaching method was significantly better than their counterpart taught Agricultural science concepts using Conventional teaching method insenior secondary schools in Kaduna State.

Research Question Five: What is the performance of students taught Agricultural science concepts using activity-based conceptsmapping method and those taught using Conventional teaching method in senior secondary schools in Kaduna State?

In order to answer this research question, the data collected from the post-test administered on students were analysed using mean and standard deviation. The summary of the analysis is presented in table 9.

Table 9: Mean and standard deviation on the effect of activity-basedinquiryon the performance of students taught Agricultural science concepts in senor secondary school in Kaduna State.

Method	N	Mean	SD	Mean difference
Experiment	122	71.10	23.56	
				22.75
Control	122	48.35	20.11	

Table 9 showed the mean score of 71.10 with standard deviation of 23.56 for students taught Agricultural science concepts using activity-based inquirymethod; while the students taught Agricultural science concepts using Conventional teaching method had mean score of 48.35 with standard deviation of 20.11. This showed that there was a mean difference of 22.75 between the experimental and control groups. However, their standard deviation shows that there is high variation in the students' scores. This result therefore, implies that the performance of students taught Agricultural science concepts using activity-based inquirymethod was significantly better than those taught using Conventional teaching method in senior secondary schools in Kaduna State.

4.4 Hypotheses Testing

Independent sample t-test was used to test the hypotheses formulated in the study at 0.05% level of significance. The summary of each of the hypothesis tested is presented as follows:

Hypothesis One: There is no significant difference in the performance of students taught Agricultural scienceconcepts using activity-based teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

Data collected from the post-test administered on the students were analysed using Independent sample t-test: The summary of the hypothesis tested is presented in Table 10.

Table 10: Independent sample t-test showing differences in post-test scores of experimental and control groups taught Agricultural science concepts using activity-based and conventional teaching method.

Group	N	Mean	SD	t-cal	α	t-crit	df	p- value	Decision
Experiment	122	73.70	23.99	6.82	0.05	1.97	131	0.00	Rejected
Control	122	7.70	19.97						

Table 10 showed that there is difference in the effect of activity-based teaching method on students' performance in Agricultural science in senior secondary schools in Kaduna State. The table showed the t-cal of 6.82 and t-crit of 1.97 while the p-value is 0.01 ($p< 0.05$). this means that there is a significant difference in the effect of activity-based teaching method on students' performance in Agricultural science in senor secondary school in Kaduna State.

Therefore, null hypothesis which Stated that there is no significant difference in the effect of activity-based teaching method on students' performance in Agricultural science in senior secondary schools is hereby rejected.

Hypothesis Two: There is no significant difference in the retention ability of students taught Agricultural science conceptsusing activity-based teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

Data collected from the retention test administered on students were analysed using Independent sample t-test. The summary of the hypothesis test is presented in Table 11.

Table 11: Independent sample t-test showing deference in the retention test scores of experimental and control group taught Agricultural science concepts using activity-based teaching method and conventional teaching method.

Group	N	Mean	SD	t-cal	α	t-crit	df	p-value	Decision
Experimental	122	78.13	24.70						
				5.89	0.05	1.97	242	0.00	Rejected
Control	122	54.60	21.38						

Table 11 showed that there is significant difference. This was as a result of the t-cal which showed that 5.89 is greater than t-crit of 1.96 while the p-value is 0.00 ($p < 0.05$). Therefore,the null hypothesis which Stated that there was no significant difference in the retention ability of students taught Agricultural science concepts using Activity-based teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State is hereby rejected.

Hypothesis Three: there is no significant difference in the performance of students' taught Agricultural science concepts using activity-based discussion teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

Date collected from the post-test administered on students were analysed using Independent sample t-test. The summary of the hypothesis tested is presented in Table 12.

Table 12: Independent sample t-test showing the performance of students taught Agricultural science conceptsusing activity-baseddiscussion teaching method and conventional teaching method.

Group	N	Mean	SD	t-cal	α	t-crit	df	p-value	Decision
Experimental	122	63.04	25.84						
				3.91	0.05	1.97	242	0.00	Rejected
Control	122	46.24	18.08						

Table 12 showed that there is significant difference. This was as a result of the t-cal which showed that 3.91 is greater than t-crit of 1.96 while the p-value is 0.00 ($p < 0.05$). Therefore,the null hypothesis which Stated that there is no significant difference in the performance of students taught Agricultural science concepts using Activity-based discussion teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State is hereby rejected.

Hypothesis Four: there is no significant difference in the performance of students taught Agricultural science concepts using activity-based teaching method and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

Data collected from the post-test administered on the students were analysed using Independent sample t-test. The summary of the hypothesis tested is presented in table 13.

Table 13: Independent sample t-test showing difference in the post-test scores of experimental and control groups taught Agricultural science conceptsusing activity-based teaching method and conventional teaching method.

Group	N	Mean	SD	t-cal	α	t-crit	df	p-value	Decision
Experimental	122	69.17	23.06						
				4.74	0.05	1.97	242	0.00	Rejected
Control	122	53.37	19.43						

Table 13 showed that there is significant difference. This was as a result of the t-cal which showed that 4.74 is greater than 1.97 while p-value is 0.01 ($p<0.05$) Therefore, the null hypothesis which Stated that there is no significant difference in the performance of studentstaught Agricultural science concepts using activity-based teaching method and those taught using Conventional teaching method is hereby rejected.

Hypothesis Five: There is no significant difference in the performance of students' taught Agricultural science concepts using activity-based inquirymethod and those taught using Conventional teaching method in senior secondary schools in Kaduna State.

Data collected from the post-test administered on the students were analysed using Independent sample t-test. The summary of the hypothesis tested is presented in Table 14.

Table 14: Independent sample t-test showing difference in post-test scores of experimental and control groups taught Agricultural science conceptsusing activity-based inquiryand conventional teaching method.

Group	N	Mean	SD	t-cal	α	t-crit	df	p-value	Decision
Experimental	122	71.10	23.56						
				6.00	0.05	1.97	242	0.00	Rejected
Control	122	48.35	20.11						

Table 14 showed that there is significant difference. This was as a result of the t-cal which showed that 6.00 is greater than t-crit of 1.97 while p-value 0.03 ($p<0.05$). therefore, the null hypothesis which Stated that there is no significant difference in the performance of students taught Agricultural science concepts using activity-based inquirymethod and those taught using Conventional teaching method is hereby rejected. This implies that the treatment administered on the experimental group was effective.

4.5 Summary of Major Findings

The following are the majorfindings of the study

1. The performance of students taught Agricultural science concepts using Activity-based method was significantly better than those taught using Conventional teaching method in senior secondary schools in Kaduna State. This was because the t-calwhich is 6.82 is greater than the t-critof1.97 at p-value 0.01 ($p<0.05$)
2. The students taught Agricultural science concept using activity-based teaching method retained the learned concepts longer than their counterparts who were taught using conventional teaching method. This was because the t-cal which is 5.19 is greater than the t-crit of 1.96 at p-value 0.00 ($p<0.05$).
3. The performance scores of student taught Agricultural science concepts using activity-based discussion teaching method was significantly higher than their counterparts score who were taught the same concepts using conventional teaching method. This was observed from the t-cal of 3.19 which is greater than the t-crit of 1.96 while the p-value was 0.00 ($p<0.05$).
4. The performance of students taught Agricultural science concepts' using activity-based teaching method was significantly better than those taught using conventional teaching method. This was because the t-cal of 4.74 is greater than the t-crit of 1.96 at p-value 0.01 ($p<0.05$).
5. The performance of students taught Agricultural science concepts using Activity-based inquiry methods was also significantly better than their counterparts taught the same concept using conventional teaching method. This was because the t-cal of 6.00 was greater than the t-crit of 1.97 at p-value 0.02 $p<0.05$. Therefore, null hypothesis five was rejected.

4.6 Discussion of Findings

The finding on research question one revealed that the performance of students taught Agricultural science using the activity-based teaching method was significantly better than those taught using the Conventional teaching method in senior secondary schools in Kaduna State. Therefore, null hypothesis one which Stated that there was no significant difference in the performance of students taught Agricultural science using activity-based teaching method and Conventional teaching method in senior secondary schools in Kaduna State is hereby rejected. This finding is in agreement with the finding of Ameh and Dantani (2012), which Stated that methodology is very vital in any teaching-learning situation. The method adopted by teachers may promote or hinder learning. The finding also agreed with the finding of Upele (2013), that method of teaching has influence in the performance of students' and the findings also agreed with the finding of Iwuji (2012) that activity-based teaching method enhances the performance of students taught basic science using the activity-based teaching method in junior secondary schools.

The finding on research question two revealed that the students taught Agricultural science concepts using activity-based teaching method encoded and recalled the learned concepts faster than their counterpart who were taught the same concepts using the Conventional teaching method in senior secondary schools in Kaduna State. Therefore, null hypothesis two which Stated that there is no significant difference in the retention ability of students taught Agricultural science using activity-based teaching method and those taught using the Conventional teaching method in senior secondary schools in Kaduna State was hereby rejected. This finding is in agreement with Mohammed, Niaz, Maqsood, Faize and Sher (2012) that student taught using activity-

based teaching method remembered or recalled concept taught better than their counterpart who are taught using the Conventional teaching method because it encourages students to search for relevant knowledge rather than the Conventional teaching method where students are spoon-fed. The finding also agreed with the finding of Iwuji (2012), that activity-based teaching method enhances retention. Also, the finding agreed with the finding of Hassain, Anwar and Majoka (2011) pointed out on the basic research that during a lecture, learners are not attentive to 40% of the time, they retain 70% of the information from the first ten minutes of a lecture and only 20% of the information from the ten minutes and four months after a lecture-based course they retain only 8%

The finding on research question three revealed that the performance of students taught Agricultural science concepts using activity-based discussion teaching method was significantly better than those taught using the Conventional teaching method in senior secondary schools in Kaduna State. Therefore, null hypothesis three which Stated that there is no significant difference in the performance of students taught Agricultural science concepts using activity-based discussion teaching method and those taught the same concepts using the Conventional teaching method in senior secondary schools in Kaduna State was hereby rejected. This finding is in line with other findings (such as Azuka, 2013, Okediji 2014, Ameh& Dantani 2012). For instance, Okediji (2014) observed that Activity-Based discussion teaching method guide students' to discover fact for themselves thereby improving students performance similarly Suleiman (2011) founded that students who were taught using Activity-Based discussion teaching method performed significantly better in both basic and clinical science. Rahman, Khalid, Jumani, Malik Ajmal and Sharif (2011) also founded that Activity-Based discussion teaching method was more effective than lecture method because the students taught

using Activity-Based discussion teaching method performs better than the counterparts which indicated the usefulness of Activity-Based discussion teaching method in teaching Socials Studies.

The finding on research question four revealed that the performance of students taught Agricultural science concepts using Activity Based demonstration method was significantly better than their counterparts taught the same concepts using the Conventional teaching method in senior secondary schools in Kaduna State. Therefore, the null hypothesis four which Stated that there is no significant difference in the performance of students taught Agricultural science concepts using activity-based teaching method and those using the Conventional teaching method in senior secondary schools in Kaduna State was hereby rejected. This finding agreed with Ameh and Dantani (2012) said Activity-based teaching method Sharpen mental activities which are the basis of social power, it encourages initiatives and curiosity thus making self-reliance and survival easily. David (2007) also affirmed that slow learners taught using Activity-based teaching method performed significantly better and retained the learned concepts for a longer time than their counterparts taught using the conventional teaching method. Iqbal and Raha (2014) affirmed that Activity-based teaching method was more effective than the Conventional teaching method regarding knowledge, comprehension and application. Also, the finding of Salina and Khan (2012) was in agreement with the present finding that Activity-based teaching method changes the behaviours of teachers and students towards teaching and learning process that enforced participatory approach in classroom teaching.

Finding on research question five revealed that the performance of students taught Agricultural science concepts using Activity-Based inquiry method was

significantly better than their counterparts taught the same concepts using the Conventional teaching method in senior secondary schools in Kaduna State. Therefore, the null hypothesis which Stated that there is no significant difference in the performance of students taught Agricultural science concepts using Activity-Based inquiry method and those taught the same concepts using the Conventional teaching method in Senior secondary schools in Kaduna State. The finding is in line with other researchers such as Elvis (2013), Azuka (2013) and Mishra and Yadav (2013). Elvis (2013) who affirmed the effectiveness of three (3) teaching methods on students' academic performance, that the mean result of Activity-Based inquiry, teacher-student interactive method was the most effective teaching method by student-centred while the teacher-centred was the least effective teaching method. Similarly, Mishra and Yadav (2013) who affirmed that Activity-Based inquiry enhances achievement in science of class VII students by providing pleasure and interest in the classroom situation. It also developed the creative activities of the students in the teaching and learning process. Azuka (2013) in his findings outline some of the activities strategies such as discovery, concept mapping, demonstration, appropriate practical work, use of teaching aids, cooperative learning, discussion strategy and so on. Teachers should move away from the traditional method to activity-based learning strategies which are effective in teaching science.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The study investigated the effect of Activity and Conventional Teaching method on students' performance and Retention in Agricultural science in Senior Secondary Schools in Kaduna State Nigeria. The study was carried out with five objectives these include to determine the effect of Activity-based teaching method on students' performance Agricultural science in Senior Secondary Schools in Kaduna State, ascertain the retention ability of students taught Agricultural science using Activity-based teaching method and those taught using conventional teaching method., in Senior Secondary School in Kaduna State, determine the performance of students taught Agricultural science concepts using Activity-Based discussion teaching method and those taught using conventional teaching method., in Senior Secondary Schools in Kaduna State, Thestated objectives were transcribed into five corresponding research questions and five null hypotheses. The study was limited to SSII students offering Agricultural Science in Kaduna State.

Relevant literatures were reviewed on the key variable of the study. They include the concept of Activity-based teaching and Conventional teaching method of teaching Agricultural Science, performance and retention. The research work was based on the construction learning theory. Constructivism is a revolution in educational psychology, built on the work of Jcoan Piaget and Jereme Bruner. Constructivism emphasized the importance of active involvement of learner in constructing knowledge for themselves. Seventeen (17) empirical studies were reviewed in line with the present study.

The study adopted quasi-experimental design specifically the pre-test, post-test and retention test control group was used. The target population of the study comprised fifteen thousand four hundred fifty-eight SS2 (15458) students in public secondary schools in Kaduna State offering Agricultural science. The sample size for the study comprised one hundred and sixty-six (166) male and seventy-eight (78) female students, making the total of two hundred and forty-four (244) SS2 Agricultural science students. The sample was arrived at using purposive sampling technique.

The instrument used for data collection in the study was a structured Agricultural science performance Test (ASPT) designed by the researcher. The instrument consisted of (45) multiple choice items. The validated (ASPT) was pilot tested using test-retest, the data collected from the field were subjected to statistical analysis using Pearson product moment correlation coefficient (PPMCC) statistics and a reliability co-efficient of 0.70 was obtained. The data collected from the field were subjected to statistical analysis using both descriptive and inferential statistical technique. At descriptive level frequency and percentage was used to analyze the bio-data of the respondent while mean and standard deviation was used to answer the research questions. At inferential level independent sample t-test was used to test the hypotheses at 0.05 level of significance.

Findings from the study revealed that the performance of students taught Agricultural science concepts using Activity-based teaching method was significantly better than those taught using conventional teaching method., in Senior Secondary School in Kaduna State. The students taught Agricultural science concepts for a longer time than their counterparts taught using conventional teaching method., in Senior Secondary School in Kaduna State.

In addition, the performance of students taught Agricultural science concepts, were significantly better than their counterparts taught the same concepts using conventional teaching method., in Senior Secondary Schools in Kaduna State. This showed that Activity-based teaching method has facilitative effect on the performance of students in Agricultural science in Senior Secondary Schools in Kaduna State.

5.2 Conclusion

The study concluded that Activity-based teaching method has a facilitating effect on students' performance and retention because students' gain more knowledge and performed significantly better when taught using Activity-based teaching method. Findings from this study have confirmed this claim by revealing that students obtained higher scores when taught Agricultural science concepts using Activity-based teaching method as compared to those taught the same concepts using the Conventional teaching method in Senior Secondary Schools in Kaduna State.

5.3 Recommendations

Based on the findings of this study and conclusion, the following recommendations were made:

1. Agricultural Science Teachers should explore Activity-based teaching method of teaching method to their advantage in enhancing effectiveness in their classroom.
2. The teaching style by agricultural science teachers should be based on guiding, directing, and facilitating while students should do the real work by themselves. This would enable them to discover new ideas and skills in solving problems.
3. Curriculum planners and test book writers should incorporate Activity-based teaching method into their publications for effective teaching of Agricultural Science.

4. Students should be made to understand the vital roles agricultural science plays in the development of the nation.
5. Federal, StateMinistries of Education and local government authorities should through resource centres organize workshops and seminars regularly for serving agricultural science teachers on the use of Activity-based teaching method of teaching in the classroom.

5.4 Contribution to Knowledge

1. The study enables Agricultural Science teachers to understand that the method adopted by teachers may promote or hinder learning. It may sharpen mental activities which are the bases of social power or may discourage initiative and curiosity thus making self-reliance and survival difficult.
2. The study also contributed by correcting the erroneous belief students have on the subject, that it is meant for their grandfather in the countryside by embracing agricultural science as a source of livelihood and employment opportunity.
3. The study also offers teachers the opportunity to understand that the use of the Conventional teaching method to overcome the bulky syllabus before the senior school certificate examination (SSCE) is majorly responsible for the poor performance of students in both internal and external extermination.

5.5 Suggestion for Further Studies

This study offered the following suggestions

1. The study was conducted in agricultural science; there is a need to conduct a similar study on animal husbandry and fisheries.
2. There is also a need to extend the study to another teaching method such as problem-solving, concept mapping, guided discovery and so on in teaching agricultural science and other related science subjects.

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APPENDIX ONE

Curriculum and Instruction Section,

Department of Education Foundation,

Faculty of Education,

Ahmadu Bello University,

Zaria.

Dear Respondents,

REQUEST TO PARTICIPATE IN A RESEARCH

I am a postgraduate student of the above school and department carrying out a research titled. EFFECT OF ACTIVITY AND CONVENTIONAL TEACHING METHODS ON STUDENTS' PERFORMANCE AND RETENTION IN AGRICULTURAL SCIENCE IN SENIOR SECONDARY SCHOOLS IN KADUNA STATE, NIGERIA.

I solicit for your support and cooperation in participating in the research process. The answers collected through the use of this research instrument shall be treated confidentially and shall be applied only for the purpose of this research work.

Thank you for your anticipated cooperation.

Yours sincerely,

Charles Sunday Ayuba

P14EDFC 8070

08034232391/08020346887

APPENDIX TWO

LESSON PLAN FOR EXPERIMENTAL GROUP

WEEK ONE/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Livestock Management
Unit Topic	Poultry Production
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities-based Interactive (Discussion)
Instructional Material	Pictures of farm animals (Poultry) and the equipment used in a poultry farm.
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain poultry and mention some of the animals that belong to the family of poultry. 2). Give the meaning of the following poultry terms: i. Pullet ii. Capon iii. Treading iv. Caponization v. Clutch 3) Mention three (3) breeds of domestic fowl and two (2) examples each 4) List five (5) equipment's used in poultry houses.
Previous knowledge	Students are familiar with the different farm animals especially (poultry)
Introduction Step I	i. Mention any ten (10) different farm animals you know.

	ii. Which of the named animal belongs poultry group.	
Presentation of lesson		
Teacher activity	**Learner activities**	**Learning points**
Teacher to guides the class interaction and present the picture of farm animals.	Learners explain the meaning of poultry and other animals that belong to the class of poultry	Poultry are groups of birds kept for food and other purposes. They include domestic fowl, turkey, gouse, guinea fowl and duck. They are kept for meat, egg and manure.
Step II	Learners describe pullet, capon, caponization, treading, layers, clutch	Pullet – female fowl below one year of age Chick – A young fowl from 0 – 6 weeks old Capon – A castrated male fowl Caponization – process of castration in fowl Treading – Act of meeting in fowl Broiler – fowl reared for meat Clutch – group of young chicken
Step III	Learners to enumerate the different breeds of poultry such as egg producer meat producer and dual purpose breads	a) Egg producer e.g. white leghorn brown leghorn b) Meat producer e.g. Sussex, Cornish and cochin (broiler) c) Dual purpose ones e.g. Rhode island, red ply mount, rock and new Hampshire (they are both meat

and egg producers)

Student Activities	Students identified the group of animals that belong to the family of poultry.
Summary	The teacher summarizes the main point of the lesson
Evaluation	The teacher evaluates the lesson by asking the students the following questions 1) Explain poultry and give any three (3) animals that belong to the family of poultry. 2) Give the full meaning of these poultry terminologies: I. Pullet ii. Capon iii. Treading iv. Caponization v. Clutch 3) State the three (3) breeds of poultry and give two (2) example of each breed. 4) Mention five (5) equipment's in the poultry farm and State the uses of each. Students should raise up hands to answer the questions.
Conclusion	The teacher summarizes the lesson and gives the students chalk board summary to copy. Students should copy the chalkboard summary in their note books
Assignment	Write five (5) other equipment and their uses found in poultry farm house not mentioned in the class.

WEEK ONE/LESSON TWO

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Livestock managements
Unit Topic	System of Poultry management (extensive and intensive system)
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities-based Inquiry/discussion method
Instructional Material	Pictures of free hold and fold system of poultry management.
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain semi intensive system of poultry management. 2). State three (3) advantages and three (3) disadvantages of semi intensive poultry management. 3) Enumerate four (4) advantages and two (2) disadvantages of extensive system of poultry management.
Previous knowledge	Students have seen the extensive system of poultry management and some of them have been practicing the system in their houses
Introduction Step I	i. Where poultry are confine for some time and allowed to search for food on their own is called? ii. What system of poultry management is used for raising local chicken in our homes?

Presentation

Teacher activity	Learner activities	Learning points
Teacher guides the students as they explain system of poultry management from what they inquired.	Learners explain system of poultry managements and enumerate the system of poultry management system.	System of poultry management is the extent to which birds are exposed to sunshine, pasture and also housing pattern. There are 3 system of poultry management. They are extensive, semi intensive system of poultry management.
The teacher presents the pictures of different system of poultry management.	Learners explain the meaning of extensive management and enumerate its advantages and disadvantages	Under extensive system the birds are allowed to roam about in search of food and water. There are no proper housing, care and feeding for these birds. Advantages of these system include initial capital requirement is small, labor involve is very small and it minimizes the incidence of ectoparasite. Whiles the disadvantages include; it requires large labor force to collect eggs, it also exposes birds to extreme weather conditions.
Step III	Learners explain the meaning of semi intensive system of poultry management and mention the advantages and disadvantages of the system.	The system is midway between intensive and extensive system. The birds are housed in a fixed building but are allowed to move about within a fenced area during the day. Advantages of the system include birds have access to natural vegetation which provides vitamins and

		minerals and there is protection against adverse weather condition while the disadvantages include, it lead to high cost of feeding the bird and leads to low egg production.
Student Activities	Students explain the meaning of poultry management and identify the freehold and semi intensive system of poultry management from the picture presented as instructional materials	
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Explain semi intensive system of poultry management. b) State three (3) advantages and three (3) disadvantages of semi intensive system of poultry management c) State four (4) Advantages and two (2) disadvantages of extensive system of poultry management.	
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.	
Assignment	Write 10 features of free range system of poultry management.	

WEEK TWO/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	System of poultry Management II
Unit Topic	Poultry Production
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities- based inquiry/discussion method
Instructional Material	Pictures of deep litter/battery cage system of poultry management.
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain intensive system of poultry management. 2). Differentiate between deep litter and battery cage system of poultry management. 3) State three (3) advantages and three (3) disadvantages of deep litter system. 4) Mention four (4) advantages and three (3) disadvantages of battery cage system of poultry management. 5) State any five (5) characteristics of good layer.
Previous knowledge	Students are familiar with battery cage and deep litter
Introduction Step I	i. What type of poultry management system is practiced in the school farm? ii. What type of bird are kept under

	the system mentioned?	
Presentation of lesson		
Teachers activity	**Learner activities**	**Learning points**
Teacher guides student on what they inquired on poultry management as he presents the pictures of deep litter and battery cage system of poultry management	Learners explain intensive system of poultry management and list the intensive system of poultry management inquired.	This is a system of poultry management in which birds are confined within the building and are not allowed to move out. They have not access sun shines and pasture on like the extensive system. Feeds, water and all medications are provided for the birds. There are two examples of intensive system of poultry management these are deep litter and batter cage system.
Step II	Learners give the meaning of deep litter system and State the advantages and disadvantages.	Under this system birds are keep on a house provider of concrete and litter are spread on the floor and changed periodically as occasion demands to prevent disease build-up. Advantages of the system include it increases efficiency in poultry management and facilitates management of very large flock, while the disadvantage include high cost of construction the deep litter house and high spreading rate of diseases and parasite.
Step III	Learners give the meaning of	Under this system birds are

	battery case system and enumerate the advantage and disadvantages.	housed individual. cages, each accumulating a limited number of birds, mostly one or two. Advantages of the system include it is labour saving device and saves space as the disadvantages include it is more expensive and deteriorate quickly.
Student Activities	Students explain the meaning of deep litter and battery cage system of poultry management as they enumerate their advantages and disadvantages.	
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the students with the following questions 1). What is intensive system of poultry management. 2). Enumerate two Difference between deep litter and battery cage system of poultry management. 3) Give two (2) advantages and two (2) disadvantages of deep litter system of poultry management. 4) State three (3) advantages and two (2) disadvantages of battery cage system of poultry management. 5) Mention any five (5) characteristics of good layer.	
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.	
Assignment	Enumerate any 8 features of a poultry deep litter house.	

WEEK TWO/LESSON TWO

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Livestock Management
Unit Topic	Incubation of Eggs
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities-based
Instructional Material	Discussion method Picture of incubator and a chart of a local hen incubating her eggs
Behavioural Objectives	By the end of the lesson, the students should be able to 1) Explain incubation and mention the types of incubations. 2)State the optimum incubation condition of eggs 3) Mention two (2) equipment used to test fertile eggs 4) Explain the meaning of rearing of poultry and brooding.
Previous knowledge	Students have seen how local chicken incubate her eggs
Introduction Step I	The teacher places a chart of a local hen incubating her eggs and asks the students how many days

will it take a local hen to incubate her eggs.

Presentation

Teachers activity	**Learner activities**	**Learning points**
Teacher shares the class into 4 groups and present the activities to the students to brainstorm on as he guides the discussion. The teacher present picture of a local hen incubating her eggs.	First group to brainstorm on meaning and type of incubation, collection and storage off hatching eggs	Incubation is the process of providing fertilized eggs with optimum condition of temperature. Relative humidity and ventilation necessary for the development of chicks and their successful hatching. The type of Incubation are natural and artificial. Eggs are supposed to be collected 3 – 4 times a day and store in egg holding room for a period of 2 days to 2 weeks under a temperature of 18^0c and relative humidity of 75 – 80% with the large end facing upward.
	Second group to brainstorm on the measure for the efficient operation of an egg, incubator procedure and optimum Incubation condition.	Maintain the right temperature during Incubation, test-run the incubator before setting eggs inside Maintain the right relative humidity during incubation. The Incubation procedures include setting eggs in the incubator, cleaning and disinfecting the incubator and arrangement of eggs in egg setting trays before placing in the incubator while the optimum incubation conditions are temperature off 37 - 39^0c,, RH off 50 – 60% during the 11st 19ddays and 75% during the last two to three days
	Third group to brainstorm off hatching, hatching operation efforts to ensure uniformity off hatching and operations required after hatching	Hatching – The 21 days incubation period of domestic fowl can be seen as consisting of first 118 – 19 days incubation in the setter and last two to three days hatching in the hatches. Hatching operation include testing for fertility of egg, using Candler bulb and it is done six days after incubation by the process called

		candling. The efforts to ensure uniformity of hatching includes setting eggs uniformly on the tray, timely and regular forming of eggs, properly candling of the eggs etc. and operations required after hatching include setting off chicks into male and female, drying of chicks intra-oculaar (1) NDV vaccination etc.
	Fourth groups to brainstorm on breading and hatching, rearing of poultry brooding	Fertilized eggs are incubated for 211 days using incubators after which the eggs are hatched into young chicks. Rearing of poultry is the sum total of all the processes involved in bringing birds to maturity while brooding is the device used in which the newly hatched chicks are tender by providing heat to them until they develop enough reaching 6 weeks of age.
Teacher to asks the whole groups to come together and discuss what they have brainstorms and summarizes the entire lesson		
Evaluation	The teacher evaluates the lesson by asking the students the following questions 1) Explain incubation and mention the two types of incubation you know. 2) Mention any three optimum condition of an incubator. 3) Mention two (2) equipment for testing fertile egg. 4) Give the full meaning of the following. Rearing of poultry and brooding in poultry production.	

	Students should listen and ask for clarifications where necessary.
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy. Students should copy the summary in their note books.
Assignment	List 12 preparatory practice for receiving day old chicks for rearing. Students should copy the assignment and, do them at home and bring back for correction in the next class

WEEK THREE/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Livestock managements
Unit Topic	Hatching of Poultry eggs
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities-based Discussion and demonstration method
Instructional Material	Pictures of electric bulb candler, paraffin lamp candler, fertile and infertile eggs or employ egg candler machine and eggs.
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain hatching and State the number of days an egg can be incubated before hatching can take place. 2). Mention the machine used for testing infertile eggs and how dead or infertile eggs can be detected. 3) Enumerate the efforts to ensure uniformities of hatching. 4) State any 5 preparation for receiving day old chicks for rearing
Previous knowledge	Students have seen how local fowl hatch her eggs after incubation of her eggs.
Introduction Step I	The teacher introduces the lesson by asking students that, the act of bringing young chicks to the world is called what, and how many days does it takes a local chicken to

	incubate her eggs before hatching?	
Presentation		
Teachers activity	**Learner activities**	**Learning points**
Teacher guides the students on the class discussion and present the instructional materials such as paraffin lamp for dictating fertile eggs .	Learners explain hatching and hatchery operation to ensure uniformity of hatching	Hatching is the act of bringing new/young birds into life after incubating the eggs for 21days. While operation to ensure uniformity of hatching include proper Candling of the eggs, setting eggs at the same time and selecting eggs of the same size.
Step II	Learners enumerate some of the preparations for receiving day old chicks for rearing and operational requirement after hatching.	Clean and wash brooder house, disinfect brooder house and provide adequate floor space. While the operational requirement after hatching include sorting out abnormal chicks and packing of normal and healthy chicks
Teacher explain the process of testing fertile and infertile eggs use Candler machine while the students perform the activities	Learners carryout the demonstration on their own using Candler machine to separate fertile and infertile eggs e.g. (paraffin lamp Candler)	Using paraffin lump Candler to test for living or dead developing embryos .this is done six days after incubation. The concentrated light source of the Candler will pass through the eggs in a dark room in order to see through the egg. Fertile eggs are detected when they show a spider like appearance in the egg while infertile eggs do not show any spider like appearance. The fertile eggs are put in one detection while the infertile are put in another direction.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher to evaluate the students with the following questions	

	1). Explain hatching and how many days does it take a hen incubate her eggs. 2). Mention the name of the machine used to detect fertile eggs for hatching and when will the first test take place and the second test take place. 3) State five (5) efforts to ensure uniformity of hatching. 4) Enumerate 5 preparations for receiving day old chicks.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Write short note on the following terms Rearing of poultry Brooding in chicken

WEEK THREE/ SECOND LESSON

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Livestock Management
Unit Topic	Poultry Management Practices such as housing, feeding, vaccination and breeding
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities- based Interactive (discussion)
Instructional Material	Pictures of various livestock management practice such as housing, feeding and vaccination of poultry.
Behavioural Objectives	By the end of the lesson, the students should be able to a) Mention five (5) reasons for providing good housing in poultry. b) State the categories of poultry birds that require chick's mash, grower mash and layer mash and their percentage of protein. c) State the vaccines given to 1 – 7 days bird, 18 – 20 days birds, 3 – 4 weeks birds.
Previous knowledge	Students have taken vaccine before and are aware of importance of

	housing to mankind.	
Introduction Step I	i. Why do human beings need housing? ii. What are the importance of feeding?	
Presentation		
Teacher activity	**Learner activities**	**Learning points**
Teacher leads the interactive class as he present the picture of various livestock management practices such as feeding, housing and vaccination of poultry	Learners enumerate the importance of housing, good feeding and hygiene to animals.	Housing protect birds against adverse weather condition, against thieves, against disease attack etc. birds require good food for proper growth and development, withstand disease attack , fast growth etc. while birds needs good hygiene to reduce disease attack and grow fast and healthier.
Step II	Learner State the categories of poultry that require check mash, grower mash and layer mash and vaccines given to birds from day 1-20 day 3-4 week of age.	Categories of foods given to birds includes check's mash when as 18%protein to promote rapid growth, grower mash with 13% protein given to $7^{th}20^{th}$Weeks of age birds while layers mash with 16% protein given to layers. While the vaccines given to birds include intraocular ndv1/0 through the age against Newcastle disease 1-7 days Gambaro vaccines IBDV through drinking water 18-20 days checks etc.
Student Activities	The students enumerates the importance of housing, good feeding and hygiene and category of poultry that chick mash, grower mash etc.	
Summary	The teacher summarizes the main point of the lesson	

Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Mention five (5) reasons for providing good housing in poultry. b) State the categories of poultry birds that require chick's mash, grower mash and layer mash and their percentage of protein. c) State the vaccines given to 1 – 7 days bird, 18 – 20 days birds, 3 – 4 weeks birds. Students should ask questions for clarifications
Conclusion	The teacher concludes the lesson by summarizing the entire discussion of the class and giving the students chalk board summary to copy.
Assignment	Write down ten (10) management practices involved in rearing chicks from day old to six weeks of age. Students should copy the assignment.

WEEK FOUR/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Classification of livestock feed
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities- based Discussion method
Instructional Material	Employ carbohydrate concentrate, protein concentrate rough ages like legumes and grasses.
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain livestock feed and State the effect of feed shortage in Animal production. 2). Enumerate the 4 classes of livestock feed. 3) State 3 characteristics of the four classes of feeds enumerated in objective 2 above.
Previous knowledge	Students are familiar with the different classes of livestock's feed.
Introduction	i. Mention any four (4) types of feeds given to monogastric animals ii. State any three (3) types of grasses polygastric animals feed on.

Presentation

Teacher activity	**Learner activities**	**Learning points**
Teachers leads the class discussion	Learners explain the meaning of livestock feed State the effect of feed shortage.	Livestock fed are food given to farm animals for fast growth, repair of worn-out tissue and general well

		beings of the animals. The effects of food shortage are low birth weight, loss of weight poor production delay puberty poor meat and milk and egg production.
Step II	Learner State the classes of livestock feed and explain them.	Basal energy feed it contain erode fiber less than 18%,very high in energy or starchy high carbohydrate in fat but low in protein concentrate has less than 18% crude fiber protein cone is high ,low carbohydrate and fat and highly digest able. Mineral and vitamin they are required in small quantities, they supplement basal and protein, very low in energy protein and fiber, high in vitamins and mineral. Roughages they have crude fiber content more than 18%, they are high in crude fiber, low in digestible carbohydrate. They exist in different form such as hay, and strew, sollage and silage.
The teacher present the carbohydrate and protein concentrate and roughages employed as instructional materials	Students explain the meaning of animal feed and classified the feed employed to the class as instructional materials into monogastric and polygastric feeds	

Summary	The teacher summarizes the main point of the lesson
Evaluation	The teacher evaluates the class by asking the following questions 1). Explain livestock feed and State any 5 effects of feed shortage in animal production. 2). Mention the 4 classes of livestock feed and State 3 characteristics of each.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Enumerate any 5 importance of feed to livestock.

WEEK FOUR/LESSON TWO

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Method of preparing livestock feed/feed ingredient
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities- based discussion/ demonstration method
Instructional Material	Employ grasses and legumes, blood, fish, bone etc.
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain the following terms: i. Hay ii. Strew iii. Soliage iv. Silage 2). Enumerate 5 methods of preparing feed ingredients for making poultry rations.
Previous knowledge	Students have seen blood meal, fish meal and concentrates for making poultry feed.
Introduction Step I	The teacher introduces the lesson by asking the students to mention some of the ingredients that are used in making poultry feeds and

Presentation

Teacher activity	**Learner activities**	**Learning points**
Teacher guides the student on findings the meaning of hay, silage strew and soil age as he	Learners explain the meaning of hay , strew soilages and silage	Hay is aerial part of young and succulent grass or herbage cut and dried for feeding animals. Strews are aerial part of grass or

presents the grasses and legumes employed to the class		harvested crops cut and stored for future use. Soil ages are cut fresh or succulent grasses and legumes from the field taken to animals pen for feeding when still fresh. Silages are preserved green and succulent forage crops under anaerobe conditions.
The teacher presents bone, fish, blood, maize, groundnut etc employed to carry out the demonstration on making poultry feeds ingredients	Leaner's carryout the preparation of feed ingredients under the supervision of the teacher as he read out the processes of making each feed ingredient as Stated in the learning points.	Blood meal: collect fresh blood from the ablation and allow it to clot in the open. Heat the blood to reduce the moisture content and kill the pathogens. After heating the blood in lumps is tried and crush into plunders. Fish meal: fish meal can be prepared into major ways; these are dry and wet processes. Dry process: collect fresh fish sundry or smoke it to reduce the moisture content, and then grind it into power. Wet process or rendering: collect the fish, half it with steam then dry it and crush into power. Groundnut /palm kernel cake: collect the seeds of the g/nut /palm kernel cake, crush and press the remains with stones to from cakes which are dry. Cotton seed meal: collects seed grind them extract oil from the crushed seeds dry

		reside or cake later. Bone meal: it is prepared into two ways these are dry and wet processes. Dry process: collect bone from the abattoir, dry and burn them, then crush the burning to the desired texture. Wet process or rendering: collect bone from abattoir heat with steam crush and dry the crush bones. Maize /guinea corn –remove grains from the cobs dry them and crush or grind to desired texture .these feed ingredient can be prepared or processed for farm animals by making into mash and pellets while some have to be cooked before it can be fed to farm animals.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the lesson with the following questions 1). Explain the following terms: i. Hay ii. Strew iii. Soliage iv. Silage 2). State the process of making dry fish meal, wet bone meal and groundnut cake/palm kernel cake.	
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.	

Assignment	Prepare a blood meal or cotton seed cake and present it next week

WEEK FIVE/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Food nutrients of livestock's (carbohydrate, protein and fat & oil)
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities- basedDiscussion teaching method
Instructional Material	Employ maize, wheat, fish, blood meal, groundnut and coconut etc.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). State the composition of carbohydrate protein and fat and oil. 2).list the source of carbohydrate, protein and fat and oil. 3) Enumerate any 3 functions of carbohydrate, protein and fat and oil.
Previous knowledge	The Students are familiar with the different classes of food nutrients.
Introduction	The teacher introduces the lesson by asking the students to classify instructional materials brought into the class into carbohydrate, protein and fat and oil given food.

Presentation

Teacher activities	**Learners activities**	**Learning point**
Teacher guides the student's discussion on composition,	Learners enumerate the composition of carbohydrate protein and fat and oil	Carbohydrate compress carbon, hydrogen and oxygen co H12O 6,protein

sources and function of food nutrients. The teacher present maize, wheat, fish, blood, groundnut and coconut brought to the class as instructional aid		compress of carbon, hydrogen, oxygen, sulphur nitrogen and phosphorus while fat and oil compress of carbon hydrogen and oxygen.
Step II	Learners State the sources of these nutrients.	Carbohydrate sources-maize, millet, rice yam etc. Protein source – meat, fish , animal source while, soya bean, cowpea styloetc plant source Fat and oil source – groundnut cake, coconut meal, bemused cake etc.
Step III	Learners enumerate the function of the nutrient listed above.	Carbohydrate – provide energy for growth milk production, buildup of fat Protein- for young once growth, repair of worn out tissue, and gamete formation in reproduction etc. Fat and oil –provide more energy than carbohydrate, fatty acid and fat build up, maintenance of body temperature test.
Student Activities	Student classified these instructional materials brought into the class into protein, carbohydrate, fats and oil giving food	
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the class by asking the following questions 1). State the composition of protein and fat and oil and	

	carbohydrate. 2).list the Enumerate three source of protein carbohydrate, and fat & oil. 3) Give 3 functions of carbohydrate, fat and oil and protein.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Write any five carbohydrate, protein and fat and oil sources each.

WEEK FIVE/LESSON TWO

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Food nutrient of livestock two
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities –basedDiscussionmethod
Instructional Material	Employ sources of mineral salts and vitamin e.g. bone, onion, blood meal, fruits vegetables
Behavioural Objectives	By the end of the lesson, the students should be able to: 1). Explain vitamins and mention the vitamins that are water soluble and those that are fat soluble. 2). Differentiate between macro and micro minerals given two example each. 3) Give the sources functions and deficiency symptoms of calcium magnesium and iodine. 4. Enumerate the sources functions and deficiency symptoms of vitamin A, Vitamin E, and Vitamin K
Previous knowledge	Students have seen children suffering from night blindness, ricket legs, tooth decay, goiter etc.
Introduction	The teacher introduces the lesson by asking the students that lack of vitamin A, vitamin D and K causes what from their previous

	knowledge	
Presentation		
Teacher activities	**Learners activities**	**Learning point**
Teacher leads the class discussion on the composition sources and function of mineral and vitamin. The teacher present the instructional materials to the class such as onions, bone, blood meal, fruits and vegetable	Learner explain the composition, sources and function of some of the macro and micro minerals	Mineral required by animal are grouped into two major classes. They are macro mineral needed in large quantities and micro mineral needed in small quantities . example of macro include calcium, phosphorus , potassium etc while micro include iron, iodine zine e t c sources of mineral include, bone meal, oyster shell, limestone, salt lick etc. function include goal health and productivity for contraction of muscles, constitute of milk egg and meat e t c
Step II	Learners explain the composition, source and function of vitamins.	Vitamins are organic substances required by animal for proper growth and development of the body, vitamin are grouped into two major classes fat soluble vitamin these are vitamin in that are soluble in fat e.g. vitamin A, B,E,and K, water soluble fat these are fat that are soluble in water e.g. vitamin C and B complex, sources of vitamin include fish meal, fruit yellow maize, bone meal e t c function of vitamin proper eye sight and in bone and teeth formation, blood clothing etc.
Student Activities	The students explain the meaning of minerals and vitamins stating their composition, sources and	

	functions
Summary	The teacher summarizes the main point of the lesson
Evaluation	The teacher evaluates the lesson using the following questions 1). Explain vitamins and State any three water soluble and e fat soluble vitamins. 2). Differentiate between macro and micro minerals and give five minerals each that are macro and micro minerals. 3) Enumerate the source, function and deficiency symptoms of the following minerals calcium, iodine and magnesium. 4.mention one source, function and deficiency symptoms of these vitamins, Vitamin A,E and K
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Write 7 functions of water you know.

WEEK SIX/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Animal Nutrition
Unit Topic	Ration Formulation
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities- based Discussion& Demonstration
Instructional Material	Employ Maize meal, groundnut cake, palm oil cake, bone meal, mineral salt and vitamins supplement
Behavioural Objectives	By the end of the lesson, the students should be able to a) Explain the following terms, Diet ii. Ration iii. Balance ration. b) State five (5) factors to consider when formulating ration to feed livestock. c) Mention any five (5) categories of animal that require production ration. d) Explain the formulation of ration.
Previous knowledge	Students are familiar with ration from their previous lesson.
Introduction Step I	Teacher asks students to State how Bone, fish and blood meal are made from their last lesson.

Presentation

Teacher activities	**Learners activities**	**Learning point**
Teachers guides the discussion on Topic	Learners explain the meaning of diet ration and balance diet	Diet is the amount if feed given to animal to consumed regularly. Ration is the total

		supply of feed given to an animal in a 24hrs period. Balance diet is the feed containing all essential nutrients in the correct quantity and in adequate proportion for feeding animals.
Step II	Learners enumerate factors to be considered when deciding the type of ration and explain the type of ration and categories of animals that need them.	The factors to consider in making ration include purpose for when the animals are being kept, the class of animals, age of the animal, animal's condition of health etc. The type of ration is maintenance ration and production ration. For maintenance ration is to just maintain normal functionality of the body system while production ration is given to animals to enable them produce. The categories of animals that need production rations include lactating, weaning, pregnant layer Etc.
The teacher present the feed ingredients brought to the class to carry out ration formulation for layers	Learners carry out ration formulation for layer under the guidance of the teachers using the following ingredient. Maize meal 65%, G/nut cake 20%, fish meal protein 5%, palm oil 4%, bone meal 5%, mineral salt 0.5% and vitamin supplement vitamin 0.5% = 100%.Mixed together to give us a good layer ration.	To prepare a ration for layers the following ingredients are required. Maize meal 65%, G/nut cake 20%, fish meal protein 5%, palm oil 4%, bone meal 5%, mineral salt 0.5% and vitamin supplement vitamin 0.5% = 100%.Mixed together to give us a good layer ration.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the lesson by asking the students the	

	following questions 1) Explain the terms, a) Diet b) Ration c) Balance ration. 2) State five (5) factors to be considered when formulating ration. 3) Mention any five (5) categories of animal that require production. 4) Briefly Explain how ration can be formulated stating the ingredients and their percentage.
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy in their note book.
Assignment	List the procedure for Formulating a ration for layers.

WEEK SIX/ SECOND LESSON

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Animal Nutrition
Unit Topic	Malnutrition in Farm Animals
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities- based Discussion method
Instructional Material	Pictures of animals suffering from some of these malnutrition diseases.
Behavioural Objectives	By the end of the lesson, the students should be able to Explain malnutrition in farm animals and State the causes of Ricket and osteomalacia, milk fever and perosis. b) List the symptoms of these malnutrition diseases a) Pregnancy toxemia ketosis, grass tetany and scurvy c) Mention how the following malnutrition can be corrected. Beri-beri, Night blindness and Baby pig Anaemia
Previous knowledge	Students have seen some of this malnutrition before, others in their animals or in human beings.
Introduction Step I	i. What are the signs of

	malnutrition ii. Give two (2) malnutrition diseases	
Presentation **Teacher activities** Teacher guides the discussion as follow and presents the pictures of poultry suffering from malnutrition disease .	**Learners activities** Learners explain the meaning of malnutrition and enumerate some of the malnutrition diseases.	**Learning point** Malnutrition is a condition in which animals' shows evidence of nutritional deficiency .it occurs when a ration does not supply the entire essential nutrient in the right proportion and quantities. example of malnutrition diseases include osteomalack, peroses, ricket pregnancy toxemia baby pig anaemk e t c
Step II	Learners to enumerate the causes, symptoms and correction of the malnutrition diseases mentioned above.	For esteomalacia is lack of calcium,symptom is flexible and carvex bone correction. Add fish meal bone. For porosis lack of chlorine, folic acid, symptom include chicken Lie down on their kneels correction add B-complex and bone meals in their diet. For pregnancy toxiemia lack of sufficient energy porosis, symptoms include less appetite, intake by animals' correction feed carbohydrates to animals. The baby pig anaemia low iron in blood, symptoms include loss appetite and nervousness, correction inject iron dextran into the body e t c
Student Activities	From the pictures presented explain the kind of malnutrition disease you can see from the picture.	

Summary	The teacher summarizes the main point of the lesson
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Explain malnutrition in farm animals and State the causes of Ricket and osteomalacia, milk fever and perosis. b) List the symptoms of these malnutrition diseases a) Pregnancy toxemia ketosis, grass tetany and scurvy c) Mention how Beri-beri, Night blindness and Baby pig Anaemia can be corrected.
Conclusion	The teacher concludes the lesson by summarizing the discussion process and give the students chalk board summary to copy in their note books.
Assignment	Write ten (10) other malnutrition diseases and how they can be corrected.

WEEK SEVEN/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Range and Pasture Management
Unit Topic	Range Management
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities -based Discussion method
Instructional Material	Employ common grasses and legumes example Elephant, guinea Bahama grass legumes e.g. centro, mucuna and stylo.
Behavioural Objectives	By the end of the lesson, the students should be able to 1) Explain the Range land and State five (5) importance of rangeland. 2) Mention any five (5) factors affecting the level of production of Herbage 3) List five (5) methods of rangeland improvement
Previous knowledge	Students have seen elephant grass, guinea grass, centrosema, legume etc
Introduction Step I	Teacher asks students to classify the grasses brought into the classes into legumes and grasses and mention the kind of feed goat, sheep, cattle and horses like to feed on

Presentation

Teacher activities	Learners activities	Learning point
Teacher guides the discussion on range land as he present the grasses and legumes employed to the class such as elephant grass, bahama grass, centro, stylo and mucuna legumes.	Learners explain what range land is all about; enumerate the importance of range land and characteristic of range land.	Rangeland is an extensive area of land when contains forage grass and legumes and other herbage plants where animals can graze. The importance of rangeland include, provision of food for ruminant animals, use for making hay and swage, cad in build-up of soil fertilities e t c while the characteristic include, contain high quality grasses contain no weeds except some plants for shade, can withstand trampling by farm animal.
Student Activities	The student classified the grasses and legumes employed into the class as teaching aids into energy given and protein given food and enumerates some of the common features found in them	
	Learners enumerate and explain the factors affecting productivity of herbage and method of improving rangeland.	Factors that affect the level of productivities include, rainfall ,grass and legumes mixture, grazing, removal of trees e t c while method of improving rangeland include controlled stocking reseeding paddocking avoidance of overgrazing etc.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	1. Explain rangeland and State five importance of rangeland 2. Mention any five (5) factors affecting the level	

	of production of Herbage 3. List five (5) methods of rangeland improvement
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy in their note books.
Assignment	Write five (5) common grasses, common legumes and their botanical names found in a range land

WEEK SEVEN/ SECOND LESSON

Subject	Agricultural Science
Group	experimental group
Class	SS2
Topic	Range Management
Unit Topic	Common Grass and Legumes in Range Land
Sex	Mixed
Duration	30 minutes
Average Age	17years
No of Students	62
Instructional Method	Activities- based Discussion method
Instructional Material	Display pictures of common grasses and their features found in range land
Behavioural Objectives	By the end of the lesson, the students should be able to a) State the uses of common grass and legume found in Range land b) Mention some of the characteristic of these grasses and legumes found in the range land. c) Give the Botanical names of some grasses and legumes found in the Range land.
Previous knowledge	Students are familiar with some of the grasses and legumes found in the Range land.
Introduction Step I	i. State five (5) grasses and legumes found in natural range land. ii. What are their features

Presentation

Teacher activities	Learners activities	Learning point
Teacher guides the class discussion on the topic and displayed the pictures of some of these common grasses and legumes found in rangeland	Learners were employed to come along with some of the forage crops found within their localities and classify them into legumes and grasses and write their common and scientific names.	Grasses include, Elephant grass (Pennisetam purpureum) Guinea grass (Penicum maximum) Giant star grass (Cynodonplectostachyum) Spear grass (Impereta cylindrical). Legumes include Centro (Centrosemapubescens) Stylo (Stylosanthesgracilis) Calopo (Calopogoniummucunoid) Mucuna (Mucunautilis).
Step II	Learners enumerate some of the features found in the common grasses and legumes they brought to the class.	Elephant grass- It is cane-like stems dull green or purplish leaf blade. Guinea grass- it is a bunchy or erect or tufted; it is about 2m tall. Giant grass-it grows more than 1m and can be propagated by cutting. Centro- it is a creeping and twining legumes with a trifoliate leaves attached

		to the stem by pulvinus. Stylo- it is a highly noduluted legume the leaves are also trifoliate and creep along the ground.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) State the uses of common grass and legume found in Range land b) Mention some of the characteristic of these grasses and legumes found in the range land. c) Give the Botanical names of some grasses and legumes found in the Range land and State their agent of dispersal.	
Conclusion	The teacher concludes the lesson by given the students chalk board summary to copy in their note books.	
Assignment	Make an album containing 10 grasses and 10 legumes. Use twenty leaves exercise book write their common names and scientific names (Botanical)	

WEEK EIGHT/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Range and Pasture Management
Unit Topic	Pasture and Forage Crops
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	60
Instructional Method	Activities - basedDiscussion/Field trip
Instructional Material	A visit to a nearby rangeland/pasture
Behavioural Objectives	By the end of the lesson, the students should be able to a) Explain pasture and State five (5) uses of forage crops. b) State three (3) characteristics of natural pasture and artificial pasture each. c) Mention the scientific names and three (3) characteristics of Bahama grass, Northern gamba grass, centro and tropical kudzu d) enumerate three (3) factors that affect the distribution of a pasture
Previous knowledge	Students are familiar with the topic from their previous lesson on rangeland.
Introduction Step I	Teacher asks students the uses of forage crops and where can we find them.

Presentation

Teacher activities	Learners activities	Learning point
Teacher guides the discussion and the visit to the nearby pasture/rangeland.	Learners explain the meaning of pasture State the importance and characteristic of pasture as the manager of the pasture takes students round the pasture or rangeland.	Pasture is a piece of land on which forage crops are grown and are fed by livestock forage crops are plants cultivated for their vegetative portions and used in fresh or preserved form for feeding livestock. Used for forage crops or pasture include, livestock feed, as cover crops, conservation of soul moisture, prevention of erosion. Pasture are classified in natural (rangeland) and artificial pasture, some of their characteristic include, ability to regenerate fast ,ability to withstand trumpling, high palatability etc.
Step II	Learners enumerate the factors affecting the distribution and productivity and factors to be considered when establishing a pasture.	Factors affecting the distribution are climatic Edaphic and biotic factor. Factors that affect productivity include; persistence aggressiveness resistance to trampling seed viability , accurate sucking etc. while factors to be considered when establishing pasture are , adaptation of species palatability, computability, time of maturity and life cycle of

		the species.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Explain pasture and State five (5) uses of forage crops. b) State three (3) characteristics of natural pasture and artificial pasture each. c) Mention the scientific names and three (3) characteristics of Bahama grass, Northern gamba grass, centro and tropical kudzu d) enumerate three (3) factors that affect the distribution of a pasture	
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy in their note books.	
Assignment	Enumerate five (5) differences between rangeland and artificial pasture in a tabula form	

WEEK EIGHT/ SECOND LESSON

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Range and Pasture Management Practice
Unit Topic	Pasture and Forage Crops
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	62
Instructional Method	Activities- based Discussion/demonstration method
Instructional Material	Employ pictures of sillage and hay making.
Behavioural Objectives	By the end of the lesson, the students should be able to a) Enumerate five (5) factors to be considered when establishing a pasture b) Mention Some of the management practices carried out on a pasture to ensure continuous supply of the forage crops. c) State the procedure for making silage
Previous knowledge	Students are familiar with the topic.
Introduction Step I	Teacher asks students to mention the kind of grasses goat and cattle like to eat.

Presentation

Teacher activities	**Learners activities**	**Learning point**
Teacher leads the class discussion on the topic and the demonstration of hay making and silage making.	Learners to enumerate the sequence taken in establishment of pasture and management practice of a pasture.	The sequence taken in trying to establish a pasture are follow site selection ,clearing land removal of debris, cultivation of site, planting of pasture crops supplying etc. while the management practice are as follows , burning fencing, application of fertilizer, weed control ,irrigation ,pest and diseases control and adequate stocking .
The teacher presents pictures of hay and silage making	Learners carry out the demonstration of hay making under the guidance of the teachers as shown in the learning point.	Cut pasture species at the right stage of maturity i.e. before flowering. Chop the pasture species into pieces and dry them under the sun.
Step III	Learners carry out the demonstration of making silage under the supervision of the teacher as he reads out the process Stated in the learning point	Dig a pit to the size and depth required. Cut the pasture species into pieces. With the cut and chopped by spreading in the sun for about a day. Line the inside of the pit with banana leave or cocoyam leaves. Load the chopped mixed pasture into the pit in stages. Compress each layer by rolling heavy substances over it to expel much of the air which can cause spoilage. Sprinkle white mineral acid

		after each layer Deposit other layer and compress the layer each time until the pit is full Finally compress the heap Spread poiythene sheet over the heap toward off water Pack a heap of soil on top of the poiythene Provide shade over the heap Leave to ferment with minimum of 2-4 weeks.
Summary	The teacher summarizes the main point of the lesson	
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Enumerate five (5) factors to be considered when establishing a pasture b) Mention any five (5) common practices to be embarked on in order to ensure continuous supply of forage crops in the pasture. c) State the procedure of making silage.	
Conclusion	The teacher concludes the lesson by given the students chalk board summary to copy in their note books.	
Assignment	Write ten (10) factors to look at when trying to grow forage crop.	

APPENDIX THREE

LESSON PLAN FOR CONTROL GROUP

WEEK ONE/LESSON ONE

Subject	Agricultural Science
Group	Experimental Group
Class	SS2
Topic	Livestock Management
Unit Topic	Poultry Production
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture method
Instructional material	Pictures or chart of farm animals (Poultry) and the equipment used in a poultry farm.
Behavioural Objective	By the end of the lesson, the students should be able to 1) Define poultry and mention some of the animals that belong to the family of poultry. 2) Give the meaning of the following poultry terms: i. Pullet ii. Capon iii. Treading iv. Caponization v. Clutch 3) Mention three (3) breeds of domestic fowl and two (2) example each 4) List five (5) equipments of poultry and their uses.
Previous knowledge	Students have being rearing chicken in their houses either local or hybrid (Improved) chicken
Introduction Step I	The teacher introduces the lesson by asking the students to know who has eaten chicken meat before and what do you call it.
Presentation of lesson Teacher Activities	The teacher defines poultry and lists some animals that fall in the class of poultry bird.
Step III	The teacher writes the following terminologies on the board and gives their meaning. Cock, Cockerel, Hen, Pullet, Chick, Capon, Caponization, Treading, grower, Layer, Broiler, Clutch flock and chicken

Step IV	The teacher also writes and explains the Breed of poultry such as egg producer, meat producer and dual purpose breed and writes some of the equipment's and States their uses.
Evaluation	The teacher evaluates the lesson by asking the students the following questions 1) Define poultry and give any three (3) animals that belong to the family of poultry. 2) What is the full meaning of these poultry terminologies: i. Pullet ii. Capon iii. Treading iv. Caponization v. Clutch 3) State the three (3) breeds of poultry and give two (2) example of each breed. 4) Mention five (5) equipment's you saw in the poultry farm and State the uses of each one you mentioned.
Conclusion	The teacher summarizes the entire lesson before giving the students chalk board summary to copy.
Assignment	Write five (5) equipment and their uses found in poultry farm not mention in the class.

WEEK ONE/ SECOND LESSON

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Livestock managements
Unit Topic	System of Poultry management (extensive and semi intensive system)
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional Lecture method
Instructional Material	Pictures of free hold and fold system of poultry management.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). Define semi intensive system of poultry management. 2). State three (3) advantages and three (3) disadvantages of semi intensive poultry management. 3) Enumerate four (4) advantages and two (2) disadvantages of extensive system of poultry management.
Previous knowledge	Students have seen the extensive system of poultry management and some of them have been practicing the system in their houses
Introduction Step I	The teacher introduces the lesson by asking students that, the local fowls we keep at home are rear using which system of poultry management?
Presentation of lesson Teacher Activities	The teacher defines semi intensive system of poultry management and explains the advantages and disadvantages of semi intensivesystem of keeping or rearing poultry to the students.
Step II	The teacher defines extensive system of poultry management, lists and explains the advantages and disadvantages of extensive system of poultry management to the students.
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Define semi intensive system of poultry management. b) Statethree (3) advantages and three (3) disadvantages of

	semi intensive system of poultry management c) State four (4) Advantages and two (2) disadvantages of extensive system of poultry management.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson of the class and given the students chalk board summary to copy.
Assignment	State 10 characteristics features of a good layer.

WEEK TWO/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	System of poultry Management II
Unit Topic	Poultry Production
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture Method
Instructional Material	Pictures of deep litter/battery cage system of poultry management.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). Define intensive system of poultry management. 2). Differentiate between deep litter and battery cage system of poultry management. 3) State three (3) advantages and three (3) disadvantages of deep litter system. 4) Mention four (4) advantages and three (3) disadvantages of battery cage system of poultry management. 5) State any five (5) characteristics of good layer.
Previous knowledge	Students are familiar with battery cage and deep litter system of poultry management.
Introduction Step I	The teacher introduces the lesson by asking students the system of poultry management where poultry are confined to one place and they fed and provided with hygiene is called?
Presentation of lesson Step II	The teacher presents the lesson by defining intensive system of poultry management and enumerates the intensive system of poultry management such as deep litter and battery cage system.
Step III	The teacher describes deep litter and battery cage system of poultry management, stating their advantages and disadvantages.
Step IV	The teacher to enumerate the characteristic of a good layer.

Evaluation	The teacher evaluates the students with the following questions 1). What is intensive system of poultry management. 2). Enumerate two Difference between deep litter and battery cage system of poultry management. 3) Give two (2) advantages and two (2) disadvantages of deep litter system of poultry management. 4) State three (3) advantages and two (2) disadvantages of battery cage system of poultry management. 5) Mention any five (5) characteristics of good layer.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Enumerate any 8 features of a poultry deep litter house.

WEEK TWO/LESSON TWO

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Livestock Management
Unit Topic	Incubation of Eggs
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional Lecture Method
Instructional Material	Picture of incubator and a chart of a local hen incubating her eggs
Behavioural Objective	By the end of the lesson, the students should be able to 1) Define incubation and mention the types of incubations. 2)State the optimum incubation condition of eggs 3) Mention two (2) equipment used to test fertile eggs 4) Explain the meaning of rearing of poultry and brooding.
Previous knowledge	Students have seen how local chicken incubate her eggs
Introduction Step I	The teacher asks student who have seen a local hen incubating her eggs and how many days will it take a local hen to incubate her eggs?
Presentation Step II	The teacher defines incubation Statethe type of incubation and how eggs are collected before they arestored for hatching.
Step III	The teacher to enumerate the measures to be taking for efficient operation of an egg, incubation procedure and optimum incubation condition.
Step IV	The teacher States and explains efforts to ensure uniformity of hatching and operations required after hatching
Evaluation	The teacher evaluates the lesson by asking the students the following questions 1) Define incubation and mention the two types of incubation you know.

	2) Mention any three optimum condition of an incubator. 3) Mention two (2) equipment for testing fertile egg. 4) Give the full meaning of the following. Rearing of poultry and brooding in poultry production. Students should listen and ask for clarifications where necessary.
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy. Students should copy the summary in their note books.
Assignment	List 12 preparatory practice for receiving day old chicks for rearing. Students should copy the assignment and, do them at home and bring back for correction in the next class

WEEKTHREE/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Livestock Management
Unit Topic	Hatching of poultry Eggs
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional /Lecture Method
Instructional Material	Pictures of electric bulb candler, paraffin lamp candler, fertile and infertile eggs or employ egg candler machine and eggs.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). Define hatching and State the number of days an egg can be incubated before hatching can take place.. 2). Mention the machine used for testing infertile eggs and how dead or infertile eggs can be detected. 3) Enumerate the efforts to ensure uniformities of hatching. 4) State any 5 preparation for receiving day old chicks for rearing
Previous knowledge	Students have seen how local fowl hatch her eggs after incubation of her eggs.
Introduction Step I	The teacher introduces the lesson by asking students that, the act of bringing young chicks to the world is called what, and how many days does it takes a local chicken to incubate her eggs before hatching?
Presentation step ii	The teacher defines i. Hatching and enumerates hatching operation to ensure uniformity of hatching. ii. Explains the Preparations for receiving day old chicks for rearing and operational requirement after hatching.
Step III	The teacher explains how fertile and infertile eggs can be detected using electronic bulb candler machine.
Evaluation	The teacher to evaluate the students with the following questions

	1). What is hatching and how many days does it take a hen incubate her eggs. 2). Mention the name of the machine used to detect fertile eggs for hatching and when will the first test take place and the second test take place. 3) State five (5) efforts to ensure uniformity of hatching. 4) Enumerate 5 preparations for receiving day old chicks. .
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Write short note on the following terms Rearing of poultry Brooding in chicken

WEEK THREE/ SECOND LESSON

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Livestock Management
Unit Topic	Poultry Management practices such as housing, vaccine, feeding and breeding
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional teaching method (Lecture)
Instructional Material	Pictures of various livestock management practice
Behavioural Objective	By the end of the lesson, the students should be able to a) Mention five (5) reasons for providing good housing in poultry. b) State the categories of poultry birds that require chick's mash, grower mash and layer mash and their percentage of protein. c) State the vaccines given to 1 – 7 days bird, 18 – 20 days birds, 3 – 4 weeks birds.
Previous knowledge	Students have taken vaccine before and are aware of importance of housing to mankind.
Introduction Step I	Teacher asks the students the effects of improper feeding in poultry.
Presentation Teacher Activities	The teacher lists and explains the reason for providing housing for poultry birds to the students.
Step III	The teacher States and explains the reasons of feeding poultry birds and the kind of feeding mash given to the three categories of poultry birds.
Step IV	The teacher explains why poultry birds need to be kept healthy and in clean environment, and the type of vaccines to be given to them at different age interval.
Evaluation	The teacher evaluates the lesson by asking the students the

	following questions a) Mention five (5) reasons for providing good housing in poultry. b) State the categories of poultry birds that require chick's mash, grower mash and layer mash and their percentage of protein. c) State the vaccines given to 1 – 7 days bird, 18 – 20 days birds, 3 – 4 weeks birds.
Conclusion	The teacher concludes the lesson by summarizing the entire discussion of the class and given the students chalk board summary to copy.
Assignment	Write down ten (10) management practices involved in rearing chicks from day old to six week of age.

WEEK FOUR/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Classification of livestock feed
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture method
Instructional Material	Employ carbohydrate concentrate, protein concentrate rough ages like legumes and grasses.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). Define livestock feed and State the effect of feed shortage in Animal production. 2). Enumerate the 4 classes of livestock feed. 3) State 3 characteristics of the four classes of feeds enumerated in objective 2 above.
Previous knowledge	Students are familiar with the classes of feed, various livestock feed.
Introduction	The teacher introduces the lesson by asking the students to mention the kind of feed given to monogastric and polygastric animals to eat.
Presentation	The teacher explain
Teacher activity	1). Meaning of livestock feed, and the effect of feed shortage in Animal production. 2). State the classes of livestock feed and the characteristics of each class of feed.
Evaluation	The teacher evaluates the class by asking the following questions 1). Define livestock feed and State any 5 effects of feed shortage in animal production. 2). Mention the 4 classes of livestock feed and State 3 characteristics of each.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary

to copy in their note books.

Assignment Enumerate any 5 importance of feed to livestock's.

WEEK FOUR/LESSON TWO

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Method of preparing livestock feed/feed ingredient
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional Lecture method
Instructional Material	Employ grasses and legumes, blood, fish, bone etc.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). Define the following terms: i. Hay ii. Strew iii. Soliage iv. Silage 2). Enumerate 5 methods of preparing feed ingredients for making poultry rations.
Previous knowledge	Students have seen blood meal, fish meal and concentrates for making poultry feed.
Introduction Step I	The teacher introduces the lesson by asking the students to mention some of the ingredients that are present in poultry concentrate and what do we use in making hay and silage for feeding goat cattle etc.
Presentation step ii	The teacher explains what hay, strew, soilage and silage are.
Step iii	The teacher also explains the process of preparing feed ingredients to the students.
Evaluation	The teacher evaluates the lesson with the following questions 1). Define the following terms: i. Hay ii. Strew iii. Soliage iv. Silage 2). State the process of making dry fish meal, wet bone meal and groundnut cake/palm kernel cake.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary

	to copy in their note books.
Assignment	Prepare a blood meal or cotton seed cake and present it next week

WEEK FIVE/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Food nutrients of livestock's (carbohydrate, protein and fat & oil)
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture method
Instructional Material	Employ maize, wheat, fish, blood meal, groundnut and coconut etc.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). State the composition of carbohydrate protein and fat and oil. 2).list the source of carbohydrate, protein and fat and oil. 3) Enumerate any 3 functions of carbohydrate, protein and fat and oil.
Previous knowledge	The Students are familiar with the different classes of food nutrients.
Introduction	The teacher introduces the lesson by asking the students to mention the sources of carbohydrate, protein and fat and oil given food.
Presentation Teacher activity Step i	The teacher present the lesson by defining Carbohydrate, Protein, Fat and oil and stating their composition
Step ii sources	The teacher list and explain the sources of Carbohydrate, Protein and Fat and oil
Step iii	The teacher State and explain the function of **Carbohydrate** Provides energy for farm animal for growth Helps in milk production Helps in buildup of fat etc **Protein** Essential for growth of young ones Aids in repair of worn out tissue Aids in formation of gamete in reproduction **Fat and oil** Provide more energy than carbohydrate Aids in fatty acid and fat build up Aids in maintenance of body temperature

Evaluation	The teacher evaluates the class by asking the following questions 1). State the composition of protein and fat and oil and carbohydrate. 2).list the Enumerate three source of protein carbohydrate, and fat & oil. 3) Give 3 functions of carbohydrate, fat and oil and protein.
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Write any five carbohydrates, protein and fat and oil sources each.

WEEK FIVE/LESSON TWO

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Animal nutrition
Unit Topic	Food nutrient of livestock Two (2)
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional Lecture method
Instructional Material	Employ sources of mineral salts and vitamin e.g. bone, onion, blood meal, fruits vegetables etc.
Behavioural Objective	By the end of the lesson, the students should be able to: 1). Define vitamins and mention the vitamins that are water soluble and those that are fat soluble. 2). Differentiate between macro and micro minerals given two example each. 3) Give the sources functions and deficiency symptoms of calcium magnesium and iodine. 4. Enumerate the sources functions and deficiency symptoms of vitamin A, Vitamin E, and Vitamin K
Previous knowledge	Students have seen children suffering from night blindness, ricket legs, tooth decay, goiter etc.
Introduction	The teacher introduces the lesson by asking the students that vitamin A is for what, vitamin D and K etc. from their previous knowledge
Presentation Teacher activity	The teacher list and explains the composition of mineral, those needed in large quantity and those needed in small quantity with their examples, explaining the sources, functions and deficiency symptom of each macro and micro nutrients.
Step ii	The teacher list and explain the meaning of vitamins, fat soluble ones and the water soluble ones too, explaining the sources, functions and deficiency symptoms of vitamin A, C, D, K and B complex.
Evaluation	The teacher evaluates the lesson using the following

	questions 1). Define vitamins and State any three water soluble and e fat soluble vitamins. 2). Differentiate between macro and micro minerals and give five minerals each that are macro and micro minerals. 3) Enumerate the source, function and deficiency symptoms of the following minerals calcium, iodine and magnesium. 4.mention one source, function and deficiency symptoms of these vitamins, Vitamin A,E and K
Conclusion	The teacher concludes the lesson by summarizing the entire lesson and gives the students chalk board summary to copy in their note books.
Assignment	Write 7 functions of water you know.

WEEK SIX/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Animal Nutrition
Unit Topic	Ration Formulation
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture Method
Instructional Material	Employ Maize meal, groundnut cake, palm oil cake, bone meal, mineral salt and vitamins supplement
Behavioural Objective	By the end of the lesson, the students should be able to 1) Define the following terms, Diet ii. Ration iii. Balance ration. 2) State five (5) factors to consider when formulating ration to feed livestock. 3) Mention any five (5) categories of animal that require production. 4) Explain the formulation of ration.
Previous knowledge	Students are familiar with ration from their previous lesson.
Introduction Step I	Teacher asks students to explain how Bone meal, fish meal and blood meal are made from their previous lesson.
Presentation Teachers Activities	The teacher explains the meaning of diet, ration and balance ration to the students.
Step III	The teacher lists and explains the factors to be considered when formulating ration for livestock.
Step IV	The teacher lists and explains the types of rations and categories of farm animals that required each type of ration.
Step V	The teacher explains how rations are formulated the ingredients needed and the percentage of each ingredient needed for better formulated ration.

Evaluation	The teacher evaluates the lesson by asking the students the following questions 1) Define the terms, a) Diet b) Ration c) Balance ration. 2) State five (5) factors to consider when formulating ration. 3) Mention any five (5) categories of animal that require production ration. 4) Briefly Explain how ration can be formulated stating the ingredients and their percentage.
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy.
Assignment	List the procedure for Formulating a ration for layers.

WEEK SIX/ SECOND LESSON

Subject	Agricultural Science
Group	Control
Class	SS2
Topic	Animal Nutrition
Unit Topic	Malnutrition in Farm Animals
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional teaching method (Lecture)
Instructional Material	Pictures of animals suffering from some of these malnutrition diseases.
Behavioural Objective	By the end of the lesson, the students should be able to a. Define malnutrition in farm animals and State the causes of Ricket and osteomalacia, milk fever and perosis. b) List the symptoms of these malnutrition diseases a) Pregnancy toxemia ketosis, grass tetany and scurvy c) Mention how the following malnutrition can be corrected. Beriberi, Night blindness and Baby pig Anemia
Previous knowledge	Teacher asks students have they ever seen a kwashiorkor patient, Night blindness, Ricket and bowleg patient what causes them?
Introduction Step I	Asks students have they ever seen a kwashiorkor patient, Night blindness, Ricket and bow leg patient what causes them?
Presentation Teachers Activities	The teacher Defines malnutrition in farm animals and explains Recket and Osteomalacia, Milk fever and perosis under the following sub-headings causes, symptoms and correction
Step III	The teacher also explains pregnancy toxemia ketosis, grass tetancy and seurvy following the above mentioned sub-headings.
Step IV	The teacher explains Beriberi, Night blindness and Baby pig Anemia following the same sub-headings

Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Define malnutrition in farm animals and State the causes of Ricket and osteomalacia, milk fever and perosis. b) List the symptoms of these malnutrition diseases a) Pregnancy toxemia ketosis, grass tetany and scurvy c) Mention how Beri-beri, Night blindness and Baby pig Anaemia can be corrected.
Conclusion	The teacher concludes the lesson by given the students chalk board summary to copy.
Assignment	Write ten (10) other malnutrition diseases and how they can be corrected.

WEEK SEVEN/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Range and Pasture Management
Unit Topic	Rangeland Management
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture Method
Instructional Material	Employ common grasses and legumes example Elephant, guinea Bahama grass legumes e.g. centro, mucuna and stylo.
Behavioural Objective	By the end of the lesson, the students should be able to 1) Define the Range land and State five (5) importance of rangeland. 2) Mention any five (5) factors affecting the level of production of Herbage 3) List five (5) methods of rangeland improvement
Previous knowledge	Students have seen elephant grass, guinea grass, centrosema, legume etc
Introduction Step I	Teacher asks students to mention what kind of feed goat, sheep, cattle and horses feed on and where can they be found?
Presentation Teachers Activities	The teacher defines rangeland andStates the importance of range land.
Step II	The teacher lists and explains the factors affecting the level of productivity of a rangeland and explains the methods of range improvement.
Evaluation	The teacher evaluates the lesson by asking the students the following questions 1) Define the Range land. 2) State five (5) importance of rangeland. 3) Mention any five (5) factors affecting the level of

	production of Herbage 4) List five (5) methods of rangeland improvement
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy.
Assignment	Write five (5) common grasses and common legumes and their botanical names found in a range land

WEEK SEVEN/ SECOND LESSON

Subject	Agricultural Science
Group	Control
Class	SS2
Topic	Range Management
Unit topic	Common Grass and Legumes in Range Land
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional teaching method (Lecture)
Instructional Material	Display pictures of common grasses and their features found in range land
Behavioural Objective	By the end of the lesson, the students should be able to a) State the uses of common grass and legume found in Range land b) Mention some of the characteristic of these grasses and legumes found in the range land. c) Give the Botanical names of some grasses and legumes found in the Range land and State their agent of dispersal.
Previous knowledge	Students are familiar with some of the grasses and legumes found in the Range land.
Introduction Step I	Teacher asks students the kind of food or feed that ruminant animals feed on and is it all grasses and legumes that they eat?
Presentation Teachers Activities	The teacher writes on the board and explains the uses of some of the grasses and legumes found in a range land.
Step II	The teacher lists and explains the characteristics or features of some of the grasses and legumes found in the range land.
Step III	The teacher writes the board the common names and scientific names of the common grasses and legumes found in the range land.
Evaluation	The teacher evaluates the lesson by asking the students the

	following questions a) State the uses of common grass and legume found in Range land b) Mention some of the characteristic of these grasses and legumes found in the range land. c) State the Botanical names of the following: elephant grass, giant star, spear grasses, stylo, centro and mucuna stating their agent of dispersal.
Conclusion	The teacher concludes the lesson by given the students chalk board summary to copy.
Assignment	Make an album containing 10 grasses and 10 legumes. Use twenty leaves exercise book write their common names and scientific names (Botanical)

WEEK EIGHT/LESSON ONE

Subject	Agricultural Science
Group	Control Group
Class	SS2
Topic	Range and Pasture Management Practices
Unit Topic	Pasture and Forage Crops
Sex	Mixed
Duration	60 Minutes
Average Age	17 Years
No of Students	71
Instructional Method	Conventional Lecture Method
Instructional Material	Pictures of pasture and forage crops and rangeland employ some of the forage around the school environment
Behavioural Objective	By the end of the lesson, the students should be able to a) Define pasture and State five (5) uses of forage crops. b) State three (3) characteristics of natural pasture and artificial pasture each. c) Mention the scientific names and three (3) characteristics of Bahama grass, Northern gamba grass, centro and tropical kudzu d) enumerate three (3) factors that affect the distribution of a pasture
Previous Knowledge	Students are familiar with the topic from their previous lesson on rangeland.
Introduction Step I	Teacher asks students the uses of forage crops and where can we find them.
Presentation Teacher Activities	The teacher to define pastures and explains the uses of forage crops to the students.
Step III	The teacher to lists and explains the types of pasture and their characteristics to the students.
Step IV	The teacher to write the scientific names of some of the grasses and legumes found in the pasture explaining their characteristics
Step V	The teacher to write the factors affecting the distribution of

	a pasture and explain them to the students.
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Define pasture and State five (5) uses of forage crops. b) State three (3) characteristics of natural pasture and artificial pasture each. c) Mention the scientific names and three (3) characteristics of Bahama grass, Northern gamba grass, centro and tropical kudzu d) enumerate three (3) factors that affect the distribution of a pasture
Conclusion	The teacher concludes the lesson, by summarizing the entire lesson and giving the class a chalk board summary to copy.
Assignment	Enumerate five (5) differences between rangeland and artificial pasture in a tabula form

WEEK EIGHT/ SECOND LESSON

Subject	Agricultural Science
Group	Control
Class	SS2
Topic	Range and Pasture Management Practice
Unit Topic	Pasture and Forage Crops
Sex	Mixed
Duration	30 Minutes
Average Age	17 Years
No of Students	51
Instructional Method	Conventional Lecture Method
Instructional Material	Employ pictures of pasture containing forage crops
Behavioural Objective	By the end of the lesson, the students should be able to a) Enumerate five (5) factors to be considered when establishing a pasture b) Mention Some of the management practices carried out on a pasture to ensure continuous supply of the forage crops. c) State the procedure for making silage
Previous knowledge	Students are familiar with the topic.
Introduction Step I	Teacher asks students to mention the kind of grasses goat and cattle like to eat.
Presentation Teacher Activities	The teacher to write and explain the factors be considered when establishing a pasture.
Step III	The teacher to write and explain some of the common management practices to be carried on the pasture to ensure a continuous supply of grasses and legume in the pasture.
Step IV	The teacher list and explain the procedure of making hay and silage making to the students
Evaluation	The teacher evaluates the lesson by asking the students the following questions a) Enumerate five (5) factors to be considered when establishing a pasture b) Mention any five (5) common practices to be embarked on in order to ensure continuous supply of forage crops in

	the pasture. c) State the procedure of making silage.
Conclusion	The teacher concludes the lesson by given the students chalk board summary to copy.
Assignment	Write ten (10) factors to look at when trying to grow forage crop.

APPENDIX FOUR

Department of education,
Ahmadu Bello University,

Lecture /Agricultural Science Teacher,
……..
……..
Dear Sir/Ma,

VALIDATING A RESEARCH INSTRUMENT

I have adopted a research instrument design to generate data for my M.ed Curriculum and Instruction Thesis on the teaching of Agricultural Science in Senior Secondary school. The instrument title "Agricultural Science performance test" consists of 45 multiple choice items to be used as a pretest and post-test. The draft of the instrument is enclosed herewith:

As an experience Science Educationist/Agricultural Science teacher, inputs from you would certainly improve the quality of the instrument. I would appreciate it, if you could please examine the items with respect to the following:

Content validity
Appropriateness of the items
Clarity of the Statements in the instrument
Language use in the instrument
Whether or not the test items are related to Agriculture
Concepts of Senior Secondary School Syllabus.
Your valuable suggestions will be quite appreciated. Thank you.

Yours Sincerely,

Mr. Charles Ayuba

DEPARTMENT OF EDUCATIONAL FOUNDATIONS & CURRICULUM
FACULTY OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA

Instrument Validation Form

Dear Sir/Ma,

The candidate is a postgraduate student of Educational Foundations and Curriculum Department, Ahmadu Bello, Zaria. He/she is hereby humbly requesting your assistance in validating this research instrument. Please, grant the candidate all the necessary assistance. Thank you.

.....
Head of Department (Signature, Date & Official Stamp

Student's Surname. AJUBA ..... **Other Name** SUNDAY .....

Registration Number: P..... **Programme:** M.ed CURR...

Title of the Instrument: AGRICULTURAL SCIENCE PERFORMANCE TEST

Please comment on the following:

1. Appropriateness of the instrument for the research work: The instrument is appropriate for the research work
2. Clarity and simplicity of the language used: The language is simple and clear.
3. Suitability of the instrument for the level of respondent: The instrument is suitable for the level of respondent
4. The extent in which the items cover the topic it meant to cover: The whole coverage of the topic.
5. Is the instrument properly structured in line with objectives and research questions? The instrument is inline with the objectives & ques
6. Others (grammatical errors, spelling errors and others): The mechanical accuracy, grammar and spelling are fairly good

1

7. General comment on the instrument: The instrument was well constructed to suit the research topic adequately

Suggestion(s) for improving the quality of the instrument

1. The instrument quality to be improved by subjecting it to adequate reliability tests.
2. .....
3. .....
4. .....

ATTESTATION SECTION

I hereby testify that the above named student brought his/her instrument for validation

Name of Attester: Abubakar, Lawal

Designation: Lecturer I

Name and Address of Institution: Ahmadu Bello University, Zaria

Phone No: 08036293335 **E-mail:** lawy_al@yahoo.co.uk

Abubakar 27/05/2019

Signature and Date

Thank You

DEPARTMENT OF EDUCATIONAL FOUNDATIONS & CURRICULUM
FACULTY OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA

Instrument Validation Form

Dear Sir/Ma,

The candidate is a postgraduate student of Educational Foundations and Curriculum Department, Ahmadu Bello, Zaria. He/she is hereby humbly requesting your assistance in validating this research instrument. Please, grant the candidate all the necessary assistance. Thank you.

Head of Department
Dept. of Educational Foundations
A. B. U. Zaria

Head of Department (Signature, Date & Official Stamp)

Student's Surname: AYUBA Other Names: CHARLES SUNDAY

Registration Number: [illegible] Programme: CURRICULUM (M.Ed)

Title of the Instrument: Assessment of Science Performance Test

Please comment on the following:

1. Appropriateness of the instrument for the research work: Appropriate for the research work
2. Clarity and simplicity of the language used: The Language is simple and clear
3. Suitability of the instrument for the level of respondents: They are Suitable compare to the respondent level
4. The extent in which the items cover the topic it meant to cover: They effectively covered the topic
5. Is the instrument properly structured in line with objectives and research questions? Well Structured and in line with objectives
6. Others (grammatical errors, spelling errors and others): Yes, identified a few errors but were corrected

7. General comment on the instrument... The instrument can be used for data collection

Suggestion(s) for improving the quality of the instrument

1. Correct errors identified and produce for Pilot Study
2. Avoid using words in one question that would have demanded for seperate answers (qualified as invalid)
3. .....
4. .....

ATTESTATION SECTION

I hereby testify that the above named student brought his/her instrument for validation

Name of Attester: Dr. A. A Dada

Designation: Member Supervisory Committee

Name and Address of Institution: EDC, [illegible]

Phone No: 08036153035 **E-mail:** .....

17/10/18

Signature and Date

Thank You

APPENDIX FIVE

SECTION B: AGRICULTURAL SCIENCE PERFORMANCE TEST (ASPT)

INSTRUCTION

i. Answer all questions

ii. Each question is followed by four (4) options lettered A – D find out the correct option for each question and shade with pencil on your answer sheet, answer space which bears the same letter as the option you have chosen. Give only one answer to each question.

INSTRUMENT

Agricultural Science performance Test (ASPT)

Items from livestock management

1. The following belong to the group of poultry bird except
   a. Goose
   b. Turkey
   c. Bat✓
   d. Duck
2. The process of castration in poultry is referred to as
   a. Caponization
   b. Clutch
   c. Trading
   d. Flock
3. Which of these breeds of domestic fowl produced both meat and egg
   a. Cornish
   b. Sussex
   c. White leg horn
   d. Rhode island red✓
4. Trading in poultry production is referred to as
   a. Group of fowl
   b. Act of mating in fowl✓
   c. Meat of fowl
   d. Castrated male fowl
5. The equipment used to detect unfertile egg is called
   a. Mash box
   b. Fulus
   c. Egg tray
   d. Candler✓
6. The system of poultry management in which domestic fowls are allowed to roam about in search of food and water is called

a. Free range system✓
b. Fold unit system
c. Deep litter system
d. Battery cage system

7. The following are Advantages of intensive system of poultry management except
   a. It maximizes the use of land
   b. It maximizes the use of labour
   c. It leads to low egg production✓
   d. It makes selection and culling easier
8. One disadvantage of extensive system of poultry management is
   a. Birds are exposed to extreme weather condition✓
   b. It require small capital to start the business
   c. It leads to high cost of feeding
   d. It increases efficiency in poultry management
9. Gomboro vaccine is given to birds between the age of
   a. 6 weeks
   b. 18 – 20 days✓
   c. 1 – 7 days
   d. 3 – 4 weeks
10. The feed given to chicks/bird from the age of 7 – 20 weeks is called
    a. Layer's mash
    b. Chick's mash
    c. Grower's mash✓
    d. Finishing's mash
11. The following are reasons for providing good housing in poultry except
    a. Protect birds against disease's attack
    b. Protect birds from thieves
    c. Protect birds from attack by wild animals
    d. Protect the birds from selling✓
12. Fertile eggs are incubated for _____ days
    a. 18
    b. 21✓
    c. 14
    d. 31
13. The act of receiving extra heat by chicks immediately after hatching either by stove or electric bulb is called
    a. Brooding✓
    b. Candling
    c. Turning
    d. Hatching
14. The process of detected infertile eggs and dead embryo is called
    a. Debating
    b. Brooding

c. Candling ✓
d. Treading

15. One of this is not an optimum condition of an incubator
    a. Pullet✓
    b. Temperature
    c. Egg turning
    d. Ventilation
16. All the following are poultry management practices except
    a. Provision of housing
    b. Vaccination of poultry
    c. Management of soil✓
    d. Proper feeding of poultry
17. The following are preparation practices of receiving a day old chicks except
    a. Drying of Chicks✓
    b. Disinfect brooder house
    c. Provision of adequate floor space
    d. Clean and wash brooder house

Items from Animal Nutrition

18. One characteristic of carbohydrate concentrate is that
    a. It has high protein
    b. It has low energy
    c. It has high fibre
    d. It has high carbohydrate or fat✓
19. Which of this is an effect of feed shortage in animal production
    a. Delayed puberty✓
    b. High fibre
    c. High digestable
    d. Low in energy
20. Carbohydrate is made up of
    a. Carbon, hydrogen, oxygen and sulphur
    b. Carbon, hydrogen and oxygen✓
    c. Carbon, hydrogen, oxygen and nitrogen
    d. Carbon, hydrogen, oxygen and phosphorus
21. Which of the following is a function of fat and oil
    a. Bone and teeth formation
    b. Aid blood clotting
    c. Aid in the production of enzymes and hormones
    d. Provide more energy than carbohydrate✓
22. Which of this elements is a macro minerals
    a. Iodine
    b. Copper✓
    c. Magnesium
    d. Zinc

23. Which of the following is a deficiency symptoms of vitamin A(retinol)
    a. Beri-Beri
    b. Night blindness✓
    c. Scurvy
    d. Ricket
24. The amount feed regularly given to or consumed by animals is called
    a. Diet✓
    b. Ration
    c. Protein
    d. Cake
25. The ration given to animals like lactating, pregnant, layers, weaning etc is known as
    a. Maintenance ration
    b. Balance ration
    c. Production ration✓
    d. Faltering ration
26. All are factors to be considered when formulating ration for farm animals except
    a. The age of the animals
    b. Cost of the feed stuff
    c. Availability of the feed stuff
    d. The place of formulation✓
27. Milk fever is cause by
    a. Lack of calcium
    b. Low iron in blood
    c. Low blood sugar✓
    d. Lack of vitamin C
28. Lesion around the connective tissue is a symptom of
    a. Grass tetany
    b. Perosis
    c. Beri-Beri
    d. scurvy✓
29. Perosis can be corrected by
    a. Adding vitamin B complex and bone meal✓
    b. Feed vegetable and fruit to the animals
    c. Feed with yellow maize
    d. Feed carbohydrate to animals
30. The following are malnutrition diseases except
    a. Osteomalacia
    b. Bab pig anaemia
    c. Beri-Beri
    d. New castle disease✓
31. Insufficient blood in farm animals result to
    a. Night blindness

b. Ricket leg
c. Scurvy
d. Aneamia✓

32. Which of the feed ingredient is a source of protein in ration formation
    a. Maize meal
    b. Blood meal✓
    c. Oyster
    d. Bone meal
33. All the following are classes of livestock feed except
    a. Roughages
    b. Mineral/Vitamins supplement
    c. Protein concentrate
    d. Soil✓
34. The process of cutting aerial part of young and succulent grass or herbages and dried under the sun for feeding ruminant animal during the dry season is called
    a. Hay✓
    b. Straw
    c. Soilage
    d. Silage

Items from Rangeland and Pasture Management

35. An extensive area of land which contains forage, grasses and legumes and other herbage for feeding ruminant animals is called
    a. Range land✓
    b. Forest
    c. Farm land
    d. Forest reserved
36. The importance of range land is
    a. Provision of food for livestock✓
    b. Provision of meat
    c. Provision of robbers
    d. Provision of light
37. The following are factors that affect the level of productivity of herbage except
    a. Rainfall
    b. Fertility of the soil✓
    c. Control of weed
    d. Overgrazing
38. The botanical name of Guinea grass is
    a. Pennisetumpurpureum
    b. Penicummaximum ✓
    c. Cynodondactylon
    d. Centrosemapudescens
39. Range land can be improved by
    a. Irrigation✓

b. Overgrazing
c. Burning
d. Pest and disease attacked

40. The common name of Centrosemapubescens is
    a. Calopo
    b. Mucuna
    c. Centro✓
    d. Stylo
41. All the following are uses of herbage except
    a. For green manure
    b. As bedding material
    c. As cover crops
    d. Clothe✓
42. Which of the following can provide a good cover crops
    a. Elephant grass
    b. Goat weed
    c. Centro✓
    d. Spear grass
43. Which of this legumes is dispersed by explosive mechanism
    a. Stylo
    b. Tropical kudzn
    c. Centro✓
    d. Calopo
44. The following are factors affecting the productivity of a pasture except
    a. Persistence
    b. Fencing✓
    c. Aggressiveness
    d. Resistance to trampling
45. One characteristic of artificial pasture is
    a. It can withstand trampling by farm animals✓
    b. Contain poor quality grass and legumes
    c. Have low productivity
    d. It contain low quality grasses and legumes

APPENDIX SIX

PILOT STUDY

Calculation of reliability of agricultural science performance test (ASPT) after test and re-test administration using PPMC statistical tool

	Test scores						
S/NO OF STUDENTS	**X TEST (X)**	**Y RE TEST**	**$X - \bar{X}$**	**$Y - \bar{Y}$**	**$(X - \bar{X})^2$**	**$(Y - \bar{Y})^2$**	**$(X - \bar{X})(Y - \bar{Y})$**
1	40	38	-4	-3	16	9	12
2	43	40	-7	-5	49	25	35
3	39	36	-3	-1	9	1	3
4	37	38	-1	-3	1	9	3
5	36	37	0	-2	0	4	0
6	25	30	11	5	121	25	55
7	30	36	6	-1	36	1	-6
8	36	40	0	-5	0	25	0
9	41	37	-5	-2	25	4	10
10	39	38	-3	-3	9	9	9
11	32	33	4	2	16	4	8
12	36	36	0	-1	0	1	0
13	38	34	-2	1	4	1	-2
14	40	39	-4	-4	16	16	16
15	42	38	-6	-3	36	9	18
16	37	36	-1	-1	1	1	1
17	29	32	7	3	49	9	21
18	36	29	0	6	0	36	0
19	36	38	0	7	0	49	0
20	33	30	3	5	9	25	15
21	36	33	0	2	0	4	0
22	37	38	-1	-3	1	9	3
23	28	26	8	9	64	81	72
24	27	30	9	5	81	25	45
25	36	35	0	0	0	0	0
Total	**889**	**886**	**11**	**3**	**543**	**382**	**316**

$\bar{X} = \frac{889}{25} = 35.6 \simeq 36$ Mean of X

$\bar{Y} = \frac{886}{25} = 35.4 \simeq 35$ Mean of Y

$$PPMC = r = \frac{\sum(\bar{X} - X)(\bar{Y} - Y)}{\sqrt{\sum(\bar{X} - X)^2(\bar{Y} - Y)^2}}$$

$$= \frac{316}{\sqrt{543X\ 382}} = \frac{316}{\sqrt{207426}} \frac{316}{455} = 0.69$$

APPENDIX SEVEN

DATA OUTPUT

	Groups	N	Mean	Std.Deviation	Std. Error Mean
Experimental Scores		127	78.13	24.70	.88730
Conventional		117	54.60	21.38	1.03241

Levene's Test for Equality of Variance		t-test for Equality of Means on Hypothesis one						
F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
5.793	.017	4.304	222	.014	23.53	1.37681	-.92296	4.51492
		4.319	222	.019	23.53	1.36131	-.89252	4.48449

Group Statistics on Research Question Two

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Experimental Scores		127	78.13	24.70	1.10819
Conventional		117	54.60	21.38	.91838

Levene's Test for Equality of Variance		t-test for Equality of Means on Hypothesis Two						
F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
.414	.021	11.656	222	.000	16.8	1.42877	13.83158	19.47467
		11.571	222	.000	16.8	1.43927	13.80958	19.49667

Group Statistics on Research Question Three

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Experimental Scores		127	63.04	25.84	.89474
Conventional		117	46.24	18.08	1.06478

Levene's Test for Equality of Variance		t-test for Equality of Means on Hypothesis Three					
F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference

							Lower	Upper
6.350	.013	9.440	222	.003	16.3221	1.40832	-1.45149	4.11081
		9.561	222	.031	16.3296	1.39080	-1.41718	4.07650

Group Statistics on Research Question Four

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Experimental Scores		127	69.17	23.06367	1.74617
Conventional		117	53.37	19.43386	1.21960

Levene's Test for Equality of Variance		t-test for Equality of Means on Hypothesis Four						
F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
3.572	.016	4.832	16.22	.001	10.13111	2.09652	5.96784	14.29438
		4.757	16.22	.001	10.13111	2.12991	5.89265	14.36957

Group Statistics on Research Question Five

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Experimental Scores		127	71.10	23.06367	1.74617

Conventional	117	48.35	20.43386	1.21960

Levene's Test for Equality of Variance		t-test for Equality of Means on Hypothesis Four						
F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
3.572	.016	4.832	23.22	.001	10.13111	2.09652	5.96784	14.29438
		4.757	23.22	.001	10.13111	2.12991	5.89265	14.36957