EFFECTS OF USING INSTRUCTIONAL MATERIALS ON ACADEMIC ACHIEVEMENT OF AGRICULTURAL SCIENCE STUDENTS IN SECONDARY SCHOOLS IN KADUNA STATE, NIGERIA

By

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A THESIS SUBMITTED TO THE DEPARTMENT OF VOCATIONAL EDUCATION, SCHOOL OF TECHNOLOGY AND SCIENCE EDUCATION, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER IN AGRICULTURAL TECHNOLOGY EDUCATION OF THE MODIBBO ADAMA UNIVERSITY OF TECHNOLOGY, YOLA.

APRIL, 2019

DECLARATION

I hereby declare that this thesis was written by me and it is a record of my research work. It has not been presented before in any previous application for a higher degree. All references cited have been duly acknowledged.

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EZEKIEL, Joyce **Date**

DEDICATION

This thesis is dedicated to my loving parents Dr. and late Mrs. Solomon Yabaya and my beloved children Jehdeiah and Jehosheba.

APPROVAL PAGE

This thesis entitled “Effects of Using instructional Materials on Academic Achievement of Agricultural Science Students in Secondary Schools in Kaduna State, Nigeria.” meets the regulations governing the award of Master Degree of the Modibbo Adama University of Technology, Yola and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

The study was to determine effect of using instructional materials on academic achievement in Agricultural Science in secondary schools in Kaduna State, Nigeria. Six specific objectives, six research questions and two null hypotheses guided the study. The two null hypotheses were formulated and tested at 0.05 level of significance. The study was based on two theories: the instructional theory and the Social cognitive theory. The study adopted a pre-test, post-test, non-equivalent, quasi-experimental research design. The study area was Kaduna State in North West Nigeria. The population of the study was twenty eight thousand five hundred and thirty eighty (28, 538) students in all the sampled schools of Kaduna State. A multistage sampling technique was used to arrive at two senior secondary schools from the study area based on the availability of resources and intact classes of one hundred and ninety one (191) students. The instrument for data collection was Agricultural Science Achievement Test (ASAT) with twenty multiple choice objective items and the students answered the entire questions by ticking the correct option. The test instrument was subjected to face and content validation by three validates. Since the ASAT questions were adopted from WAEC past question papers, it was considered reliable. Data was collected by the researcher and two trained research assistants. Scores of agricultural science students' in the pre-test and post-test form the data for this study. Data collected was analyzed with the help of SPSS version 17. Mean was used to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. The study revealed among others that Agricultural Science students taught without learning materials had mean scores of 42.26 over 100.00. The study found based on the result of students' achievement that only audio learning materials cannot enhance students' academic achievement. The study among others recommend the use of visual teaching materials with audio as the use of visual, audio teaching materials alone does not improve academic achievement.

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CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The basic aim of teaching at any level of education is to bring an essential transformation in the learner (Tebabal & Kahssay, 2011). Scholars are searching continually for ways to improve the quality and speed of learning. This according to Faruata (2007) led to the use of instructional materials such as audio, visual, audio-visual and so on to assist learners. The

present use of teaching materials for academic achievement at secondary schools level has been under attack for not yielding the expected result, which is reflected in poor academic performance in external examinations such as Secondary Schools Certificate Examination (SSCE). It is expected that teachers should apply appropriate instructional materials that best suit specific objectives in order to facilitate the process of knowledge transmission.

Teaching and learning activities are more interesting when instructional materials are used effectively and efficiently in a classroom-teaching situation (Egun, 2007). According to Kemp in Farauta (2007), the term instructional materials can be used interchangeably with teaching materials, resource materials and learning resources. They all mean forms of information carriers that can be used for teaching/learning. They are materials or gadgets or equipment that can be used in the course of learning to make lessons more meaningful and clearer to learners. Development in science and technology has led to the advent of audio tape recorders, photographs, television and communication satellites which can be explored in the teaching and learning process. Therefore it is necessary for teachers of Agricultural Science to use audio-visual materials as instructional tools in order to make their teaching more interesting, that is to arouse the learners' interest and sustain their attention for effective learning. Unavailability of audio or visual instructional materials has become a problem in many secondary schools of Kaduna state even where they are available, the teachers fail to use them effectively (Ashaver and Igyuve, 2013). The reason for this attitude perhaps is the teachers' ignorance of the effect of audio/visual instructional materials on academic achievement of students. Hence the researcher is prompted to carry out this study. The quest for teachers to cover the syllabus, instead of making their teaching more meaningful and impacting has affected the use of instructional materials (Farauta, 2007).

According to Buba (2000), teachers in the past used the term instructional materials to refer to the teaching aids or apparatus, which could be used to make learning more interesting, real and effective which invariably will improve students' academic achievement. Teachers of the contemporary world however, refer to these materials as instructional media. In the early part of 20th century, audio-visual education was only known and called 'visual education', this of course was logical and appropriate because most of the media available to the schools by then were in the form of visuals (Ekeyi, 2013). By the 1950s, the term audio-visual was accepted as an accurate name for the instructional media available (Farauta, 2007). Today, the advent of

more sophisticated gadgets such as projectors of different kinds, computers, closed circuit television and many more justifies the term instructional media.

According to Anzaku (2011) the term audio-visual materials is commonly used to refer to those instructional materials that may be used to convey meaning without complete dependence upon verbal symbols or language. Thus according to the above definition, a text book or a reference material is not considered as an audio-visual material but visual illustration in a book is classified as one. Some audio-visual components are in the nature of process and experience, for example, dramatizing an event or a procedure. Some of the audio-visual materials like the motion pictures require the use of equipment to release their latent value. Some do not need equipment at all like an exhibit or a study print. This term designates in common usage both material things as well as processes such as field trips.

Eze (2013) also states that human being learns more easily and faster by audio-visual processes than by verbal explanations alone. Gopal (2010) stressed that audio-visual materials help the teacher to overcome physical difficulties of presenting subject matter. That is to say, with audio-visual materials, the barrier of communication and distance is broken. According to Ngozi, Samuel and Ameh (2012), audio-visual materials include materials and equipment alike; materials are considered to be system, or body of content of potential value when put to work. While equipment often referred to as the hardware and components used as means of presenting such content. The importance of audio-visual materials in the academic processes cannot be over emphasized (Eze, 2013). Swank (2011) stressing the effectiveness of audio-visual materials in leaning, estimated that about 40% of our concepts are based upon visual experience, 25% upon auditory, 17% on tactile, 15% upon miscellaous organic sensation and 3% upon taste smell. With the above assertion, it becomes clearer why audio-visual materials are important in the academic achievement processes. This is because they bring the contributions of different senses together to get one hundred percent clarity.

Quite often, teachers and researchers alike, use the terms Audio-visual aid and instructional materials interchangeably. Tairu in Bello & Goni (2016) categorized instructional materials used in teaching/learnig into the following Audio, Visual, and Audio-visual materials:

1. Audio materials which include cassette, recorder, radio, television and gramophone.
2. Visual materials; are books, charts, motion pictures, posters, diagrams models and

photographs.

3. Audio-visual materials; include film, television projectors, among others.

In highly developed countries; some of the materials listed by Tairu (e.g. gramophone, motion pictures, film) as constituting instructional materials are no longer in use or are to say the least obsolete. However, in developing countries such as Nigeria, audio-visual materials such as films, overhead among others are still used in instruction (Oyeshika and Ashiru 2003). Slavin (2000) argues that instructional or audio-visual materials such as text book, pictures diagram's, flashcards, posters television among others are materials or devices that help in the teaching learning process because they influence the senses of seeing and hearing, but its utilisation must depend on proper planning. This seems to confirm the view expressed by Onasanya and Adegbiya (2007) that a planned utilization of instructional materials help the students comprehend, retain and recall concepts, principles or theories and acquire professional skills. Instructional materials are therefore, an integral part of teaching.

Teaching is the activity of facilitating learning (Isola, 2010). A competent teacher of agricultural science must acquaint himself or herself with agricultural science methodology and be well groomed in the application of the various materials for teaching the subject (Adeyemi, 2008). The global wave for the use of educational technology and its revolutionary effects is a major attraction in the field of education. Teaching materials are resource materials, devices or anything which help in the achievement of learning objectives. They can transmit learning experiences through any of the sense of sight, hearing, smell, touch and taste. According to Jocelyn (2010), teaching or instructional materials significantly increase students' achievement by supporting learning. Madhavan (2010) stated that instructional materials are used to aid the transfer of information from one person to another. Dahar and Faize (2011) are of the opinion that instructional materials are used within the classroom to facilitate the teaching and learning process. Instructional materials are objects or devices, which help the teacher to make a lesson much clearer to the learners (Isola, 2010). According to Agina-Obu (2005) instructional materials are also described as concrete or physical objects which provide sound, visual or both to the sense organs during teaching. instructional materials are of various classes such as audio or aural, visual and audio-visual (Oladejo, 2011). Thus, audio instructional materials refer to those that make use of the sense of hearing only, like radio and audiotape recordings. Visual instructional materials on the other hand, are those devices that appeal to the sense of sight only,

such as, the chart, slide, power point and film-strip. An audio-visual instructional material however, is a combination of devices which appeal to the sense of both hearing and seeing such as television, motion picture, videotaped instruction and the computer. It is hoped that when these materials are employed effectively, there will be an improved academic achievement.

Academic achievement is the measure of knowledge gained via formal evaluation evident by test scores, grade point average and degree. Students' academic achievement depends greatly on the application of appropriate instructional materials by the teachers during curriculum implementation. Lafer and Markert (2009) explained that there are broad groups of definitions of academic achievement. The first one refers to numerical scores of a pupil's knowledge, which measure the degree of a pupil's adaptation to school work and to the educational system. The second group is a more subjective one, as it is determining of academic success is on using percentage grade score, the student's attitude towards academic achievement as well as by the attitudes of others towards the learners' success. Students' persistent poor academic achievement has been partly ascribed to inadequate instructional materials and inappropriate instructional methods adopted by science teachers (Ameh and Dantani, 2012). Ifemuyinwa (2013) reported the deplorable academic achievement of secondary school students in science subjects and identified persistent use of the traditional mode of instruction as one of the major short-coming affecting the learning and higher achievement in science subjects. The situation is further exacerbated by the abysmal performance recorded in WAEC Annual report for 2010-2016 for agricultural science and other science subjects.

Generally, the inability of teachers to select and use appropriate audio/visual materials in the teaching of Agricultural science has resulted to lack of interest among students in learning activities which affect academic achievement. There is a major problem of non-availability of the audio/visual materials for teaching which the teacher alone may not be blamed. The school administrators often do not motivate the teacher in terms of providing instructional materials. Poor funding of schools is one of the major factors affecting acquisition of required audio/visual materials in agricultural science.

Agricultural Science is one of the core vocational subjects taught in both junior and senior secondary schools in Nigeria. National Curriculum Council (NCC) specified that agricultural science should be taught in secondary schools in order to create and sustain student's interest in agriculture, and to serve as a foundation for future advancement in the study of

agricultural science (Farauta & Amuche, 2013). Incontrovertibly for the reason of its promising role in promoting self-reliance through the provision of employment opportunities and production of staple foods for the populace together with raw materials supply for the agro-allied industries, its teaching as a course offering in our schools has been given an important focus by the federal government (Farauta & Amuche, 2013). The Federal Republic of Nigeria in its attempts towards the attainment of the laudable goals of vocational and technical education subjects outlined that, the basic objectives of teaching of agricultural science at the secondary schools level are to:

1. stimulate and sustain students‘ interest in agriculture,
2. inculcate in students farming skills,
3. enable students acquire basic knowledge and practical skills in agriculture,
4. prepare students for future studies in agriculture,
5. produce prospective future farmers (FRN, 2013).

The above objectives can only be attainable through motivated instruction of students by teachers of agricultural science. Surprisingly, most teachers of agricultural science in secondary schools are still known to have difficulty in teaching some agricultural science concepts perhaps due to non-utilization of instructional materials, which could be among the causes of students' poor academic performance in such areas especially in prescribed external examinations like West African Senior Secondary School Certificate Examinations (WASSCE), National Examination Council (NECO) and National Technical Education Board (NATEB) (Egun, 2007). The motivation of students in agricultural science can be enhanced through the use of appropriate audio-visual teaching materials.

Ekeyi (2013) said that Agricultural science could be better taught and learnt if it is accompanied with appropriate instructional materials. The teacher needs instructional materials to further help him or her cope effectively with the differences in students' abilities as students come to school from different backgrounds. There may be students who understand the printed work on the board, while there are others who do not understand concepts by mere writing on the board. As a result this may necessitate the need for the materials such as chalk board and text books to help motivate and communicate to the students effectively otherwise there may be many different learners with different education backgrounds who perhaps will not achieve the required knowledge (Abubakar, 2015). Audio-visual materials come in handy,

helping a teacher to cope with various abilities and different level in the class.

The need for instructional materials for effective academic achievement has been established in studies such as WoottingPong (2014); Asadi & Berimani (2015). Nonetheless, of particular interest is the study conducted by WoottingPong (2014) on audio-visual materials; in which he expressed the need for instructional materials especially on the African child, reported that these materials are important because, today's African children have to begin learning a new language like English, if they are to go far in their education. In this case, visual materials become essential for understanding the real meaning of many of the new words they learn especially in the area of description of things.

According to Abubakar (2015) instructional materials provide the teacher with interest compelling spring board into a wide variety of learning activities. The materials have a role to play in stimulating the students. In most cases a teacher's limitation will mainly be his/her own imagination, the more they can find useful ways of employing these materials for more meaningful and permanent learning to take place the better. Idris (2015) stated that the teaching of any subject will be more effective, if the spoken or written materials are accompanied with visual materials either in the form of pictures, charts, diagram among others. His research has shown that even the use of pictorial illustration in a text books does not necessarily help in the acquisition of knowledge from the text than the practical use of those materials. Idris (2015) revealed that the use of audio-visual materials in the teaching/learning of science can be significantly better than the use of conventional method in which no audio-visual materials will be involved. Inappropriate use of teaching materials and lack of or inadequacy of the materials as well as lack of qualified teachers to improvise and handle instructional materials in senior secondary schools in Kaduna State is the major concern to all educational stakeholders in Education (Abubakar, 2015). In light of these, audio-visual materials can be used to improve the quality of instruction in Agricultural Science hence the current study is undertaken.

1.2 Statement of the Problem

In Kaduna state the percentage pass in agriculture has declined through the years, 65% in 2014, 62% in 2015, 59% in 2016 and 57% in 2017 (West Africa Examination Council, 2014-2017). Despite the initiatives, mandates, recommendations by different government organizations, policies, and the ever-increasing use of technology worldwide, it has been observed that audio-visual aids are not being used effectively by the teachers (other than

computer science teachers) teaching various subjects like agricultural science. The use of audio-visual materials in teaching agricultural science by teachers in Kaduna State is left to the drain perhaps due to their inability to develop such materials. This none or poor usage of audio-visual aids in academic could lead to poor teaching by agricultural science teachers (Abubakar, 2015). The resultant effect was poor understanding of the subject and many failures in agricultural science external examination such as WAEC and NECO (National Examination Council, 2015). The rate of failure in secondary schools certificate examination in recent years has been alarming. Educationist, parents and others, express concern over this disappointing and embarrassing issue.

The researcher has experience in marking agricultural science subject at WAEC level. From over five years of experience of marking, the researcher saw the rate of failure of students in the paper due to their inability to identify or label items correctly, their inability to state the uses and maintenance of common agricultural items. This might probably be due to the lack of utilization of appropriate instructional materials by teachers in their teaching sessions. From the experience of the researcher in supervising teaching practice, the researcher observed that teaching of agriculture was more of theories without the use of instructional materials such as audio/visual. Agricultural science is a practical subject that is supposed to inculcate skills into the learners to enable them fill the gap of tomorrow farmers and boost the economy of the nation. It is also observed that most teachers in the schools visited by the researcher during teaching practice supervision, do not use teaching materials especially the audio-visual types even the best teaching plan which could come up against communication barriers that originate in the classroom. The above mentioned problems call for a change in the teaching of agriculture if students will acquire necessary skills and perform better. This means something needs to be done to the teaching of agriculture to enhance students' performance and the use of audio-visual materials.

1.3 Purpose of the Study

The main purpose of the study was to determine the effect of using instructional materials on academic achievement of Agricultural Science in secondary schools in Kaduna State, Nigeria. The specific objectives are to:

1. Determine the mean academic achievement of Agricultural science students when taught without instructional materials,
2. Determine the mean academic achievement of Agricultural science students when taught with audio instructional materials,
3. Determine the mean academic achievement of Agricultural science students when taught with visual instructional materials,
4. Determine the mean academic achievement of Agricultural science students when taught with audio-visual instructional materials;
5. Compare the mean academic achievement of Agricultural science students when taught with audio, visual, audio-visual instructional materials and those taught without instructional materials.
6. Determine the combined mean academic achievement of female and male Agricultural science students taught without instructional materials and with audio-visual instructional materials.

1.4 Research questions

The following research questions guided the study:

1) What is the mean academic achievement of Agricultural science students when taught without instructional materials,
2) What is the mean academic achievement of Agricultural science students when taught with audio instructional materials?
3) What is the mean academic achievement of Agricultural science students when taught with visual instructional materials?
4) What is the mean academic achievement of Agricultural science students when taught with audio-visual instructional materials?
5) What is the mean academic achievement of Agricultural science students when taught with audio, visual, audio-visual instructional materials and those taught without instructional materials?
6) What is the combined mean academic achievement of female and male Agricultural science students taught without instructional materials and with audio-visual instructional materials?

1.5 Hypotheses

Four null hypotheses were formulated to guide the study and tested at 0.05 level of significance.

HO_1: There is no significant difference between the mean academic achievement of Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials.

HO_2: There is no significant difference between the mean academic achievement of female and male Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual learning materials and those taught without instructional materials.

1.6 Significance of the Study

The findings of this study will be significant to: students, parents, teachers, principals, Federal and state ministries of education, curriculum developer/planners, educational bodies, parents, researchers and society at large. It is hoped that the study will be of significance to students as when teachers use audio-visual instructional materials in order to improve academic achievement. The study will also benefit parents in counseling their children on the choice of discipline in the secondary schools, especially agricultural science. It will help the parents in determining the choice of the type of school with good audio-visual materials for their children. This is because, their wards will enjoy good school learning environment with adequate audio-visual materials that will lead to quality school products.

The findings will enable the teachers to appreciate the need for proper utilization of instructional materials. It will help the teacher to improve both in teaching effectiveness and increased productivity in the schools. Findings of this study will help clarify among the teachers the need for continuous and regular improvisation of suitable instructional materials for academic achievement of agricultural science. Also the study will be useful to teachers when the government make adequate provision of instructional materials available.

The study will provide our educational administrators in the Ministry of Education, Science and Technology (MOEST), educational test and measurement experts with information

on the need to provide instructional materials for teaching/learning of agricultural science in our secondary schools setting particularly in Kaduna State. Principals will benefit through identification and provision of the right audio-visual materials for teaching/learning of Agricultural science which can improve academic achievement recommended in this study. It will provide the school principals the opportunity to improve in school supervision so as to ensure both provisions of adequate quality materials and utilization to enhance academic achievement in the schools. It will enable them appreciate the contribution of instructional materials on students' academic achievement.

Recommendation from the study findings will assist the ministry of education in policy making and provision of audio-visual materials that will enhance academic achievement of agricultural science, as well as managing the audio-visual materials for efficient and effective teaching of Agriculture at senior secondary schools level. The findings will help the government or the policy makers in formulating effective planning and implementation of policies and programmes for improved school teaching and learning activities through utilization of audio-visual materials. It will also provide policy makers with intelligent forecast and analysis of future needs of the schools in the areas of audio-visual materials.

Moreover, the results of this study will be of great significance to the agricultural science curriculum planners. The curriculum developers will find the work useful in reviewing the agricultural science curriculum by seriously laying emphasis on utilization of instructional materials so as to meet up with emerging needs of the society. The study will also be useful in educational policy making. The research will arouse instructional educational funding agencies such as Federal Ministry of Education, faculties or schools of education, National Teachers' Institutes as well as professional bodies such as Science Teachers Association of Nigeria (STAN) to formulate educational polices which may be useful in implementation of agricultural science curriculum.

Finally, it will be of benefit to the student researchers as it will provide a valid working document or literature in investigating other areas not covered by this study. Thus, it will serve as a point of reference to future researchers in the field. This study will be of immense benefit to researchers in the field of agricultural science by forming a basis for further studies on the usage of instructional materials and teachers' quality in order learning aspects of

agricultural science as a subject. The study also will be useful to society depending on who may wish to undertake a similar research, also acts as a primary source of information in the university, and the government in designing policies on the effective teaching of agricultural science.

1.7 Scope of the Study

The study was delimited to Government Secondary Schools of Kaduna State in the use of audio, visual and audio-visual materials to teach Agricultural Science students. The experiment covered range land management, livestock (poultry) management, livestock (goat) management and livestock (pig) management as specified in the Senior School Certificate Examination 2009 syllabus.

CHAPTER TWO

LITERATURE REVIEW

The related literature was reviewed under the following sub-headings:

2.1 Theoretical Framework

2.2 Teaching Agricultural Science in Senior Secondary School with Audio-Visual Materials

2.3 Academic Achievement and Audio-Visual instructional Materials

2.4 Instructional Materials: Audio, Visual and Audio-Visual

2.5 Impact of instructional Materials on Academic Achievement of Agricultural Science students in Senior Secondary Schools

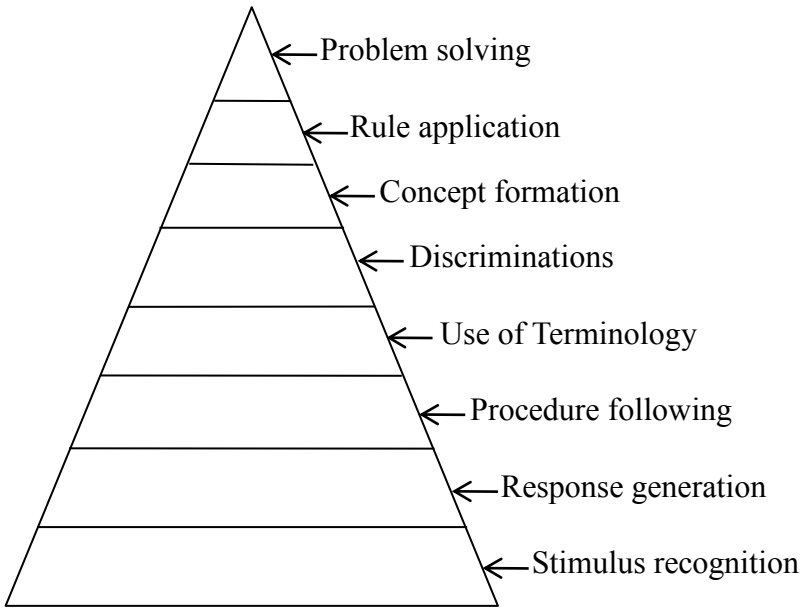
2.6 Review of Related Empirical Studies

2.7 Summary of Literature Reviewed

2.1 Theoretical Framework

The theoretical framework of the study is based on the instruction theory propounded by Gagne in 1992. Gagne's theory of instruction which stated that different types of learning require different instructional conditions are most likely to bring about these different types of learning. Gagne identifies five major categories of leaning; verbal information, intellectual skill, cognitive strategies, motor skill and attitude. Different internal and external condition are necessary for each type of learning, He further suggested that instructional delivery for enhanced academic achievement can be organized in a hierarchy according to complexity; stimuli, recognition, response generation, procedure following, use of terminology, discrimination, concept formation, role application and problem solving (Gagne and wager 1992).

Gagne's theory of instruction



(Source: Gagne's and Wager 1992)

The primary significance of the hierarchy is to identify prerequisites that should be completed to facilitate learning of each learner. In addition, the theory outlines nine instructional events and corresponding cognitive processes (Gagne's and wager 1992).

1. Gaining attention (reception)
2. Information learner of the objective (expectancy)
3. Stimulating recall of prior learning (retrieval)
4. Presenting the stimulus (selective perception)
5. Providing learning guidance(systematic encoding)
6. Eliciting performance (responding)
7. Proving feedback (reinforcement)
8. Assessing performance (retrieval)
9. Enhancing retention and transfer(generalization)

These events should provide the necessary condition for learning and serves as the basis for designing instruction and selecting appropriate instructional materials. There are various authorities that have propounded theories on learning. These theories are on constructs from either psychological or sociological theories; however, one of the theories that

capture this study is Gagne's theory of instruction. Gagne's considered internal and external conditions under which a teacher can arrange for the instructional delivery to enhance performance outcomes of students. The external conditions are the instructional materials that the teachers arrange during instruction and the internal conditions are academic achievement of students.

This study is inclined to Gagne's theory of instruction which advocates that instructor's attitudes should be encouraged by using appropriate instructional materials to deliver the required knowledge to promote of academic achievement of students in Agricultural science. The theory came out with some learning principles as follows.

i. Learning by doing: Refer to the fact that, learning is best if there is active and willing participation of learning process.

ii. Use of learning material: It enhance better insight and performance when the learner has reason to continually make use of learning material or practice the learned task. He is more likely to develop a better understanding of learned materials and perform better out of any such tasks than not putting such to use.

iii. Type of teaching method: - Enhance learning skills, when learning involves acquisition of skills and use of appropriate teaching methods to enhances learning and retention.

For this reason the teacher expect the learners to develop practical skills and thoroughly established habit of performing a task in an efficient manner. Gagne's central idea in instructional theory provide teachers to think carefully about the nature of practical skills or task they wanted to teach and make sure that the learner's have the necessary prerequisite to acquire the skills through conditions of learning and events of instruction to promote the transfer of knowledge and skills (Senchi, 2005).

This study is also anchored on the social learning theory. The theory was propounded by Bandura in 1977. The social cognitive learning theory states that learning usually undertaken by way of observation or imitation through which an organism watches or observes another organism. The basic premise of Bandura's mediation learning theory is that behavior results from a continuous interaction between significant factors. These factors include imitation, vicarious learning and symbolic learning (Okoye, 2012). It is Bandura's view that the

learner plays a prominent role in cognitively selecting, organizing and transforming stimuli from the environment in which he is found. Accordingly, learning occurs by watching the events of the environment. By social learning then, humans are seen as social animals that through observations of their social world or the interpretations of such world or the interpretations of such observations collect large amounts of data or information through which complex and skilled performances are learnt. According to Miranda (2007), owing to his social nature, a human being forms his behavior by observing the way others behave; he endeavours to imitate others. Learning can then be carried out by observation and imitation, such learning is referred to as modeling.

Bandura in Alao and Adeniyi (2008) stated that social learning theory focuses on the behaviour of individual and groups and how behavior is affected by the presence or influence of other people. For social learning to take place, there are four factors which must be present. These are observers (learners), teacher (model), learners' attention and proximity or nearness. The process of learning is influenced by the extent of identifications and imitation by the learners to the other three factors. According to Bandura's theory of social learning, it is possible to explain that learning has occurred by acts performed by the observer, during and after observing the model. According to Miranda (2007), these acts are sometimes carried out by the observer covertly; this might involve thinking deeply about the events carried out by the model. The cognitive mediation theory of social learning has useful application in learning such as computerized systems.

In this study, the students will watch (observed) Agricultural science instructions as presented using audio, visual and audio-visual materials (stimuli). The study will assess if the students will be able to cognitively organize and transform the stimuli. The assessment will be done using their scores from achievement test (responses) to the questions posed on the instructional content. Acquisition of skills (learning) indicates ability to transform stimuli from the environment.

This study is also of the opinion that agricultural science teachers should use the materials that would enable students to easily perceive learning situations in a positive way, especially in the teaching of agricultural science. According to Akanbi (1989) distinguished four stages in the development of cognition or intelligence. This concept of stage implies that development takes place in unvarying steps like sequence, regardless of the child's culture or

education. According to Akanbi, the child begins rudimentary concept formation at the pre-conceptional thinking stage. Here the child begins to classify things in certain classes because of their similarity. Here he explains that the child's rather than his logic being either deductive or inductive, it is transductive. This study here is of the opinion that the teacher should be able to present instructional materials that would enable the students to overcome the problems of transductive. The inability of teachers to utilize the appropriate methods and materials to teach agricultural science has contributed to poor students' academic achievement in the subject.

2.2 Teaching Agricultural Science in Senior Secondary Schools with Audio-Visual Materials

The Nigerian, agriculture sector had suffered neglect for decades due to the discovery of oil. However, the sector still contributes significantly to the nation's gross domestic product. As highlighted by Adegboye (2004), agriculture contributes more than 30 percent of the country's annual Gross Domestic Product (GDP), employs about 70 percent of the labour force, accounts for over 90 percent of the nation's non-oil exports and provides over 80 percent of the country's food resources.

Despite the importance of agriculture such as food, clothing, homes, even human traditions and values all come from agriculture, Oluwadaisi (2010) reported that the study of agriculture in Nigerian schools is faced with a myriad of challenges. Onuekwusi and Okorie (2008) reported low students' performance in agriculture science in Nigeria in the recent years and attributed this low performance to number of factors which among others are: lack of interest, lack and motivsation, poor utilization of instructional materials and methods; also lack of adequately trained youths in agriculture to take up farming as a career (Kanaimba, 2009).

In the National Policy on Education, Agriculture is one of the subjects offered in Junior and Senior Secondary Schools, as a pre-vocational elective and vocational elective respectively (FRN, 2013). The curriculum content of the senior school level was structured to focus on three major areas: production (food production), projection (agronomy and forestry) and economics (agricultural economics and farm management). 'Guided Discovery' a method that lays emphasis on learning by doing was recommended in the curriculum to enable the students explore and harness the agricultural resources within their local environment. Perhaps this can be achieved via prudent application of appropriate teaching materials such as audio,

visual and audio-visual. The aim will help students in food production and other agricultural products for themselves and their community (NERDC, 2012).

The overall objective of the revised curriculum is to provide students with adequate knowledge and skills that will enable them to discover their talents and enrich agricultural science education in Nigeria (NERDC, 2012). Specifically, the objectives of senior secondary Agricultural education are to:

1. stimulate and sustain students interest in Agriculture;
2. impart functional knowledge and practical skills in agriculture to students;
3. prepare students for further studies in area of agriculture; and
4. prepare students for profession in Agriculture (NERDC, 2012).

Ikeoji, Agwubike and Disi (2007) stated that the basic goal of the National Policy on Education is to make education both practical and useful. It has also been observed that vocational education originated out of the need for the system to make its products useful to themselves and to the society (Ikeoji, 1997). Even though agriculture is a vocational elective at senior secondary, the performance of students in the subject and the sector has not improved. Ikeoji and Agwubike (2006) noted that graduates of vocational agriculture in senior secondary schools in Nigeria have often not been able to take up their responsibility in paid jobs at the completion of their secondary education, thus, defeating the goals of changing agriculture to a vocational subject at secondary school level in Nigeria.

In many societies teachers are placed in the centre of educational process. All they do is to impact to the students certain ideas, attitudes, skills and basic knowledge in the possible time given according to the principles of leaning, the main effort of the teacher is to help the learner and direct him in the way he or she will achieve that new knowledge, skill or attitude. The teacher uses materials for effective teaching. According to Bello and Goni (2016) these materials assist both the teachers and the learner to acquire the prescribed knowledge, skills and ideas, the students need relevant teaching materials and qualified teachers to help them comprehend teaching and learning. These materials of learning perhaps have some impact on the students and may lead to improvement on the students' academic achievement. It could therefore, be said that subjects in schools could be better taught and learnt if the teaching is accompanied with teaching materials. The teacher needs teaching materials to further help him cope effectively with the differences in students' abilities, as students come to school from different backgrounds.

There may be students who understand the printed work on the board, while there are others who do not understand concepts by mere writing on the board. As a result this may necessitate the need for the materials such as chalk board and text books to help motivate and communicate to the students effectively otherwise the many different learners with different education backgrounds may not achieved the required knowledge. Audio-visual materials come in handy helping a teacher to cope with various abilities and different level in the class (WoottingPong, 2014).

The need for instructional materials for effective teaching and learning has been established especially in other studies (Aina and Adekanye 2013; Ashaver and Igyuve 2013; Asadi and Berimani 2015; Bello and Goni 2016). But of particular interest is on audio-visual materials, which expresses the need for teaching materials. The students need to see and share, to see hand books and pictures which they can study in their leisure time even of more importance is the fact that presently most students have to begin learning a new language like English, if they are to go far in their education. In this case, visual materials become essential for understanding the real meaning of many of the new words they learn especially in the area of description of things. Teaching materials provide the teacher with interest compelling spring board into a wide variety of learning activities. The materials have a role-play in stimulating and revolving the students. In most cases a teacher's limitation will mainly be his own imagination, the more he can find useful way of employing these materials for more meaningful and permit learning to take place the better.

The teaching of agriculture at the secondary level in Nigeria today is done at two levels: (i) at the Junior Secondary School (JSS) and (ii) at the Senior Secondary School (SSS). At the Junior Secondary School (JSS), spanning through the last three years of basic education, "Practical Agriculture" is recommended as one of the core subjects (Umaru, 2011). The National Curriculum for Junior Secondary Schools, outlined the objectives of agricultural education in secondary schools in Nigeria as:

(i) To stimulate students interest in agriculture.

(ii) To enable students to acquire basic knowledge of agriculture

(iii) To develop basic agricultural skills in students

(iv) To enable students to integrate knowledge with skills in agriculture

(v) To expose students to opportunities in the field of agriculture

(vi) To prepare students for further studies in agriculture

(vii) To prepare students for occupations in agriculture (William, 2004).

Nigeria as a country today faces numerous challenges. Principal among these as put by Adebiyi, (2005) is how to move its citizenry from the rank of dreamers to that of achievers, transforming the socio-political country called Nigeria from being a mere geographical expression into a real nation. To overcome this the federal government in the fourth edition of the National Policy on Education (FRN, 2013) found education as an instrument par excellence for responding to this all important challenge. Education, according to Adebiyi (2005), is "the process of training and learning to improve knowledge and develop skills and attitude. Every nation needs to develop its human and natural resources for the full benefit of its citizens. This cannot be attained without functional education, for the knowledge and skills require to do this would be realized through effective teaching, learning, and training backed up with sound information through audio-visual resources. The success of any education system largely depends on the quality of teaching and learning that takes place, which in turn depends on the level of efficiency and effectiveness of the teachers and their ability to use Audio-Visual resources effectively.

According to Agbulu and Ademu (2010) instructional materials are important because they are used for the transference of information from one individual to another, help the teacher in extending his learner's horizon of experience, stimulate learners' interest and help both teachers and students to overcome physical limitations during the presentation of subject matter, among others. The instructional materials required for effective teaching of agricultural science to students in senior secondary schools include hoes, shovel, sickle, watering can, hand trowel, digger, axe and pictures, video clips (NERDC, 2012). It is the view of the council that the recommended instructional materials of agricultural science in curriculum should be made available in schools by the school authority. Teaching materials increase the rate of learning, save the teachers' time and efforts, increase learners interest and facilitate retention of what was learned through appropriate learning strategies chosen by the teacher. Learning strategies refer to the different activities that students apply and by which learning is achieved for teachers to foster the deep learning strategy they must teach outside of the teaching paradigm. In other words, teacher must present information in way that encourages students to seek their own answer using their own strategies. Instructional materials are the devices developed or acquired to assist or

facilitate teachers in transmitting organized knowledge skills and attitudes to the learners within a teaching situation (Nwachukwu, 2006).

2.3 Academic Achievement and Audio-Visual instructional Materials

Academic achievement refers to a successful accomplishment or performance in particular subject area. According to Ward, Stoker and Murray-Ward (1996) it is indicated by grades, marks and scores of descriptive commentaries. Academic achievement is the extent to which a student, teacher or institution has achieved their short or long-term educational goals (Bossaert, Doumen, Buyse, and Verschueren, 2011). Apparently academic achievement is commonly measured through examinations or continuous assessments, though there is no general agreement on how it is best evaluated or which aspects are most appropriate. According Fajola (2008) there are inconclusive results over which individual factors successfully predict academic achievement, elements such as test anxiety, environment, motivation, and emotions require consideration when developing models of school achievement.

Individual differences in academic achievement have been linked to differences in intelligence, environmental (instructional materials inclusive) and personality (Ward, Stoker and Murray-Ward, 1996). Students with higher mental ability as demonstrated by IQ tests and those who are higher in conscientiousness (linked to effort and achievement motivation) tend to achieve highly in academic settings. A recent meta-analysis suggested that mental curiosity (as measured by typical intellectual engagement) has an important influence on academic achievement in addition to intelligence and conscientiousness (Ward, Stoker and Murray-Ward, 1996).

Students semi-structured home learning environment transitions into a more structured learning environment when children start first grade. Early academic achievement enhances later academic achievement (Magnuson, 2007). Children's first few years of life are crucial to the development of language and social skills. School preparedness in these areas help students adjust to academic expectancies. Indirect evidence suggests that physical activity such as instructional materials could have an impact on academic achievement. Studies have shown that physical activity can increase neural activity in the brain (Bossaert, Doumen, Buyse, and Verschueren, 2011).

Academic achievement also depends on how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers in a fixed time or

academic year. Fajola (2008), used the notion of academic self-concept in referring to individuals' knowledge and perceptions about themselves in academic achievements, and convictions that they can successfully perform a given academic task at designated levels. Rothstein (2000) argues that; learning is not only a product of formal schooling but also of communities, families and peers. Socio-economic and sociocultural forces can affect learning and thus school achievement. A great deal of research on the determinants of school achievement has centered on the relative effects of home-related and school-related factors. Others argued that in various studies they indicated both home and school environments have a strong influence on performance of students.

Kobaland and Musek (2001) stated that there are two broad groups of definitions of academic achievement. The first one could be considered more objective, because it refers to numerical scores of a pupil's knowledge, which measure the degree of a pupil's adaptation to schoolwork and to the educational system. The second group is a more subjective one, as its determination of academic success is reliant upon the student's attitudes towards his academic achievement and himself, as well as by the attitudes of significant others towards his/her success and him/herself. Achievement is defined as something accomplished successfully, especially by means of exertion, skill, practice, or perseverance (Umoren & Ogong, 2007). It can be referred also to measurable changes in students' behaviour in academic as a result of exposure to a given concept. Different findings have emanated from researches carried out on effects of instructional materials on students' achievement.

According to Otekunrin, Oni and Otekunrin (2017) continuous poor achievement of students in agricultural science implies that a majority of them will not be able to take courses in agriculture in the higher institutions of learning. The ripple effect of this is that many young people will not have interest in taking up a career in agriculture which will eventually lead to the problem of food insecurity in the country. Thus, researchers in agricultural Science education have been conducting a series of research to ascertain the causes of poor achievement in the subject and proffer solutions to these challenges. For instance, Usman and Memeh (2007) listed students' non-use of appropriate teaching materials, background, students' negative attitude towards agriculture, poor teaching techniques among others as causes of poor academic achievement in the subject. The problem, according to Camilus (2011) can be attributed to poor perception and lack of interest in the subject on the

part of the students. Moreover, Marsh (2004) affirmed that students' self-perception of academic ability will affect their academic achievement in school. The inability of teachers to employ the use of instructional materials influences the academic achievement of students negatively.

Students achieve the desired outcomes in an agricultural experience through developing beliefs and attitudes around the industry of agriculture. Exposing students to more diverse agricultural subject matter can improve their disposition towards the agriculture industry as a potential career option (Opara, 2006). Academic outcomes result from students experiencing educational opportunities and acquiring knowledge to form attitudes which lead to decision-making behaviour concerning careers as indicated by Dewey (2008). Perhaps this can be achieved through adequate provision and utilization of instructional materials. These educational opportunities according to Phipps, Osborne, Dyer & Ball (2008) can be facilitated through the complete agricultural education programs because of the curricular and developmental focus on the individual. Considering the increasing demand for manpower with expertise in agriculture, food systems, and natural resources, Goecker, Smith and Goetz (2010) buttressed that the secondary agriculture programs will need to nurture high number of human resources through the use of appropriate instructional materials such as audio-visuals. The use of these materials is not properly adopted by the Agricultural Science teachers as evidenced by empirical studies that the use of audio, visual and audio-visual materials is not communal. Thus, it is important to investigate the effects of instructional materials on academic achievement of Agricultural Science in secondary schools in Kaduna State, Nigeria.

2.4 Instructional Materials: Audio, Visual and Audio-Visual

Instructional materials are resource materials, devices or anything which help in the achievement of learning objectives and which can transmit learning experiences through any of the senses of sight, hearing, smell, touch and taste (Ashaver and Igyuve, 2013). According to Jocelyn (2010), instructional materials significantly increase students' achievement by supporting learning. Madhavan (2010) states that, instructional materials are used to aid the transfer of information from one person to another. Dahar and Faize (2011) were of the opinion that insrtuctional materials are used within the classroom to facilitate the teaching and learning process. Instructional materials are objects or devices, which help the teacher to make a lesson much clearer to the learners (Isola, 2010). According to (Agina-Obu, 2005), earning

instructional materials are also described as concrete or physical objects which provide sound, visual or both to the sense organs during teaching. Miranda (2007) buttressed that instructional materials are part of the teaching procedure because they supplement the teaching delivery approach adopted by the teacher.

Ofoegbu (1994) identified the importance of instructional materials in teaching of concepts and principles, stating that, instructional materials are necessary if pictures and images are to be vividly retained in the memory. Furthermore, Ofoegbu agreed that human beings learn easily and faster through the use of instructional materials than by verbal expression alone. Ofoegbu explained that the various organs of sight, hearing, smell and touch could cause excitation along the neural channels, which reach mental centers where the impressions fuse with previous acquisitions. Perhaps instructional materials can facilitate the academic achievement and recall of materials. This is because they seek to evoke the maximum response of the whole organization. Ofoegbu (2003) argued that instructional materials supply the basis for making learning more permanent. They also motivate students to carryout investigations on their own.

According to Nicholls (2000), education has become widespread and exclusive oral teaching cannot be the key to successful pedagogy. For this reason, to make teaching and learning interesting, the teacher has to use instructional materials. Jotia and Matlale (2011) states that, a resourceful instruction needs to give all students the opportunity to grasp the content taught at a time. In so doing, active participation during instruction increases learning and retention. Lecturing is still a common way for instructors to communicate information. However, it does not allow for much interaction between learner and teacher and as a result, the instructor may falsely assume that students fully understood the concepts that he presented (Cope, 2011). Therefore, students learn more efficiently by participating in instruction. Also, using a variety of teaching approaches can significantly improve learning and retention in students of all ages.

2.4.1 Audio instructional materials

Instructional materials are of various classes such as audio or aural, visual and audio-visual (Oladejo, 2011). Thus, audio instructional materials refer to those that make use of the sense of hearing only, like radio and audiotape recordings. According to Umaru (2011) audio includes model, computer, tape recording, tapes and cassettes, and radio broadcasts among

others. Educators have realized the value of audio materials, not as a separate subject, or a teaching project, but as an effective, vital method of teaching, providing for the presentation of knowledge through seeing and learning experience. The gains in audio materials in the teaching/learning processes must be consolidated. The advent of computer assisted instruction (CAI) and educational games have further emphasized the primary function of audio materials, which is to improve the efficiency and effectiveness of the teaching and learning process (Uyagu, 2009).

Prostano and Prostano cited Ashaver and Igyuve (2013) asserted that from the time immemorial, audio-visual materials existed but were not incorporated into educational system". According to the authors, the advent of audio-visual materials is long but it is the use that has been limited until in the 1960s and 1970s that libraries realized the use of these materials and started incorporating them into the library collections for future use. Aina and Adekanye (2013) stressing on the advent of the materials stated that before man developed speech as a means of communication, he expressed himself in terms of drawings, signals and symbols. The point here is that the use of audio-visual materials started as early as man's civilization begain. This is evident in their attempt to communicate ideas. Green (1965) cited in Ashaver and Igyuve (2013) has this to say; in time of antiquity, man carried pictures on rocks for conveying ideas.

2.4.2 Visual instructional materials

Visual instructional materials on the other hand, are those devices that appeal to the sense of sight only, such as, the chart, slide, power point and film-strip. Instructional materials provide the teacher with interest compelling spring board into a wide variety of learning activities. The materials have a significant role of motivating and encouraging the students. In most cases a teacher's limitation will mainly be his own imagination, the more he can find useful way of using these materials for more meaningful and permit learning to take place the better. According to Thouless in Bello and Goni (2016), teaching of any topic will be more effective, if the spoken or written materials are accompanied with visual materials either in the form of pictures, charts, diagram among others. It is evident that even the use of pictorial illustrations in a text book does not necessarily help in the acquisition of knowledge from the text than the practical use of those visual materials (Uyagu, 2009).

The visual materials are those instructional materials that can be clearly seen with our eyes vividly (Faruata, 2007). These materials give graphical representation of materials without

the audio profile. Examples of visual materials according to Umaru (2011) are chalkboard, agricultural science textbooks, charts, model, specimen, a practical farm or school gardens, survey equipment, simple farm tools, farm machinery and implement, cages for small animals (rabbit and poultry), feeding trough, samples of different soils among others. According to Balogun cited in Umaru (2011) it is part of the duty of any agricultural science teacher to make models, charts and diagrams. Among the most continuously useful visual aids for the teaching purposes are those the agricultural science teachers made for himself. Moreover, the students should be encouraged to help, and to make such aids as a hobby especially in science club, handicraft groups – basket making, local cage making and so on. Specimens are real things. As general rules, living specimens are better than dead ones. Obtaining specimens takes time, if then, the agricultural science teacher makes poor use of them, his/her time will have been largely wasted. If rightly used, specimens should not only add interest to the lesson, they should also help the agricultural science students to understand and to remember the subject (Imogie, 1989). For instance in studying agricultural implements (simple farm tools) there are variations in the type of shape of tools used in the farm in different communities. These variations are brought about by variations in the rate of development of agriculture, the soil type and the planting operation for which the tool is used. The following are the most common farm tools used in Nigeria; the hoe, the matchet or cutlass, an axe, the sickle, the file, and the mattock. Visual materials including models, real objects, three dimensional displays, the chalkboard, bulletin board, adhesives, graphs, diagrammes, charts, maps, cartons, posters and pictures and projected forms like transparencies, slides, filmstrips and films.

According to Aina and Olutade (2006) the chief visual tools which can be used by the teacher may be classified as follows:

Visual Materials

Pictorial and Graphic

Chalkboard

Textbooks illustrations

Charts

Pictures

(a) Drawing

(b) Reproductions

(c) Photographic

Maps of various types

Diagrams. Picture language (Isotype) among others.

Optical Aids

Episcope

Diacopes

(a) Standard Lantern

(b) Sub-standard slide projector

(c) Strip projector

(d) Micro-slide projector

16mm Cinematograph

(a) Silent

(b) Sound

Specimens

(a) Actual objects

(c) Facsimiles or reproductions

The direct experience

The contrived experience or "Mock-up"

Models

(a) Reduced

(b) Enlarged

(c) Sectional

(d)Working, included real objects e.g. school visits

Dike (1993) grouped audio-visual materials into: audio-visual combinations are sound film and filmstrips, slides-tape decks, television programmes, videotapes and dramatization. Other materials includes educational programmes/games, programmed instructions, demonstration and field trips. From the above we can see that Audio/Visual materials are divided into audio visual and a combination of audio and visual materials and others which are class with audio-visual materials which can either be in a projected or non-projected forms (Ashaver and Igyuve, 2013).

2.4.3 Audio-Visual instructional materials

Audio-visual materials are those that we can hear and see, by producing sound that the sound are expressed in thought. They appeal to our senses of hearing and seeing. Audio visual aids include: tapes, video, television, projectors and motion pictures. An audio-visual instructional material however, is a combination of devices which appeal to the sense of both hearing and seeing such as television, motion picture, videotaped instruction and the computer. The use of audio-visual materials can revolutionize teaching and can help decrease forgetting and increase the permanence of what is taught (Quddus, 1990).

Among the instructional materials the classroom teacher uses, the visuals out-numbered the combination of the audio and audio-visual. According to Miranda (2007) teaching aids are useful to reinforce what you are saying, ensure that your point is understood. Also, enable student to visualize or experience something that is impracticable to see or do in real life and engage students' other senses in the learning process. Esu, Enukoha and Umoren (2004) cited in Aninweze (2014) assert that instructional materials are the pivot on which the wheel of teaching and learning rotates. Teaching and learning are complex processes composed of interaction among teachers, students, teaching content and the environment (Miller, 1991). For this study, the instructional materials used are audio, visual and audio-visual materials for agricultural science instruction.

Audio-visual materials are part of our cultural heritage, carrying a huge amount of information that needs to be preserved for future use. The rich variety of media expressions in society should be reflected in teaching and learning process of agricultural science to enhance academic achievement. Non-printed materials are however, often referred to as audio-visual resources, according to Aina and Adekanye (2013) they are the product of advanced technology, some of which require special equipment to operate. Non-printed resources can be grouped into three such as audio, visual and audio-visual). Audio-visual centers in the 21st century can and should be the hubs for increasing students' achievement. The resource center or libraries houses audio-visual resources for all ages that cover many of the concepts of agricultural science.

The school library also provides facilities for students to watch video and DVDs, listen to sound recording and view microfiches and microfilms. Students and teachers can also watch live streaming and recorded TV programs online by use of e-TV. The audio-visual materials have their unique roles to play in teaching and learning situation and so must be made readily

available and accessible for utilization to improve academic achievement (Adewoyin, 2007). Audio-visual materials or media resources according to Alokun (2004) have not been given proper recognition in the secondary schools as that given to books and journals in developing countries like Nigeria (Aina and Adekanye, 2013).

Gopal (2010) stressed that audio-visual materials help the teacher to overcome physical difficulties of presenting subject matter. That is to say, with audio-visual materials, the b a r r i e r of communication and distance is broken. The culture and climatic conditions of other countries can be brought into the classroom with the aid of slides, films, filmstrips and projectors. This is important because, according to Dike (1993) once the phenomenon is visualized, the picture and knowledge becomes very clear and permanent. Agreeing to this assertion, a 20^{th} century Chinese philosopher stated that "one picture is worth a thousand words. The effectiveness of visual materials in leaning, estimated that about 40% of our concepts are based upon visual experience, 25% upon auditory, 17% on tactile, 15% upon miscellaous organic sensation and 3% upon taste smell (Swank, 2011). With the above assertion, it becomes clearer why audio-visual materials are important in the teaching and learning processes. This is because; they bring the different senses contributions together to get 100% clarity.

According to Eze (2013) human beings learn more easily and faster by audio-visual processes than by verbal explanations alone. The ability of human beings s to arrive at abstract concept through perceptual experience is however, a phenomenon not clearly explained and perhaps not explicable. Furthermore, Oketunji (2000) stressed that audio-visual materials when effectively used have these advantages. They lessen major weakness of verbalism, humanize and vitalize subject matter, provide interesting approach to new topics and give initial correct impressions, economic time in learning, supply concrete materials needed, stimulate the initiative of the pupils.

According to Matin (2009) these materials stimulate interest of learning as it takes place effectively when the teacher sets out to provide learning situation in which a child will learn because of his natural reactions of the provided materials". During the process of learning, the teacher has to provide the learning situation to satisfy the natural reaction of the learner and this is through the use of instructional aids. The attention of the learner is caught and his interest is also won and he is ready to learn. A friendly, accepting group climate is

important in any learning situations, especially those audio-visual materials that require students to reveal their ignorance and confront their fellow students

Mcnaught (2007) also observed that audio-visual materials are very useful teaching as well as promotional aids. He further stressed that where consistency of presentation is desirable, audio-visual materials are useful. They provide experiences not easily secured in other ways and hence contribute to the depth and variety of learning. These audio-visual materials serve as source of information to the child to think, because, the information can be gotten from the good use of perceptual instructional materials especially those provided from our locality. When they are used in the class, their familiarity gives a background understanding of the lesson.

Audio-visual resources can play a major role of making learning permanent, Gopal (2010) was of the opinion that "audio-visual methods do seem to facilitate the acquisition, the retention and the recall of lessons learned, because, they seem to evoke the maximum response of the whole organism to the situations in which learning is done. And perceptual materials readily associate themselves with the unique experiential background of each individual. Natoli (2011) stressed that audio-visual materials are important in the teaching and learning processes because having seen something, most people remember, for whatever that thing was, it conjures up an image at a mere mention and can be talked about freely. Dike (1993) also explained that students forget because of lack of interest and opportunities to use the knowledge they have gained later on. Audio-visual materials can therefore contribute to the clarity of lesson presented by allowing students to visualize what is learned.

Furthermore, the relevance of instructional materials to the objective of the lesson and the ease of use of the teaching materials are serious considerations in teaching materials utilization to better the learner's performance. The performance of the students in agricultural science and practical agriculture in high schools respectively is not encouraged (Ikot, 2008). Ikot observed that the poor performance of students in agricultural examinations may not be unconnected with non-utilization of suitable instructional materials. Many teachers go to classes to teach agricultural science and practical agriculture as liberal arts without any material to assist them or the learners. Learning is facilitated when the learners make use of at least three of the sense organs namely: seeing, hearing and touching.

There are different ways of classifying audio-visual materials. With the necessary related equipment for putting them to work in the classroom, audio-visual materials include the following: These materials, situations, and the people have to be visited, studied, observed, reacted to and worked with, right in their natural environment. They may come into the class in display cases or attached on bulletin boards. Dramatic performances (portrayal of people, events, procedures) dolls and puppets are produced for use as dramatic models. These materials are grouped according to Ashaver and Igyuve (2013) as:

1. Models, mock-ups globes, and relief maps can be purchased or produced by the teachers and students jointly. Exhibits and dioramas made up of models can be borrowed, purchased or constructed.
2. Television programmes: This requires television receivers and antenna systems. They can be produced jointly by students and teacher as learning experiences.
3. Motion pictures: Projection equipment for accommodation either optical or magnetic sound tracks or projection screens are required. Still pictures projection materials include transparencies and micro- projector materials (microscopic slides and microscopic slides and microscopic objects).
4. Study prints and pictorial illustrations
5. Radio and Audio programmes, as found in tapes or disk recordings and radio broadcasts.
6. Graphic materials such as maps, graphs, cartoons, diagrams and charts.

2.5 Impact of instructional Materials on Academic Achievement of Agricultural Science Students in Senior Secondary Schools

According to Adeyemo (2011) the presence of various instructional materials in schools such as audio-visual materials arouses student's interest towards learning and definitely might have positive effects on performance. Audio-visual aids take the form of technological devices, amongst these are: tape recorders, radio broadcasts, public address system, overhead and opaque projectors. As teaching resources, they are useful for the presentation and clarification of information.

The North-Western Nigeria being an agrarian society is increasingly depending on the ability to develop human resources capable of dealing with current economic, scientific, technological and environmental challenges (Ibrahim and Bin Jamil, 2012). Therefore, concerns

regarding the supply of such human resources stem from the decreasing number of qualified candidates to gain admission into the field of agriculture and agricultural related fields (WAEC Chief Examiners' Report, 2012-2013). While, students' academic achievements in the national examinations have improved in 2013, notably there remains a significant gap in the relative levels of students' achievement. This gap is associated with different levels of involvement by the teachers (Ibrahim and Bin Jamil, 2012).

Similarly, under representation of secondary school agricultural sciences in most of the researches conducted provide a basis for concern (Oribhabor and Okodugha, 2010). This is fundamental to argue that academic achievement of students in agricultural sciences can be affected by non-adherence to the use of appropriate teaching materials such as audio, visual and audio-visual at any time. Unfortunately, there is no clear enough evidence of such information in Kaduna State particularly when the current information on students' academic achievement is disaggregated into secondary schools, tertiary institutions and even among science subjects. The extents to which teaching materials affect the students' academic achievement in agricultural sciences and in Kaduna State remain to be clarified.

Intelligence is not the only determinant of the academic achievement of the student. Academic achievement of a student is always associated with many components of learning environment (Abdullahi, Mlozi and Nzalayaimisi, 2015). It is worth noting that Agricultural science students' academic achievement is affected by numerous factors, teaching materials inclusive. Ani (1990) supporting the introduction of audio-visual aids observed that as far back as the 1920s audio-visual materials came to be used in teaching in the United State of America. According to Dike (1993), the various methods of teaching informally such as observation, participation and the use of the senses are forms of audio-visual materials in our indigenous Nigerian Education. The child is asked to observe carefully without verbal instructions and to participate in domestic science, craft, and agriculture, the child is able to grasp knowledge from different fields unconsciously. Thus every student has the right to knowledge and information especially that which concerns his cultural heritage". It is imperative therefore that in cultures whose traditions are essentially of the oral rather than the writer kind, knowledge and information transfer be affected by using verbal instructions and the preservation of their cultural arts. This is the meaning of the story telling sessions in our indigenous African education (Oribhabor and Okodugha, 2010).

In modern times, the value of teaching materials has been realised of late in this country and attempts are being made by all organs connected with education to see that audio-visual materials are used in teaching and learning situations. For examples, University of Nigeria, Nsukka has established Curriculum Development and Instructional Materials Centre (CUDIMAC) to promote the utilization of various types of audio-visual materials and media in the school. Hallett and Faria (2006) posited that books are not the only way the libraries can extend the available information to the public but other means such as pictures, filmstrips, slides, recording among others should be acquired to supplement book resoruces and to substitute for books when they are not available on a particular topics. That is, in the modern educational methods modern technologies have given rise to various means of teaching which make it easier for both the teacher and learner to achieve their aims of teaching and learning.

Ashaver and Igyuve (2013) observed that libraries serving formal education have turned over the years to broaden their inventories of non-book or audio-visual materials rapidly and to accept increased responsibilities for distribution of audio-visual equipment, e.g emotion pictures, projectors as well as establishing local duplication and production services (e.g. of overlay transparencies). Agriculture is an important contributor to the Nigerian economy and its contribution to the nation and humanity cannot be over emphasized. However, it has been observed that the attitude of students towards studying it is not encouraging at all. Students' academic achievement in external examinations and the low enrolment of students in agricultural science have been very poor and discouraging in recent past (West Africa Examination Council Chief Examiner report 2011-2015). Hence the need for investigating the causes of this phenomenon which may have far reaching effects as it may affect the technological breakthrough needed by our country (Betz and Taylor, 2006). Approximately 4000 employment opportunities go unfilled because of few graduates with expertise in agriculture, natural resources, veterinary medicine, and closely aligned fields (Arrington and Hoover, 2004).

The WAEC Chief Examiners report of 2011-2015 on Agricultural science reveals that there was no improvement of candidates when compared to previous year. According to Abimbola and Balschweid (2013), this situation has affected the educational pursuits and aborted the ambition of many candidates who aspired to study professional courses like agricultural engineering and agricultural education. Several studies have been conducted in and outside Nigeria to investigate the causes of students under achievement in agriculture and other science

subjects. According to (Adegoke, 2002), the most recurring factors in all reports include inadequate teaching materials and strategies employed by the teachers, and also according to Usman and Memeh (2007), the factors that negatively affect agricultural science achievement include students' background, students' lack of interests, students' negative attitude towards agriculture, teacher- related factors like poor teacher preparation, unqualified Agricultural science teachers, inadequate teaching materials, poor teaching methods and lack of exposure to different agricultural experiences (Kanaimba, 2009).

Bassey (2000) stated that charts are used to present ideas and concepts which may be difficult to understand if presented using the verbal code only. It is noted that the use of teaching charts in teaching improves the students' reading skill and stimulates creativity in the learners. Charts present an abstract rendition of reality because what is presented is shown as effective in the cognitive domain of learning. Teachers often make use of textbooks, charts, models, graphics, real as well as improvised materials (Awotua-Efebo, 2001).

Ikot (2008) opined that agricultural science is an ancient practice which has many profitable opportunities because it involves raising fish in tanks or enclosures, usually for food or commercial purposes. The importance of agricultural science according to Nsa, Ikotand and Udo (2013) stated that it is a source of food for man as it is a rich source of animal protein, supplying essential amino-acids and vitamins, serves as a source of raw materials for industries, income generation to producers, provides employment opportunities for interested individuals, serves as means of foreign exchange and efficient land utilization and conservation of natural resources.

In the area of agricultural science for instance, much problems encountered from the use of appropriate instructional materials for teaching and learning had being usually as a result of high cost of factory produced/imported materials, scarcity of such products in the country and above all irrelevancy of some of the materials to our social/cultural settings, which had always left our students wandering in abstract. Olumorin (2009) emphasized that it is when original materials are not available for use in teaching and learning, that other types and forms of teaching can be applied. Moreover, Ikot (2008) reported that most of the factories producing teaching materials for teaching vocational based courses are usually very scarce to come by and where they are within reach, they are usually very expensive to buy. Some of the factories

produced/imported instructional materials have also been discovered to be concept-based on foreign ideas and culture.

2.6 Review of Related Empirical Studies

Otekunrin, Oni and Otekunrin (2017) conducted a study on the academic performance of agricultural science students in public secondary schools of Ibadan North, Nigeria. Also, they examined whether there were differences in the mean achievement test scores of students in the subject in selected schools. Furthermore, they studied students' attitude to the subject and examined the relationship between their academic performance in Agricultural Science and their attitudes to the subject. The study was a descriptive survey design. Three public secondary schools were randomly selected from all the public secondary schools. A total of thirty teachers and one hundred Senior Secondary School II (SSS II) students from the selected schools participated in the study. Agricultural Science Achievement Test (ASAT), Constraints facing Agricultural Science in Public Secondary Schools Questionnaire (CASPSSQ) and Students Attitude towards Agricultural Science Questionnaire (SAASQ) were used for data collection. The data collected were analyzed using descriptive statistics, Chi-square test of independence, one-way Analysis of Variance (ANOVA) and multiple comparison techniques. The major challenges confronting the teaching and learning of Agricultural Science in INLGA and their solutions were identified.

The ANOVA test was significant (P=.00). Least Significant Difference, a multiple comparison technique, on the ANOVA showed that School 1 and School 2 ASAT mean scores; School 1 and School 3 ASAT mean scores were different from each other at 5% significance level respectively. A significant relationship was found between scores obtained by the students in the ASAT and the attitudinal variable of sustained students' interests in Agricultural Science (P=.02). The study therefore recommended innovative methods of teaching the subject so as to sustain students' interest in the subject and obtain better academic achievement. The current study is on the effect of using teaching materials on academic achievement of Agricultural Science in secondary schools in Kaduna State, Nigeria hence there is a relationship between the two studies on academic performance of agricultural science students. There exists a difference between the two studies as the study employed descriptive survey design while this present study adopt quasi-experimental, and the two studies differ in content scope as the formal covers challenges and attitudes of students while the later covers

effect on academic achievement of students.

Bello and Goni (2016) conducted a study to determine the relationship between audio-visual materials and environmental factors on students' academic performance in Senior Secondary Schools in Borno State: Implications for Counselling. The study set two research objectives, and tested two research hypotheses. The population of their study is 1,987 students from three purposively selected Secondary Schools in Maiduguri. The sample size for this study was 110. The instruments used in this study consisted of Effect of Audio-visual and Environmental Influence on Student Academic Performance Questionnaire (EAEIAPQ) with reliability indices of 0.62. Based on the obtained indices coefficients, the instrument is reliable for use in their study. The data collected from students were tested using Pearson 'r' because Pearson correlates the relationship between two variables. The results obtained in this study indicated that, there was significant relationship between students' academic performance and teaching materials, therefore, the null hypothesis was rejected and there was significant relationship between students' academic performance and environmental factors. Recommendations were made to government, College Authorities and Counsellors since the relationship was good between the variables studied there is need for the school authorities to provide all the necessary teaching materials, government should also renovates the school building for better environment in all the Secondary School in Maiduguri Borno State. There is a relationship between the present study and this research work on the effect of audio-visual materials on students' academic achievement in Senior Secondary Schools. Though, these two studies are different in geographical location.

Akanmu, Adejare and Uphai (2016) conducted a study on how effective the Nigerian senior school Agricultural Science curriculum is. The study examined the effectiveness of the Nigerian senior school agricultural science curriculum. 255 teachers and 255 students were engaged for the study. Teachers' Curriculum Evaluation Instrument (TCEI) and Agricultural Achievement Test (AAT) were used for data collection. Data were analysed using descriptive statistics. Findings from the study show that 86% of the teachers perceived the agricultural science curriculum content were suitable for students' performance, the teaching facilities for agricultural science teaching in schools are not adequately available and agricultural science curriculum implementation was confronted with several challenges. Student performance in agricultural science was poor as about 51% had credit pass in the administered test and 49% failed the test. Using the CIPP frame work, this study concluded that the context (content) is

suitable, input (teaching facilities) is deficient, process (implementation) is highly deficient and consequently, the (product) student performance in agricultural science is poor. It is recommended that among others that concerned stakeholders should adequately provide teaching facilities, ensure their adequacy and also supervise their judicious utilization. This study is related to the present study in terms of subject area (Agricultural Science), independent variable and senior secondary school Agricultural Science but differs in research design, method of data analysis and area scope.

Ige, Busari and Ojo (2016) examined Agricultural Science teachers experiences as correlates of secondary school students' achievement and career decisions in agricultural science. The study adopted a survey research design. Simple random sampling technique was employed in selecting six hundred (600) senior secondary schools two (SS II) Agricultural Science Students. Instruments used were Career Decision Questionnaire, Agricultural Experience Questionnaire and Students Achievement Test in Agriculture. Four research questions were raised to guide the study. Data was analysed using Pearson Product Moment Correlation and Multiple regression. The results revealed that poultry, fishery and cashew farming had significant correlation with students' achievement (r=-0.093, -0.127 and -0.127) and career decision (r=-0.155, -0.136 and -.132) in Agricultural Science respectively. The findings showed that there were significant joint contributions of agricultural experiences to students' achievement ($F_{(3,600)} = 3.992$; $P < 0.05$) and career decision ($F_{(3,600)} = 22.807$; $P < 0.05$) in Agricultural Science. The findings further revealed that fishery ($\beta = -0.79$) was the greatest predictor of students' achievement in agriculture while poultry ($\beta = -0.333$) mostly predicted students career decision in Agricultural Science. It was recommended that curriculum planners should systematically introduce agricultural science experiences (poultry, fishery and cashew farming) into the curriculum content of all the Secondary School Students and it should not be streamlined to only science students alone because of its educational value and it relevance to the needs of the learner and society as a whole. There is a relationship between the present study and this research work on the Agricultural Science and students' academic achievement in Senior Secondary Schools. Though, these two studies are different in geographical location and research design.

Efe & Kahlil (2016) investigated the effect of teachers' instructional methods on students learning outcomes in selected senior secondary school in Kaduna, Nigeria Two instructional

methods (Demonstration and Lecture) were used on target population of one thousand nine hundred and eleven (1,911) senior secondary **(**S.S. II) Science Students. The sample consist of 100 Students randomly drawn from two co-educational senior secondary schools within Kaduna North LGA. The students were divided in to two groups: The experimental group and the control group of 50 students each based on a categorization test to ascertain the equivalence of the group. The pretest-posttest quasi-experimental control group design was adapted. The students in the experimental group were exposed to Demonstration Method, while those in the Control group were exposed to the lecture instructional strategy for a period of three weeks. The instrument developed and validated for data collection was Chemical Bonding Performance Test (CBPT). Four research questions were stated and four null hypotheses were tested. The data collected were analyzed using mean, standard deviation, t-test and ANOVA at 0.05 level of significance. The major findings from the study shows that there is significant difference in learning outcome on students exposed to demonstration and lecture strategies used to teach chemistry (tcal = 0.774 >tcrit = 0.443 and Fcal = 0.771 > Fcrit = 0.710 at P<0.05) and there is no significant difference in the academic performance of both male and female students exposed to demonstration instruction in teaching chemistry (tcal = 0.177 < tcrit = 0.861 and Fcal = 0.728 < Fcrit = 0.781 at P<0.05) . Findings from present study suggest that Chemistry teachers should incorporate demonstration method for teaching at senior secondary school level so as to enhance academic performance and also Curriculum planners should recommend and ensure demonstration method is used for teaching chemistry at senior secondary school among others. The two studies relate to each other on the geographical location (Kaduna State), design and academic achievement of senior secondary school students in teaching and learning but are distinct in terms of population, sampling technique and method of data collection. The reviewed study is on instructional methods while the current study is on instructional materials.

Falode, Sobowale, Saliu, Usman, and Falode (2016) carried out a study to determine the effectiveness of Computer Animation Teaching Package (CAIP) on academic achievement of senior secondary school agricultural science students in animal physiology in Minna, Nigeria. Influence of gender was also examined. Quasi-experimental procedure of pretest, posttest, and non-randomized, non- equivalent design was adopted. Two research questions were raised while two null hypotheses were tested at 0.05 level of significance. The sample of the study was made up of 88 senior secondary school students selected from intact classes of two co-

educational public schools within the study area. The two schools were randomly assigned to experimental and control groups. The experimental group which comprised 48 students (30 male and 18 female) was taught through CAIP while their counterparts, the control group which comprised 40 students (26 male and 14 female) was taught using lecture method. A 30-item animal physiology achievement test which was validated by experts and whose reliability coefficient of 0.85 was obtained was administered as pretest and posttest on both groups. Data gathered were analyzed using t-test statistics. Findings revealed that there was significant difference between the mean achievement scores of the two groups in favour of those taught with CAIP. Also, the package improved the achievement of both male and female students taught. It was therefore recommended among others that, computer animation teaching package should be adopted in secondary schools to complement lecture method of teaching in order to improve students' achievement in agricultural science. The two studies also focused on same level of education that is senior secondary school education. However Falode, *et al*., (2016) had different population and sampling technique, the current study is in Kaduna State and the two studies differ in subject areas.

Abdullahi, Mlozi and Nzalayaimisi (2015) carried out a study on determinants of students' academic achievement in agricultural sciences: A case study of secondary schools in Katsina State, Nigeria. To achieve the goal of this research, students from Katsina State Science and Technical Education Board (STEB) were purposively selected for the study. Random sampling technique was used to select 300 students from six secondary schools. Primary data were collected using a structured questionnaire designed to address the specific objectives of the study. Cramer's V and stepwise regression model were used as tool of analyses to achieve the stated objectives of the study. Age of students was found statistically related to students' academic achievement using Cramer's V. The regression model has an R^2 (.915) implying that 92% of the total variations in students' academic achievement was accounted for by the independent variables. The F statistic was also reliably fit and statistically significant at $p \leq 0.001$ confidence level. Of the nineteen variables, nine were statistically significant and show effect on students' academic achievement. The significant variables that were positively related to academic achievement are: parent education, parent occupation, family feeding, provision of resource materials, visits to schools, provision of pocket money, and residential type. Family type and age

category of parents had negative effects on students' academic achievement. They recommended that an intensified public enlightenment and awareness campaign on family planning and child spacing as well as dilution of family resources to counter the effect of family type being a risk factor should be adopted. The researcher made use of survey method in conducting his study while the present study used Quasi-experimental involving pre-test post-test research design. The reviewed study was located in Katsina State while the current study is located in Kaduna State, Nigeria. One of the important factors for consideration again is that this study unlike the former focused on specific subject area (Agricultural Science).

Bello (2015) conducted a study to examine the Impact of Computer-Aided Instruction and Enriched Lecture Method on Interest and Performance in Physics among Secondary School Students, Zaria Nigeria. The study developed five research objectives among which included the determination of the impact of Computer-Aided Instruction and Laboratory Facilities on interest and academic performance of students exposed to wave concept of physics in Senior Secondary Schools of the study area. The study was guided by five Research Questions and four null hypotheses. Two research designs: namely, Survey and Quasi-experimental-control group designs involving pre-and post-tests were used in this study. The population of this study covered all public Senior Secondary Schools with population of one thousand six hundred and ninety six (1,696) year II physics students as at 2014/15 academic session out of which a total number of 198 SS II students were sampled from three public Senior Secondary Schools of Zaria education zone selected using systematic sampling technique. Three validated instruments developed by the researcher namely; Availability of Computer-Aided Instruction and Laboratory Facilities Questionnaire, Wave Performance Test and Wave Interest Inventory Questionnaire with reliability coefficients of 0.8, 0.7 and 0.9 respectively were used for the study. Research Questions raised were answered using means and standard deviations, while null hypotheses were tested with inferential statistics using t-test and Analysis of Varience at 0.05 level of significance.

Results showed that there was significant difference between the mean academic performance of students taught wave concept using Computer-Aided Instruction and Laboratory Facilities enriched with lecture method and those taught the same concept using Lecture Method in favour of Computer-Aided Instruction and Laboratory Facilities enriched with lecture method groups. Also, there is significant difference between the interest of physics students‟ taught wave

concept using Computer-Aided Instruction and Laboratory Facilities enriched with lecture method and Lecture Method at Senior Secondary Schools of the study area. Similarly, the findings revealed no significant difference between the mean academic performance scores of male and female students taught wave concept of Physics using Computer-Aided Instruction and those taught the same concept using Lecture Method only at Senior Secondary Schools of the study area. The study recommended for the need of state government to train and retrain teachers on the use of Computer-Aided Instruction in teaching physics at Secondary School level. This study has a similar topic, design and content scope of aided materials with the present research study, differs with the present study in sample, area and population. Though the present research study is on the effect of using instructional materials, the subject areas are different; Physics and agricultural sciences respectively.

Aninweze (2014) examined the effects of two instructional delivery approaches on senior secondary schools students' achievement and retention in biology. The two instructional delivery approaches used were Videotaped instructions (VTI) and Power point presentations (PPP). The design of the study was the pretest-posttest non-equivalent group design. Seventy – Nine (79) Biology students in Senior Secondary Two (SSII) were drawn from two intact classes. The two treatment groups (VTI and PPP) were randomly assigned to the intact classes. Biology Achievement Test (BAT) and Biology Retention Test (BRT) were administered as Pre-test, Post- test and delayed Post-test respectively. Six research questions and six hypotheses were also formulated to guide the study. The research questions were answered using mean and standard deviation while the hypotheses were tested using Analysis of Covariance (ANCOVA). The result of the analysis showed that VTI had a significant effect on students' achievement and retention in Biology. Gender was a significant factor in students achievement as the male students achieved higher than the female students. Gender also has a significant effect on student retention as the male students retained higher in total mean retention scores but females retained better when taught using VTI. Following the findings and implications of this study, it was recommended that Biology teachers should employ the use of VTI in teaching Biology to enhance students' achievement and retention. It was concluded that VTI was more effective in enhancing students' achievement and retention in Biology in Senior Secondary Schools. Suggestions for further studies were also made, one of which is; a study to investigate the effect of VTI on students' acquisition of science process skills and interest in biology.

Anyanwu, Anyanwu and Ansa (2014) conducted a study to examine determinants of academic success in Agricultural science among senior secondary school students in Oru L.G.A. of Imo State, Nigeria. Cross sectional data generated from 200 students drawn from 2 secondary schools randomly selected from the lists of secondary schools in Oru L.G.A of Imo State was used. Descriptive statistical tools such as percentages and frequency tables, as well as regression analysis were used in analyzing the data. Results of the analysis showed that likeness or interest in agricultural science subject by the students, occupation of the parents of the students, type of accommodation which symbolized environmental influence on the students, the level of teaching experience possessed by the teachers, level of class attendance by the students, togetherness of the parents and the educational level of the parents of these students were statistically significant determinants of academic success in agricultural science subject among senior secondary school 1 and 2 students in the State. It is therefore recommended that the Government should boost and sustain the interests of these students through the provision of the requisite instructional materials. The recruitment of qualified and well experienced teachers was also advocated in order to sustain the interests in agricultural science subject. The reviewed study is related to the present study as it determines determinants of academic success in Agricultural science among senior secondary school students. However, the present study seeks to determine the effect of using instructional materials on students' academic performance Agricultural Science.

Aina and Adekanye (2013) investigated the audio-visual resources availability and use for library services among colleges of education in Lagos State Nigeria. The introduction of audio-visual resources (AVR) in teaching and learning has far reaching effect on the management and infrastructure facilities in libraries. The integration of both books and non-book materials into the library system will go a long way in providing necessary information to clientele. This study surveyed the audio-visual resources availability and use for library services among colleges of education in Lagos State. A total of 150 male respondents and female librarians, lecturers and students were selected from three colleges of education in Lagos State of Nigeria using Random sample technique. Data were collected through 20 items questionnaire. Findings revealed that apart from FCE, AOCOED and LACOPED had no access to AV resources, no adequate time for training while respondents were of the opinion that AVR has a significant effect on teaching learning. Findings also revealed that the major obstacle faced is inadequate funding, skill, monitoring, irregular supply of electricity, non-provision of

AV resources and attention of the government hindered the use of AV resources. Based on the result of the findings, the Federal Government of Nigeria should publish a position paper on provision of AV resources centers and to appoint professionals to man AVR centers. The centre should consist of departments like Graphics, Electronics, Audio-Visual unit and be funded by federal and state government among other findings.

This study has a similar topic and content scope of audio-visual with the present research study, differs with the present study in design, sample, area and population. Though the present research study is on the effect of audio-visual, the subject areas are different; library service and agricultural sciences respectively.

Ashaver and Igyuve (2013) carried out a study on the use of audio-visual materials in the teaching and learning processes in colleges of education in Benue State-Nigeria. The study was based on achieving the following purposes: To evaluate how the library meets the needs of the teachers in supply of audio-visual materials; the types and quality of audio-visual materials available in the college, their frequencies of use and inhibitions and finally what steps the librarian has taken in promoting or creating an awareness of the available audio-visual resources in the library. Two sets of questionnaires were administered to lecturers and staff in order to elucidate the needed information. The researcher also went to the college to observe and also to administer the questionnaire. Through the questionnaire and observation made by the researcher, data were collected, organized and analysed using non-parametric statistical techniques like percentages and frequencies; mean was also used in research question three for easy analysis and discussion because of the number of th e items involved. It was finally discovered that: The College collection of audio-visual materials is fairly adequate. The lecturers in the college rarely use audio-visual resources in teaching. The chalkboard is the only audio-visual material frequently used by the lecturers. Non-availability, lack of supporting infrastructures and human factors are hindrances to the use of audio-visual aids in the college. There are numerous benefits that students derive from the use of audio-visual aids. The awareness of available audio-visual resources created by the librarian is not impressive. The two studies relate to each other on the use of audio-visual materials in teaching and learning but are distinct in terms of geographical location, design and method of data analysis.

Abdulhamid (2013) carried out a study to determine the effect of two teaching methods (demonstration and discussion) on student's retention of Agricultural Science knowledge in

secondary schools of Bauchi metropolis. The study was guided by two research questions based on the specific objectives and three null hypotheses, tested at 0.05 level of significance. The pretest-posttest control group quasi-experimental design was employed. All the students from three intact SS II classes were used; one class each from three randomly selected schools. A 20 item multiple choice achievement test was administered to the two treatment groups before and after the treatment and the scores so obtained were analyzed by mean, standard deviation and t-test. The findings revealed that both the two teaching methods have significant effect on student's retention of Agricultural Science knowledge. Demonstration method was found to be more effective in making the students to remember Agricultural Science knowledge. It was therefore recommended that the demonstration method be used with confidence to teach Agriculture Science in Bauchi State secondary schools. The two studies similar to each other on the subject areas which is Agricultural Science teaching and learning but differ in terms of geographical location, design and method of data analysis and the use of audio-visual materials.

Mberekpe (2013) carried out a study on effect of students improvised instructional materials on senior secondary school students' achievement in Biology .The study investigated the effects of student's improvised instructional materials on students' achievement in Biology. This study became necessary because of the unavailability of instructional materials for teaching biology in the secondary schools. The study employed a quasi experimental design, specifically the pretest – posttest non equivalent group design. One hundred and forty SSI students from potiskum Education Zone from 2 schools randomly drawn from public primary schools in Potiskum education zone of Yobe State formed sample of the study. Three experts validated the instrument Biology Achievement Test (BAT). Five research questions were answered and five hypotheses were tested. The data were analyzed using mean, standard deviation and ANCOVA. The results revealed that students taught using improvised instructional materials performed better than students taught using conventional material; male students did not perform better than their female counterparts in Biology; rural students performed better than urban students in biology; The results do not suggest ordinal interaction effect between mode of method and gender on students' achievement in biology. This was because at all the levels of gender, the mean scores were higher for student's improvised instructional material; the result suggests ordinal interaction effects between modes of method and location on students' achievement in Biology; this was because at all the levels of location, the mean scores were higher for student's

improvised instructional material compared to conventional materials with lower mean scores; there was significant difference in the mean score of students taught using students improvised instructional material and those taught using conventional instructional materials; there was no significant difference in the mean achievement scores of male and female students in Biology; there was significant difference in the mean achievement scores of urban and rural students in biology; The interaction effect of method and gender on students mean achievement scores in Biology was, not statistically significant. The interaction effect of method and location on students' mean achievement scores in Biology was, not statistically significant. Based on the findings and implications, it was recommended that teaching of Biology in secondary school should be conducted in a manner that students will effectively understand and learn the concept taught. It was suggested that further research could be carried out on this topic using true experimental research design. The two studies relate to each other on the use of instructional materials in teaching and learning but are distinct in terms of geographical location, design and method of data analysis.

Owoeye & Yara (2011) conducted a study on school facilities and academic achievement of secondary school Agricultural Science in Ekiti State, Nigeria. The study looked at the provision of facilities as it relates to academic performance of students in agricultural science in Ekiti state of Nigeria between 1990 and 1997. The study population was results of the West African School Certificate Examinations (WASCE) conducted between 1990 and 1997 in 50 secondary schools in both rural and urban areas of the state. One validated instrument (S T Q F) was used for data collection. One hypothesis was formulated and answered. Data were analysed using mean and t – test. The results showed that there were no significant differences in the performance of students between rural and urban secondary schools in term of availability of library facilities ($t = 1.79$, $p<0.05$), availability of textbooks ($t= 1.20$; $p <0.05$) and availability of laboratory facilities ($t= 1.83$, $p<0.05$). It has been established that facilities are potent to high academic achievement of students; therefore, Ekiti State Government should provide adequate material resources to rural/urban locations to enhance teaching and learning processes. The Parent Teacher Association (PTA), philanthropist and other charitable organizations are also implored to compliment the effort of the government to boost the performance of students in SSCE. Both studies relate to each other on the use of materials in teaching and learning on academic achievement in Agricultural Science but are distinct in terms of geographical location,

design and method of data analysis.

Umaru (2011) carried a survey on the availability of instructional materials, its adequacy and relevancy; characteristics of instructional materials, importance of instructional materials, and factors affecting the use of instructional materials on students' academic performance in agricultural science. This study made use of Survey Research Design. Thirty (30) Government and private secondary schools were used. It had the population of 8,142 agricultural science students and 73 agricultural science teachers. Sample of 206 students were randomly selected with 30 agricultural science teachers. The instrument used for collection of data was a questionnaire designed by the researcher for the teachers and students of agricultural science. Four research questions and four null hypotheses (Ho) were formulated to guide the study. Contingency chi-square statistical tool was used in testing the hypotheses at 0.05 level of significance. The analysis yielded the following findings that good and relevant textbooks were the instructional materials available to be used to influence students' academic performance in agricultural science. That instructional materials should possess characteristics of visibility, simplicity, attraction, and clarity. Recommendations were made in line with the findings, which include the agricultural science teachers should endeavour to use and try to improvise instructional materials for effective teaching of agricultural science in secondary schools. Government should ensure the adequate employment of dedicated and qualified agricultural science teachers and make funds available and sponsor the teacher's attendance at conferences, seminars and workshops on utilization of agricultural science instructional materials. In conclusion, students perform better when appropriate and improvised materials were made available and utilized in teaching agricultural science. The agricultural science knowledge and subsequent performance of students in both junior and senior secondary schools and agricultural science as a subject becomes more interesting to learn when it was taught by experienced, well committed, dedicated and qualified agricultural science teachers.

Teaching of agricultural science will not be completed if the instructional materials needed to facilitate learning are not sourced for, and properly utilized for each agricultural science topic designed to be taught and construct others using available local materials. The present study is similar to this research work as they both deal with instructional materials but is different in scope, research design, population and method of data analysis.

Uyagu (2009) carried out a research study titled: "Effects of Instructional Materials'

Usage and Teachers' Quality on Students' Academic Performance in Science in Senior Secondary Schools in Zaria LGA in Kaduna State". The target population was fifteen thousand four hundred and thirty (15,430) senior secondary school students from twenty-four (24) secondary schools in Zaria LGA and one thousand and thirty-three (1,033) teachers. Sample of eighty (80) students were randomly selected with nine (9) teachers. Three (3) null hypotheses and three (3) research questions were formulated to guide the study. t-test statistical tool was used in testing the null hypotheses at 0.05 level of significance. The findings revealed that students performed better when appropriate and improvised materials were made available and utilized in teaching science and teachers possessing good qualifications enhanced students' performance in science.

The present research study is similar in the title, "effects of instructional materials on academic achievement of Agricultural Science in secondary schools in Kaduna State, Nigeria". The target students' population for the present research study and the scope will differ from the study as well as sample. Four (4) null hypotheses will be tested in the present research study using z-test compared with three (3) null hypotheses formulated in the past research study using t-test statistical tool in testing the null hypotheses at 0.05 level of significance. Though the present research study is located in two educational zones in Kaduna State while the past research study was located only in Zaria LGA of Kaduna State.

2.7 Summary of Literature Review

The current study is based on two theories: instructional theory propounded by Gagne in 1992 and the Social cognitive theory. Learning theories form a distinct part of theoretical psychology. Sensory motor ability is the basis of intelligence and other ingredients are ability to perceive situations accurately, to see relations, to remember, to use good judgment and to persist in solving problems. The psychologist posited that in attempt to learn anything a student must pay attention to it. It also involves exploration of the visual field, fixing the eyes successively on different parts rating these parts and anticipating phenomenon that are not yet clearly perceived.

The literature also reviewed the agricultural science in senior secondary schools, academic achievement and instructional materials: audio, visual and audio-visual as well as the

impact of instructional materials on academic achievement of agricultural science students in senior secondary schools. These reviews gave an in-depth knowledge of related studies which shows instructional materials provide the teacher with interest compelling spring board into a wide variety of learning activities. The audio, visual and audio-visual teaching materials have a role-play in stimulating and revolving the students. In most case a teacher's limitation will mainly be his own imagination, the more he can find useful way of employing the audio, visual and audio-visual teaching materials for more meaningful and permit learning to take place the better. Most of the studies reviewed are reporting on the use of instructional materials separately but this study look at the Audio, Visual and Audio- Visual to compare their effectives in teaching and learning so as to come out with a finding that clearly shows when one among the different materials use that have improve the student academic achievement in the secondary schools in Kaduna State.

CHAPTER THREE
METHODOLOGY

This chapter describes the procedure employed in this study under the following sub-headings; Research Design, Area of the Study, Population of the Study, Sample and Sampling Technique, Instrument for Data Collection. Others are Validation of the Instrument, Reliability of the Instrument, Experimental Procedure, Method of data Collection and Method of Data Analysis.

3.1 Research Design

The study adopted a pre-test, post-test, non-equivalent, quasi-experimental research design. This research design is considered to be appropriate for this study because it is interested in applying treatment to the experimental group while the control group was not given any treatment as shown in Figure 1(Appendix I). According to White and Sabarwal (2014) quasi-experimental designs identify a comparison group(s) (in this study control group without teaching materials) that is as similar as possible to the treatment group in terms of baseline characteristics. The comparison group captured what could be the outcomes if the treatment (i.e., the audio, visual and audio-visual) had not been implemented. Hence, the treatment can be said to have caused any difference in outcomes among the experimental groups. A quasi-experimental design by definition lacks random assignment, however assignment to conditions (treatments versus control group) is by means of self-selection which the teacher selects participants (Shadish and William, 2002).

This situation is where four groups were used with three groups receiving treatment which in this case are audio, visual and audio-visual teaching materials. These groups were called experimental groups (1-3). Treatment i.e utilization of teaching materials was however, withheld from the fourth group called the control group. (As found in appendix 1)

3.2 Area of the Study

The area of the study was Kaduna State in North West Nigeria. The State lies geographically between latitude 10.20^0 North and longitude 7.45^0 East (Hayab, 2014). The State is bordered with Kano State to the North, Niger State to the West, Plateau State to the East and Nasarawa State to the South.

3.3 Population of the Study

The population for this study consisted of the entire Senior Secondary School II (SS II) Agricultural Science students' was twenty eight thousand five hundred and thirty eight (28,538) while two hundred and eighty (280) Agricultural Science students in the sampled schools of Kaduna State in the 2017/2018 academic session.

3.4 Sample and Sampling Techniques

A multi-stage sampling technique was adopted in this study, because the sampling process was in four stages. Stage I: this involves stratifying the schools into the existing ten educational zones in the state; Anchau, Birnin-Gwari, Godogodo, Kaduna Metropolis, Kafanchan, Lere, Rigachukun, Sabon-Tasha, Zaria and Zonkwa zone. Stage II: purposive sampling of two schools from one educational zone of Kaduna State (i.e Kafanchan zone) for the purpose of convenience and availability of resources. Stage III: an intact class of about thirty (30) SS II Agricultural Science Students' averagely per stream was also selected in each of the schools. Stage IV: randomly assign group to each of the selected schools through simple balloting. In all, the study used a sample size of 191 students from all the intact classes.

3.5 Instrument for Data Collection

The instrument used for data collection in this study was Agricultural Science achievement test (ASAT). The achievement test served as the instrument for the student's with twenty (20) multiple choice with option A-D. The questions were adapted from WAEC Agricultural Science past question papers, and students answered the entire questions by circling the correct options. A total mark of 100 percent taken at the end.

3.6 Validation of the Instrument

The instrument was validated by three experts, one from the Vocational Education Department, Modibbo Adama University of Technology, Yola, and two from Agricultural Science Department, Kaduna State College of Education Kafanchan, who made suggestions to determine the face validity of the instrument, to ascertain the degree of appropriateness and accuracy of the research instrument.

3.7 Reliability of the Instrument

The study adopted past questions from WAEC as the research instrument hence, there was no reliability test. Since WAEC is a standard examination body the instrument was considered reliable.

3.8 Experimental Procedure

The experiment was conducted in three stages; 1) administration of pre-test to all the groups to determine the class equivalence, 2) administration of instruction and 3) administration of post-test in each of the selected Government Secondary schools. Firstly, the researcher duly informed through their respective principals or vice-principals as the case maybe. All the necessary arrangements with respect to time schedule, materials and staff support was concluded before the actual experiment. The Schools were thereafter grouped into experimental and control groups. The control groups received instruction without teaching materials, while the experimental groups were taught in separate intact classes with audio, visual and audio-visual teaching materials respectively. The researcher provided the lesson plans, test instruments and supervised the conduct of the experiment in each school to ensure consistency. The researcher assigned experimental and control groups to the two selected schools. The researcher thereafter administered a pre-test to students in all the four intact of Agricultural Science classes involving all the Senior Secondary School II students for the study amounting to 229 students. The pre-test was done at the beginning of the whole process to determine the level of previous knowledge of the students. The pre-test and training of research assistance took a period of one week. Thereafter the students in the experimental groups (audio,visual and audio-visual) were exposed to treatment keeping all other conditions the same for both groups; (Note: the control groups received instruction without teaching materials). The regular teachers of Agricultural Science for each of the classes was used in the experiment as the research assistants after receiving training from the researcher on how to use the various materials. Last stage was administration of post-test to both the experimental and control groups after the treatment season. The treatment was done within a period of six (6) weeks. Data collected was used to find out the mean post-test scores for both groups. The mean difference between pre-test and post-test for each group was determined using appropriate statistical tool to determine whether the difference in scores between the subjects in experimental and control group is statically significant.

3.8.1 Control of extraneous variables

Experimental Bias: In order to avoid experimental bias, regular class teachers in the participating secondary schools were used to teach their students. However, the researcher was actively involved through supervision and administration of the instrument.

Teacher Variability: The classroom teachers involved in administering the instruments were properly trained by the researcher for both the experimental and control groups in order to ensure the homogeneity of instruction across the groups. Detailed explanation was given to the teachers by the researcher prior to the treatment. The researcher personally prepared lesson notes used by the teachers and each teacher participate in administering the instrument taught an equivalent group using the lesson notes prior to the experiment. The process was supervised by the researcher to arrive at a standardized mode of presentation among the teachers that were involved in administering the instruments and thus eliminate the teacher variability factor extraneous to the study. The students in the experimental and control groups were not informed that they were involved in any research process.

Initial Group Difference: The experimental and control groups were used for the study were intact classes to avoid disruption of school programs and activities. However, ANCOVA was used to take care of the initial group difference.

Instructional situation variable: For the purpose of uniformity in teaching, teachers involved were briefed by the researcher on the instructional procedure. A detailed lesson plan prepared by the researcher and validated by experts was given to the teachers to teach the same topics and within the regular periods allotted in the school time table to both experimental and control groups.

3.9 Method of Data Collection

The data was collected by the researcher with the help of two (2) research assistants one from each of the school selected for the study, the research assistants was trained by the researcher. The researcher and the research assistant administered pre-test initially to determine the class equivalence. The administration of instruction to both experimental and control groups were done concurrently for a period of four weeks thereafter administered a post-test to 191 students. The whole exercise was carried out in a period of six (6) weeks with marking and percentage computation inclusive. The scores from both pre-test and post-test were used to

measure the mean difference in achievement through the appropriate statistical tools. In all, the study used students from all the intact classes for the post-test.

3.10 Method of data Analysis

Mean and standard deviation was used to answer the research questions while ANCOVA was used to test the null hypotheses respectively at 0.05 level of significant. The analysis was done using SPSS version 17. Any item with a mean score of 40 and above was considered as effective instructional material, while items with a mean below 40 were considered not effective. For the null hypotheses, where the computed p-value was less than the level of significance, the null hypotheses was rejected and where the computed p-value was greater than the level of significance (alpha-value) the null hypotheses was accepted.

CHAPTER FOUR

RESULTS AND DISCUSSION

The results of the analysis of data collected are presented in this chapter. Presentation is in order of research question and hypotheses that guided the study.

4.1 Results

4.1.1 Research Question One

What is the mean academic achievement scores of Agricultural science students when taught without instructional materials?

The data that answered this research question are analysed and presented in Table 1.

Table 1: Mean and Standard Deviation Academic Achievement Scores of Agricultural Science Students Taught without Instructional Materials

Scores	N	Mean	Standard Deviation	Mean Difference
Pre-test	54	25.83	9.79	
				16.43
Post-test	50	42.26	14.35	

The result in Table 1 shows the mean academic achievement scores of Agricultural Science students when taught without instructional materials. The result of analysis indicates instructional material effective in post-test scores with mean 42.26 and a standard deviation of 14.35 respectively. This result indicates a remarkable improvement in the mean post test score over mean score of 16.43 in the pre-test. The study therefore found mean effective mark of Agricultural Science students when taught without instructional materials.

4.1.2 Research Question Two

What is the mean academic achievement score of Agricultural science students when taught with audio instructional materials?

The data that answered this research question are presented on Table 2.

Table 2: Mean and Standard Deviation Academic Achievement Scores of Agricultural Science Students Taught with Audio Instructional Materials

Group	Pre-test			Post-test		
	N	Mean	Standard Deviation	N	Mean	Standard Deviation
Audio Instructional Materials	60	28.58	8.69	46	38.48	10.57
Without Instructional Materials	54	25.83	9.79	50	42.26	14.35

Table 2 presents result of research question two, the mean academic achievement of Agricultural science students when taught with audio instructional materials. The Agricultural Science students have pre-test mean achievement scores of 28.58 with a standard deviation of 8.69 which indicates that the scores of student were clustered. The students have post-test mean scores of 38.48 and a standard deviation of 10.57 which show the individual scores were not close. It can be concluded that only audio instructional materials cannot effectively enhance students' academic achievement based on the bench of 40.00 mean scores, which explained the poor achievement of students in post-test mean scores.

4.1.3 Research Question Three

What is the mean academic achievement score of Agricultural science students when taught with visual instructional materials?

The data that answered this research question are presented on Table 3.

Table 3: Mean and Standard Deviation Academic Achievement Score of Agricultural Science Students Taught with Visual Instructional Materials

Group	Pre-test			Post-test		
	N	Mean	Standard Deviation	N	Mean	Standard Deviation
Visual Instructional Materials	53	30.96	10.85	53	33.87	8.97
Without Instructional Materials	54	25.83	9.79	50	42.26	14.35

The result in Table 3 shows the mean academic achievement of Agricultural science students when taught with visual instructional materials. It is observed that the post-test mean achievement was 33.87 which is not effective with a standard deviation of 8.97 which indicates

the scores were closely unanimous. Therefore, it is observed that the use of visual learning materials alone cannot effectively yield the desired students' academic achievement in Agricultural Science.

4.1.4 Research Question Four

What is the mean academic achievement score of Agricultural science students when taught with audio-visual instructional materials?

The data that answered this research question are presented on Table 4.

Table 4: Mean and Standard Deviation Academic Achievement Score of Agricultural Science Students Taught with Audio-Visual Instructional Materials

Group	**Pre-test**			**Post-test**		
	N	Mean	Standard Deviation	N	Mean	Standard Deviation
Audio-Visual Instructional Materials	62	27.74	10.93	42	43.70	15.15
Without Instructional Materials	54	25.83	9.79	50	42.26	14.35

The result in Table 4 shows the mean academic achievement scores of Agricultural Science students when taught with audio-visual instructional materials. The result of post test scores indicates effective instructional materials with means of 43.70 and a standard deviation of 15.15 respectively. This result indicates that the use of audio-visual instructional materials improves academic achievement of students significantly. The study yielded a mean difference of 15.96 between pretest and posttest which is a significant improvement from the use of audio-visual teaching materials for learning Agricultural Science students.

4.1.5 Research Question Five

What is the mean academic achievement scores of Agricultural science students when taught with audio, visual, audio-visual instructional materials and those taught without instructional materials?

The data that answered this research question are presented on Table 5.

Table 5: Mean and Standard Deviation Achievement Score of Agricultural Science Students Taught with Audio, Visual, Audio-Visual Instructional Materials and Those Taught without Instructional Materials

Group	Pre-test			Post-test		
	N	Mean	Standard Deviation	N	Mean	Standard Deviation
Audio Instructional Materials	60	28.58	8.69	46	38.49	10.59
Visual Instructional Materials	53	30.96	10.85	53	33.87	8.97
Audio-Visual Instructional Materials	62	27.74	10.93	42	43.70	15.15
Without Instructional Materials	54	25.83	9.79	50	42.26	14.35

Result of research question five contained in Table 5 presents the mean academic achievement of Agricultural science students when taught with audio, visual, audio-visual instructional materials and those taught without instructional materials. The result has post-test mean achievement scores of without instructional materials as 42.26, audio instructional materials as 38.49, visual instructional materials as 33.87 and audio-visual instructional materials as 43.70 respectively. From the result obtained the students taught without instructional materials did better than those with audio and visual respectively. Agricultural science students when taught with audio-visual instructional materials achieved better than any other group with a mean achievement scores of 43.70 which is effective.

4.1.6 Research Question Six

What is the combined mean academic achievement score of female and male Agricultural science students? The data that answered this research question are presented on Table 6.

Table 6: Combined Mean and Standard Deviation Academic Achievement Score of Female and Male Agricultural Science Students

Gender	N	Mean		Standard Deviation		Post-test Mean Difference
		Pre-test	Post-test	Pre-test	Post-test	
Female	107	27.98	42.14	11.00	15.22	7.63
Male	84	28.69	34.51	8.96	12.22	

The descriptive statistics in table 6 indicates the combined mean achievement scores of instructional materials of Agricultural Science students and gender. It is observed that the male students had a combined post-test mean achievement scores of 34.81, while female had a combined post-test mean achievement of 42.14. The result when compared indicates a little difference in post-test mean scores of 7.63 which implies female students achieve higher than their male counterpart. It can be concluded that the use of these teaching materials (when combined) can improve greatly the Agricultural Science students' academic achievement especially the female ones.

4.1.7 Hypothesis One

There is no significant difference between the mean academic achievement of Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials.

Table 7: ANCOVA Tests of Students Taught With Audio Instructional Materials, Visual Instructional Materials, Audio-Visual Instructional Materials and Those Taught Without Instructional Materials

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5131.249[a]	2	2565.624	15.010	.000	.238
Intercept	20666.191	1	20666.191	120.905	.009	.557
Pretest	539.833	1	539.833	3.158	.000	.032
Groups	4590.203	1	4590.203	26.854	.009	.219
Error	16409.241	188	170.930			
Total	333125.500	191				
Corrected Total	21540.490	190				

Analysis of covariance (ANCOVA) was conducted to determine whether there is a significant difference between the mean academic achievement of Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials. The pre-test performance

scores were obtained prior to the commencement of the treatment and used as covariate to control the group differences. The result in Table 7 shows that there was a significant difference between the mean academic achievement of Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials, F (1, 98) = 26.854, P<0.05, since the computed p-value 0.009 is less than 0.05 level of significant with a partial eta squared =0.219. This implies that null hypothesis of no significant difference is rejected.

4.1.8 Hypothesis Two

There is no significant difference between the mean academic achievement of female and male Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials.

Table 8: ANCOVA Tests of Achievement Scores of Male and Female Agricultural Science Students When Taught With Audio Instructional Materials, Visual Instructional Materials, Audio-Visual Instructional Materials and Those Taught Without Instructional Materials

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5138.642[a]	2	1712.881	9.921	.000	.239
Intercept	9368.004	1	9368.004	54.260	.032	.364
Pretest	542.926	1	542.926	3.145	.000	.032
Gender	4597.596	1	2298.798	8.751	.032	.219
Error	16401.848	188	172.651			
Total	333125.500	191				
Corrected Total	21540.490	190				

Result of hypothesis two shown Table 8 has the F = 8.751, df = (1, 110); P < 0.05 has a probability value of 0.032. Since the p-value of 0.032 associated with the calculated value of F is less than the 0.05 level of significance, the null hypothesis is rejected. The result indicates that gender is a factor that accounts for the difference in the post test achievement scores of the students. Therefore, there is significant difference between the mean academic achievement of

female and male Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials.

4.2 Findings of the Study

The following were findings of the study:

1. The study found mean scores of 42.26 of Agricultural Science students when taught without instructional materials which indicate a remarkable improvement in academic achievement.
2. The study revealed based on the result of students' achievement that only audio instructional materials cannot effectively enhance students' academic achievement which could explain the poor achievement of students in post-test mean scores.
3. The study also revealed that the use of visual instructional materials alone could not yield the desired effective students' academic achievement in Agricultural Science.
4. The study revealed that the use of audio-visual learning materials improves academic achievement of students significantly compared to using audio and visual instructional materials separately.
5. It was also found that Agricultural science students when taught with audio-visual learning materials achieved better, than when taught without instructional materials.
6. The study reveals that the use of these instructional materials (when combined) can improve greatly the Agricultural Science students' academic achievement especially the female ones.
7. The study also found that there was a significant difference between the mean academic achievement of Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials.
8. The study also revealed that there is significant difference between the mean academic achievement of female and male Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials. Evident to this is the little difference in post-test mean scores of 7.63 (Table 6 above) which implies female students achieve higher than their male counterpart.

4.3 Discussion of Findings

The study found mean pass mark of Agricultural Science students when taught without instructional materials. Teaching without materials makes learners to view issues from the teachers' perspective. It is also observed that the major constraint of teaching without materials is the tendency of teacher dominating the lesson or imposing his/her ideas on the learner due to lack of materials to aid the process. However, this finding is not in consonance with Ekeyi (2013) who said that Agricultural science could be better taught and learnt if it is accompanied with appropriate instructional materials. The teacher needs instructional materials to further help him or her cope effectively with the differences in students' abilities as students come to school from different backgrounds. There may be students who understand the printed work on the board, while there are others who do not understand concepts by mere writing on the board.

The study revealed that the use of only audio instructional materials cannot enhance students' academic achievement hence explained the failure of students in post-test mean scores. The need for instructional materials for effective academic achievement has been established in studies such as (WoottingPong, 2014; Asadi & Berimani, 2015). Nonetheless of particular interest is the study conducted by WoottingPong (2014) on audio-visual materials; in which he expressed the need for instructional materials especially on the African child, reported that these materials are important because, today's African children have to begin learning a new language like English, if they are to go far in their education. In this case, visual materials become essential for understanding the real meaning of many of the new words they learn especially in the area of description of things.

The study also revealed that the use of visual instructional materials alone can improve academic achievement but not as effective as desired in Agricultural Science. This finding disagrees with Nwachukwu (2006) who said instructional materials are the devices developed or acquired to assist or facilitate teachers in transmitting organized knowledge skills and attitudes to the learners within a teaching situation since it is observed otherwise. In contrast to this finding Idris (2015) stated that the teaching of any subject will be more effective, if the spoken or written materials are accompanied with visual materials either in the form of pictures, charts, diagram among others.

The study revealed that the use of audio-visual instructional materials improves

academic achievement of students significantly compared to using audio and visual instructional materials individually. The combination of audio-visual instructional materials has proven to be very effective in enhancing Agricultural Science students' academic achievement. The need for instructional materials for effective teaching and learning has been established especially in other studies (Aina and Adekanye 2013; Ashaver and Igyuve 2013; Asadi and Berimani 2015; Bello and Goni 2016). But of particular interest is on audio-visual materials in which expresses the need for instructional materials. The students need to see and share, to see hand books and pictures which they can study in their leisure time even of more importance is the fact that presently most students have to begin learning a new language like English, if they are to go far in their education. In this case, visual materials become essential for understanding the real meaning of many of the new words they learn especially in the area of description of things. Instructional materials provide the teacher with interest compelling spring board into a wide variety of learning activities. The materials have a role-play in stimulating and revolving the students. In most cases a teacher's limitation will mainly be his own imagination, the more he can find useful way of employing these materials for more meaningful and permit learning to take place the better.

The study also found that Agricultural science students when taught with audio-visual instructional materials achieved better than any other group with a mean achievement scores of pass mark. Comparing mean achievement of students taught without instructional materials, audio instructional materials, visual instructional materials and audio-visual instructional materials, audio-visual instructional materials emerge the best. This finding is in line with Abubakar (2015) who said instructional materials provide the teacher with interest compelling spring board into a wide variety of learning activities. The materials have a role to play in stimulating and revolving the students. In most cases a teacher's limitation will mainly be his/her own imagination, the more they can find useful ways of employing these materials for more meaningful and permanent learning to take place the better.

In the same vein, Agbulu and Ademu (2010) said instructional materials are important because they are used for the transference of information from one individual to another, help the teacher in extending his learner's horizon of experience, stimulate learners' interest and help both teachers and students to overcome physical limitations during the presentation of subject matter, among others. The instructional materials required for effective teaching of agricultural

science to students in senior secondary schools include hoes, shovel, sickle, watering can, hand trowel, digger, axe and pictures, video clips (NERDC, 2012). It is the view of the council that the recommended instructional materials of agricultural science in curriculum should be made available in schools by the school authority. Instructional materials increase the rate of learning, save the teachers' time and efforts, increase learners interest and facilitate retention of what was learned through appropriate learning strategies chosen by the teacher.

Supporting the finding Eze (2013) said human beings learn more easily and faster by audio-visual processes than by verbal explanations alone. The ability of human beings to arrive at abstract concept through perceptual experience is however, a phenomenon not clearly explained and perhaps not explicable. Furthermore, Oketunji (2000) stressed that audio-visual materials when effectively used have these advantages. They lessen major weakness of verbalism, humanize and vitalize subject matter, provide interesting approach to new topics and give initial correct impressions, economic time in learning, supply concrete materials needed, stimulate the initiative of the pupils.

The study reveals that the use of these instructional materials (when combined) can improve greatly the Agricultural Science students' academic achievement especially the female ones. The study revealed that female students achieved better than the male students. The finding might be attributed to the less concentration of the male students. These contradicting conclusions explain why the difference of academic achievement scores between male and female is not obvious. The finding is in contrast with Nuttall & Pezaris (2011) who found that males taught with instructional materials displays greater confidence in their science skills, which is a strong predictor of academic achievement.

On the tested hypotheses, it was found that there was a significant difference between the mean academic achievement scores of Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials. The study also revealed that there is significant difference between the mean academic achievement scores of female and male Agricultural science students when taught with audio instructional materials, visual instructional materials, audio-visual instructional materials and those taught without instructional materials.. Nowadays gender difference is one of the factors affecting learning and many researchers have focused their

attention on studies relating to its effect on pupils' achievement in science. Studies on the effects of students' gender on achievement have not produced conclusive results. However, in the findings Adeyemo (2011) it is observed that the presence of various instructional materials in schools such as audio-visual materials arouses student's interest towards learning and definitely might have positive effects on performance. Audio-visual aids takes the forms of technological devices, amongst these are: tape recorders, radio broadcasts, public address system, overhead and opaque projectors.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the statement of the problem, procedure used for the study and summary of major findings. Other subheadings of the chapter include conclusion based on the findings, recommendations and suggested topics for further studies.

5.1 Summary

In spite of all effort by the Kaduna State government to ensure qualitative education, the percentage pass in agriculture has declined through the years, 65% in 2014, 62% in 2015, and 59% in 2016 and 57% in 2017 (West Africa Examination Council, 2014-2017). Despite the initiatives, mandates, recommendations by different government organizations, policies, and the ever-increasing use of technology worldwide, it has been observed that audio-visual aids are not being used effectively by the teachers (other than computer science teachers) teaching various subjects like agricultural science. The use of audio-visual materials in teaching agricultural science by teachers in Kaduna State is left to the drain perhaps due to their ignorance of its effect on academic achievement. The researcher has experience in marking agricultural science subject at WAEC level. From the over five years of experience of marking, the researcher saw the rate of failure of students in the paper due to their inability to identify or label items correctly, their inability to state the uses and maintenance of common agricultural items. Six specific objectives and corresponding research questions guided the study with two null hypotheses that were formulated and tested at 0.05 level of significance.

The study adopted quasi-experimental research design. Specifically, Pre-test, Post- test, non-equivalent and control group design. The study area was Kaduna State in North West Nigeria. The population of the study was two hundred and eighty (280) in all the sampled schools of Kaduna State. A multistage sampling technique was used to select two senior secondary schools from the study area base on the availability of resources for the study which make them convenient. The instrument for data collection was Agricultural Science Achievement Test (ASAT) with twenty multiple choice objective items which the students answered by ticking the correct option. The test instrument was subjected to face validation by three validates, one from the Vocational Education Department, Modibbo Adama University of

Technology, Yola, and two from Agricultural Science Department, Kaduna State College of Education Kafanchan. Since the ASAT questions were adapted from WAEC past questions, it was considered reliable. Data was collected by the researcher and two trained research assistance, one each from the selected schools. The process was carried out in all the selected secondary schools through the trained research assistants and supervised by the researcher. The four selected topics of Agricultural Science were taught in experimental group using audio, visual and audio-visual instructional materials while same were carried out in the control group but without learning materials. After four (4) weeks of teachings, post-test was administered to both groups. The researcher thereafter marks the scripts and the scores generated were used as data for the study. Data collected was analyzed with the help of SPSS version 17. Mean was used to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. From the result of the study, the following were major findings:

1) The study revealed mean scores of Agricultural Science students when taught without instructional materials.
2) The study found based on the result of students' achievement that only audio instructional materials can enhance students' academic achievement but not as compared to other instructional materials.
3) The study also revealed that the use of visual instructional materials alone cannot effectively yield the desired students' academic achievement in Agricultural Science.
4) The study found that the use of audio-visual instructional materials improves academic achievement of students significantly compared to using audio and visual instructional materials individually.
5) It was also found that Agricultural Science students when taught with audio-visual instructional materials achieved better than any other group with a mean achievement scores of pass mark.
6) The study reveals that the use of these instructional materials (when combined) can improve greatly the Agricultural Science students' academic achievement especially the female ones.

5.2 Conclusion

The main purpose of the study was to determine the effects of three types of instructional materials on academic achievement of Agricultural Science in secondary schools in Kaduna State, Nigeria. Based on the findings, the study therefore concluded that the extent to which instructional materials affect the students' academic achievement in agricultural sciences and in Kaduna State is clarified.. Classroom learning is enhanced by a variety of audio-visual instructional materials which academic achievement of students in agricultural sciences can be affected by non-adherence to the use of appropriate instructional materials such as audio, visual and audio-visual at any time.

It is concluded that audio-visual instructional materials enables students to think and relate ideas and can apply them in various situations. It also provides learners the opportunity to share their views and ideas. The study findings affirmed that the growing importance of using audio-visual instructional materials as it improves the academic achievement of students in Agricultural science. It is convincing that the gap on effect of audio-visual instructional materials on Agricultural Science students' achievement in senior secondary schools is complete.

5.3 Recommendations

Based on the findings of the study, the following recommendations have been proffered:

1. Principals should ensure stringent instructional supervision of all teachers especially Agricultural Science teachers teaching without the use of instructional materials.
2. Training and re-training of teachers on the use of audio-visual instructional materials in combination other materials for improved academic achievement as revealed in the study.
3. The study recommends the use of visual instructional materials with audio as the use of visual instructional materials alone does not effectively improve academic achievement.
4. The school administrators and other stakeholders should make provision for the use of audio-visual instructional materials based on its effect found in the study.
5. The school administrators should provide every needed support to teachers for the use of audio-visual instructional materials as it improves the academic achievement of students.

6. There should be proper instructional supervision to ensure teachers employ the use of instructional materials (when combined) to improve greatly the Agricultural Science student as it yields higher achievement especially the female ones.

5.4 Suggestions for Further Studies

The content and area coverage of this study has given rise to the following suggestions to further studies:

1. A study may be carried out to investigate the effect of audio-visual teaching materials on students' acquisition of science process skills and interest in Agricultural Science.
2. Further research efforts in this area to investigate the effect of audio-visual teaching materials on students of different ability levels.
3. Comparative analysis of the effect audio, visual and audio-visual teaching materials on academic achievement of Agricultural Science students at the senior secondary school level.
4. A replica study of: Effect of audio, visual and audio-visual on agricultural science students' achievement in senior secondary schools in other states.
5. It is also suggested that a study of this type be conducted with a larger and broader sample size.

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APPENDICES

APPENDIX I: Schematic Figure for the Design

Groups	**Pre-test**	**Treatment**	**Post-test**
Control Group	O_1	-	O_2
Experimental Group	O_3	X_1	O_4
Experimental Group	O_5	X_2	O_6
Experimental Group	O_7	X_3	O_8

Where,

X_1 = treatment for experimental group 1 (audio)

X_2 = treatment for experimental group 2 (visual)

X_3 = treatment for experimental group 3 (audio-visual)

O = observation for the groups in both pre-test and post-test

APPENDIX II: AGRICULTURAL SCIENCE ACHIEVEMENT TEST QUESTIONS

1) Which of the following is not an abiotic condition that affects livestock production?
   a. Sunlight
   b. Rainfall
   c. Temperature
   d. Predators

2) In commercial egg production, the most effective management system is
   a. Deep Litter
   b. Free range
   c. Battery cage
   d. Fold

3) Which of the following practices is not a method of improving Rangeland?

a) Rotational grazing
b) Reseeding or depleted forage species
c) Removal of weed
d) Use of inorganic fertilizers

4) Livestock are said to feed on the range when they eat

a) Fresh herbage at the milking parlor
b) Fresh herbage directly from the pasture
c) Harvested herbage in a stall
d) Preserved herbage in the form of silage

5) Mating in poultry is known as

a) Servicing
b) Treading
c) Caponization
d) Breeding

6) The following are common grasses in the Rangeland except
   a. Pancium maximum
   b. Calopogonium mucunoides
   c. Cynodon dactylon
   d. Imperate cylindrical

7) Young pig just separated from the mother is known as
   a. Bullock
   b. Weaners
   c. Cockerel
   d. Doe

8) Which of the following plants is a pasture legume?
   a. Cynodon plectostachyus
   b. Stylosanthes gracilis
   c. Panicum maximum
   d. Pennisetum purpureum

9) The act of parturition in pig is known as
   a. Farrow
   b. Rearing
   c. Hatching
   d. Treading

10) The act of caring of chicks from the first day till they are about six weeks old is?
   a. Brooding
   b. Rearing
   c. Hatching

d. Treading

11) Meat obtained from goats is called

a. Beef
b. Chevon
c. Veal
d. Pork

12) An extensive area which contains grasses for animals grazing is called

a. Pasture
b. Rangeland
c. Paddocking
d. Stocking

13) The following are breeds of pig expect

a. Hampshire
b. Tamworth
c. Chester white
d. Beveren

14) The following are breeds of goats except

a. Sokoto Red
b. Large Black
c. Bantu
d. Kano Brown

15) Female fowl below one year of age is known as

a. Broiler
b. Hen
c. Layer
d. Pullet

16) System where animals are prevented from having access to pasture and sunshine is called

a) Semi-intensive system
b) Free range system
c) Intensive system
d) Extensive system

17) The following are characteristics of pig except

a. They are small bodied animals
b. They mature very early
c. Very prolific animals
d. Good converters of feed to meat

18) Which of the following animals belong to the Bovidea family?

a. Pig
b. Goat
c. Poultry
d. Rabbit

19) Which of the following is associated with pig

i. Lard ii. Doe iii. Bacon

a. i and ii only
b. i and iii only

c. ii and iii only
d. i, ii and iii

20) Sus sacrofa is a species of
a. Goat
b. Duck
c. Pig
d. Poultry

APPENDIX III: MARKING SCHEME FOR AGRICULTURAL SCIENCE ACHIEVEMENT TEST

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

APPENDIX IV: LESSON PLAN FOR AUDIO INSTRUCTIONAL MATERIALS (TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Range land management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of range land.
II. List the importance of range land.
III. State the characteristics of range land.
IV. Mention some common grasses and legumes of livestock in range land.

Teaching aids: playback tape and loudspeaker

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher through a playback tape will introduce the lesson by asking the students about range land management.	The student respond to the teachers' questions	Playback tape and loudspeaker
Presentation:					
Step I	10mins	Meaning of range land	The teacher explains the meaning of range land through a playback tape	The students listen to the teachers' voice and take note	playback tape and loudspeaker
Step II	15mins	Importance of range land	The teacher states the importance of range land through a playback tape	The students listen to the audio and take note	playback tape and loudspeaker
Step III	20mins	Characteristics	The teacher enumerates	The students listen to	playback

		of range land	the characteristics of range land through a playback tape	the teachers' voice and take note where necessary	tape and loudspeaker
Step IV	20mins	Some common grasses and legumes of livestock in range land	The teacher enumerates some common grasses and legumes of livestock in range land through a playback tape	The students listen to the teachers' voice and take note where necessary	playback tape and loudspeaker
Evaluation	10mins		The teacher evaluated his/her lesson by asking question base on the lesson through a playback tape	The students respond to the teachers' questions by providing answers	
Conclusion			The teacher summarizes her lesson through a playback tape	The students listen and ask questions where necessary	

LESSON PLAN FOR VIDUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Range land management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of range land.

II. List the importance of range land.

III. State the characteristics of range land.

IV. Mention some common grasses and legumes of livestock in range land.

Teaching aids: Projector display without audio, visual display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students through display about range land management	The student respond to the teachers' questions by writing them on their notebook	Projector with audio slideshow
Presentation :					
Step I	10mins	Meaning of range land	The teacher explains the meaning of range land through a playback tape	The students listen and take note	Projector with audio slideshow
Step II	15mins	Importance of range land	The teacher states the of importance of range land through the projector	The students watch the display and take note	Projector with audio slideshow
Step III	20mins	Characteristics of range land	The teacher enumerates the characteristics of range land through the projector	The students watch the display and take note where necessary	Projector with audio slideshow
Step IV	20mins	Some common grasses of livestock range land	The teacher gives some common grasses and legumes of livestock in range land through the projector	The students watch the display and take note where necessary	Projector with audio slideshow
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson through the projector	The students respond to the teachers' questions by writing them down on their notebook	
Conclusion	3mins		The teacher summarizes	The students watch	

			her lesson through a the projector	the display and write notes on their notebook	

LESSON PLAN FOR AUDIO-VISUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Range land management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of range land.
II. List the importance of range land.
III. State the characteristics of range land.
IV. Mention some common grasses and legumes of livestock in range land.

Teaching aids: playback tape and loudspeaker, Projector display with audio, video display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about range land management.	The student respond to the teachers' questions	Tape, Projectors and video display of charts
Presentation :					
Step I	10mins	Meaning of range land	The teacher explains the meaning of range land	The students listen and watch then take note	Tape, Projectors and video display

					of charts
Step II	15mins	Importance of range land	The teacher states the Importance of range land as displayed.	The students listen and watch then take note	Tape, Projectors and video display of charts
Step III	20mins	Characteristics of range land	The teacher enumerates the characteristics of range land as on the projector.	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Step IV	20mins	Some common grasses and legumes of livestock in range land	The teacher list some common grasses and legumes of livestock range land	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Evaluation	10mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers' questions by providing answers	
Conclusion			The teacher summarizes her lesson	The students listen, watch and ask questions where necessary	

LESSON PLAN FOR INSTRUCTION WITH CONVENTIONAL INSTRUCTIONAL MATERIALS (CONTROL GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Range land management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of range land.
II. List the importance of range land.
III. State the characteristics of range land.
IV. Mention some common grasses and legumes of livestock in range land.

Teaching aids: Chalk and Board

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about range land management.	The student respond to the teachers' questions	Chalk and Board
Presentation :					
Step I	10mins	Meaning of range land	The teacher explains the meaning of range land	The students listen and take note	Chalk and Board
Step II	15mins	Importance of range land	The teacher states importance of range land	The students listen and take note	Chalk and Board
Step III	20mins	Characteristics of range land	The teacher enumerates the characteristics of range land	The students listen to the and take note where necessary	Chalk and Board
Step IV	20mins	Some common grasses and legumes of livestock in range land	The teacher mentions Some common grasses of livestock range land	The students listen to the teachers and take note where necessary	Chalk and Board
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers question by providing answers	

Conclusion	3mins		The teacher summarizes her lesson	The students listen and ask questions where necessary	

LESSON PLAN FOR AUDIO INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (Poultry) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of livestock management.

II. State the meaning of poultry and terms used in poultry.

III. Identify the breeds of poultry.

IV. Identify system of poultry Management.

Teaching aids: playback tape and loudspeaker

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher through a playback tape will introduce the lesson by asking the students about livestock management.	The student respond to the teachers question by writing it on their notebook	Playback tape and loudspeaker
Presentation:					
Step I	10mins	Meaning of livestock management	The teacher explains the meaning of livestock management through a playback tape	The students listen to the teachers' voice and take note	playback tape and loudspeaker
Step II	15mins	The meaning of poultry and terms used in	The teacher states meaning of poultry and terms used in poultry	The students listen to the audio and take note	playback tape and loudspeaker

		poultry	through a playback tape		
Step III	20mins	The Breeds of poultry	The teacher enumerates the breeds of poultry through a playback tape	The students listen to the teachers' voice and take note where necessary	playback tape and loudspeaker
Step IV	20mins	The systems of poultry Management	The teacher enumerates the systems of poultry Management through a playback tape	The students listen to the teachers' voice and take note where necessary	playback tape and loudspeaker
Evaluation	10mins		The teacher evaluated his/her lesson by asking question base on the lesson through a playback tape	The students respond to the teachers question by writing it down on their notebook	
Conclusion			The teacher summarizes her lesson through a playback tape	The students listen and write question on their notebook	

LESSON PLAN FOR VIDUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (Poultry) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of livestock management.

II. State the meaning of poultry and terms used in poultry.

III. Identify Breeds of poultry Management.

IV. Identify systems of poultry Management

Teaching aids: Projector display without audio, visual display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher through a playback tape will introduce the lesson by asking the students about livestock management.	The student respond to the teachers question by writing it on their notebook	Projector with audio slideshow
Presentation :					
Step I	10mins	Meaning of livestock management	The teacher explains the meaning of livestock management through a playback tape	The students listen and take note	Projector with audio slideshow
Step II	15mins	The meaning of poultry and terms used in poultry	The teacher states meaning of poultry and terms used in poultry through the projector	The students watch the display and take note	Projector with audio slideshow
Step III	20mins	The Breeds of poultry	The teacher enumerates the breeds of poultry through the projector	The students watch the display and take note where necessary	Projector with audio slideshow
Step IV	20mins	The system of poultry Management	The teacher enumerates the systems of poultry Management through the projectors	The students watch the display and take note where necessary	Projector with audio slideshow
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson through the projector	The students respond to the teachers' question by writing it down on their notebook	

Conclusion	3mins		The teacher summarizes her lesson through a the projector	The students watch the display and write question on their notebook	

LESSON PLAN FOR AUDIO-VISUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (Poultry) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of livestock management.
II. State the meaning of poultry and terms used in poultry.
III. Identify the breeds of poultry.
IV. Identify systems of poultry management.

Teaching aids: playback tape and loudspeaker, Projector display with audio, video display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about livestock management.	The student respond to the teachers' questions	Tape, Projectors and video display of charts
Presentation :					
Step I	10mins	Meaning of livestock management	The teacher explains the meaning of livestock management	The students listen and watch then take note	Tape, Projectors and video display

					of charts
Step II	15mins	The meaning of poultry and terms used in poultry	The teacher states meaning of poultry and terms used in poultry	The students listen and watch then take note	Tape, Projectors and video display of charts
Step III	20mins	The Breeds of poultry	The teacher enumerates the breeds of poultry Management	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Step IV	20mins	The system of poultry Management	The teacher enumerates the systems of poultry Management	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Evaluation	10mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers' questions	
Conclusion			The teacher summarizes her lesson	The students listen, watch and write points on their notebook	

LESSON PLAN FOR INSTRUCTION WITH CONVENTIONAL INSTRUCTIONAL MATERIALS

(CONTROL GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (Poultry) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the meaning of livestock management.
II. State the meaning of poultry and terms used in poultry.
III. Identify Breeds of poultry.
IV. Identify systems of poultry Management.

Teaching aids: Chalk and Board

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about livestock management.	The student respond to the teachers questions	Chalk and Board
Presentation :					
Step I	10mins	Meaning of livestock management	The teacher explains the meaning of livestock management	The students listen and take note	Chalk and Board
Step II	15mins	The meaning of poultry and terms used in poultry	The teacher states meaning of poultry and terms used in poultry	The students listen and take note	Chalk and Board
Step III	20mins	The systems of poultry Management	The teacher enumerates the breeds of poultry.	The students listen to the and take note where necessary	Chalk and Board
Step IV	20mins	The systems of poultry Management.	The teacher enumerates the systems of poultry Management.	The students listen to the teachers and take note where necessary	Chalk and Board
Evaluation	10mins		The teacher evaluated his/her lesson by asking question base on the	The students respond to the teachers question by providing	

			lesson	answers	
Conclusion			The teacher summarizes her lesson	The students listen and ask questions where necessary	

LESSON PLAN FOR AUDIO INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (goat) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of goat.
II. Identity systems of goat management.
III. State the requirements for good goat management.
IV. Explain the importance of goat management.

Teaching aids: playback tape and loudspeaker

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher through a playback tape will introduce the lesson by asking the students about goat management.	The student respond to the teachers question by writing it on their notebook	Playback tape and loudspeaker
Presentation:					
Step I	10mins	Class and	The teacher enumerates	The students listen to	playback

		family of goat	the class and family of goat through a playback tape	the teachers' voice and take note	tape and loudspeaker
Step II	15mins	Systems of goat management	The teacher states the systems of goat management through a playback tape	The students listen to the audio and take note	playback tape and loudspeaker
Step III	20mins	The requirements for good goat management	The teacher enumerates the requirements for good goat management through a playback tape	The students listen to the teachers' voice and take note where necessary	playback tape and loudspeaker
Step IV	20mins	The importance of goat management	The teacher defines requirements for good goat management through a playback tape	The students listen to the teachers' voice and take note where necessary	playback tape and loudspeaker
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson through a playback tape	The students respond to the teachers question by writing it down on their notebook	
Conclusion	3mins		The teacher summarizes her lesson through a playback tape	The students listen and write question on their notebook	

LESSON PLAN FOR VIDUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (goat) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of goat.
II. Identity systems of goat management.
III. State the requirements for good goat management.
IV. Explain the importance of goat management.

Teaching aids: Projector display without audio, visual display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students through display about goat management.	The student respond to the teachers question by writing it on their notebook	Projector with audio slideshow
Presentation :					
Step I	10mins	Class and family of goat	The teacher displays the classes and families of goat	The students listen and take note	Projector with audio slideshow
Step II	15mins	Systems of goat management	The teacher states the systems of goat management through the projector	The students watch the display and take note	Projector with audio slideshow
Step III	20mins	The requirements for good goat management	The teacher enumerates the requirements for good goat management through the projector	The students watch the display and take note where necessary	Projector with audio slideshow
Step IV	20mins	The importance of goat	The teacher displays the importance of goat management through the	The students watch the display and take note where necessary	Projector with audio slideshow

		management	projector		
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson through the projector	The students respond to the teachers' question by writing it down on their notebook	
Conclusion	3mins		The teacher summarizes her lesson through a the projector	The students watch the display and write question on their notebook	

LESSON PLAN FOR AUDIO-VISUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (goat) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of pig, rabbit and goat.
II. Identity systems of pig, rabbit and goat management.
III. State the requirements for good goat management.
IV. Explain the importance of goat management.

Teaching aids: playback tape and loudspeaker, Projector display with audio, video display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by	The student respond to the teachers	Tape, Projectors and

			asking the students about goat management.	questions	video display of charts
Presentation :					
Step I	10mins	Class and family of goat	The teacher explains the class goat.	The students listen and watch then take note	Tape, Projectors and video display of charts
Step II	15mins	Systems goat management	The teacher states the systems of goat management	The students listen and watch then take note	Tape, Projectors and video display of charts
Step III	20mins	The requirements for good goat management	The teacher enumerates the requirements for good goat management	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Step IV	20mins	The importance of goat management	The teacher gives the importance of goat management	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers question	
Conclusion	3mins		The teacher summarizes her lesson	The students listen and write points on their notebook	

LESSON PLAN FOR INSTRUCTION WITH CONVENTIONAL INSTRUCTIONAL MATERIALS

(CONTROL GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (goat) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

i. State the class and family of goat.
ii. Identity systems of goat management.
iii. State the requirements for good goat management.
iv. Explain the importance of goat management.

Teaching aids: Chalk and Board

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about goats.	The student respond to the teachers' questions	Chalk and Board
Presentation:					
Step I	10mins	Class and family of goat	The teacher explains the class and family of goat	The students listen and take note	Chalk and Board
Step II	15mins	Systems of goat management	The teacher states the systems of goat management	The students listen and take note	Chalk and Board
Step III	20mins	The requirements for good goat management	The teacher enumerates the requirements for good goat management	The students listen to the teacher and take note where necessary	Chalk and Board
Step IV	20mins	The	The teacher gives	The students listen to	Chalk and

		importance of good goat management	importance of goat management	the teacher and take note where necessary	Board
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers' questions	
Conclusion	3mins		The teacher summarizes her lesson	The students listen and write points on their notebook	

LESSON PLAN FOR AUDIO INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (pig) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of pig.
II. Identity systems of pig management.
III. State the requirements for good pig management.
IV. Explain the importance of pig management.

Teaching aids: Chalk and Board

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about goat management.	The student respond to the teachers' questions	Chalk and Board

Presentation :					
Step I	10mins	Class and family of pig	The teacher explains the class and family of pig	The students listen and take note	Chalk and Board
Step II	15mins	Systems of pig management	The teacher states the systems of pig management	The students listen and take note	Chalk and Board
Step III	20mins	The requirements for good pig management	The teacher enumerates the requirements for good pig management	The students listen to the teacher and take note where necessary	Chalk and Board
Step IV	20mins	The importance of pig management	The teacher gives importance of pig management	The students listen to the teacher and take note where necessary	Chalk and Board
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers' questions	
Conclusion	3mins		The teacher summarizes her lesson	The students listen and write points on their notebook	

LESSON PLAN FOR VIDUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (pig) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of pig.
II. Identity systems of pig management.
III. State the requirements for good pig management.
V. Explain the importance of pig management.

Teaching aids: Projector display without audio, visual display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students through display about goat management.	The student respond to the teachers question by writing it on their notebook	Projector with audio slideshow
Presentation :					
Step I	10mins	Class and family of pig	The teacher displays the classes and families of pig	The students listen and take note	Projector with audio slideshow
Step II	15mins	Systems of pig management	The teacher states the systems of pig management through the projector	The students watch the display and take note	Projector with audio slideshow
Step III	20mins	The requirements for good pig management	The teacher enumerates the requirements for good pig management through the projector	The students watch the display and take note where necessary	Projector with audio slideshow
Step IV	20mins	The importance of pig management	The teacher displays the importance of pig management through the projector	The students watch the display and take note where necessary	Projector with audio slideshow

Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson through the projector	The students respond to the teachers' question by writing it down on their notebook	
Conclusion	3mins		The teacher summarizes her lesson through a the projector	The students watch the display and write question on their notebook	

LESSON PLAN FOR AUDIO-VISUAL INSTRUCTIONAL MATERIALS

(TREATMENT GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (pig) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of pig.
II. Identity systems of pig management.
III. State the requirements for good pig management.
IV. Explain the importance of pig management.

Teaching aids: playback tape and loudspeaker, Projector display with audio, video display of charts.

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about	The student respond to the teachers questions	Tape, Projectors and video display

			goat management.		of charts
Presentation :					
Step I	10mins	Class and family of pig	The teacher explains the class and family pig.	The students listen and watch then take note	Tape, Projectors and video display of charts
Step II	15mins	Systems pig management	The teacher states the systems of pig management	The students listen and watch then take note	Tape, Projectors and video display of charts
Step III	20mins	The requirements for good pig management	The teacher enumerates the requirements for good pig management	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Step IV	20mins	The importance of pig management	The teacher gives the importance of pig management	The students listen and watch then take note where necessary	Tape, Projectors and video display of charts
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers question	
Conclusion	3mins		The teacher summarizes her lesson	The students listen and write points on their notebook	

LESSON PLAN FOR INSTRUCTION WITH CONVENTIONAL INSTRUCTIONAL MATERIALS

(CONTROL GROUP)

SCHOOL:

CLASS: SS II

SUBJECT: Agricultural Science

TOPIC: Livestock (pig) Management

DATE:

DURATION: 80 minutes

BEHAVIOURAL OBJECTIVES:

By the end of the lesson students would be able to:

I. State the class and family of pig.
II. Identity systems of pig management.
III. State the requirements for good pig management.
IV. Explain the importance of pig management.

Teaching aids: Chalk and Board

Steps	Time	Content	Teacher Activity	Student Activity	Teaching aids
Introduction	5mins		The teacher will introduce the lesson by asking the students about goats management.	The student respond to the teachers' questions	Chalk and Board
Presentation :					
Step I	10mins	Class and family of pig	The teacher explains the class and family of pig	The students listen and take note	Chalk and Board
Step II	15mins	Systems of pig management	The teacher states the systems of pig management	The students listen and take note	Chalk and Board
Step III	20mins	The requirements for good pig management	The teacher enumerates the requirements for good pig management	The students listen to the teacher and take note where necessary	Chalk and Board
Step IV	20mins	The importance of	The teacher gives importance of pig	The students listen to the teacher and take	Chalk and Board

		pig management	management	note where necessary	
Evaluation	7mins		The teacher evaluated his/her lesson by asking question base on the lesson	The students respond to the teachers' questions	
Conclusion	3mins		The teacher summarizes her lesson	The students listen and write points on their notebook	

APPENDIX V: SPSS Version 17 Analysis Results

Research Question One

Descriptive Statistics

	N	Sum	Mean	Std. Deviation	Variance
ConvPre	54	4181.00	25.8333	9.79703	167.936
ConvPost	50	3124.00	42.2619	15.14976	246.980
Valid N (listwise)	50				

Research Question Two

Descriptive Statistics

	N	Sum	Mean	Std. Deviation	Variance
AudioPre	60	2689.50	28.5833	8.68915	137.993
AudioPost	46	1962.00	38.4783	10.5866	275.528
Valid N (listwise)	46				

Research Question Three

Descriptive Statistics

	N	Sum	Mean	Std. Deviation	Variance
VisualPre	52	4181.00	30.9615	10.84826	167.936

VisualPost	53	3124.00	33.8679	8.96797	246.980
Valid N (listwise)	52				

Research Question Four

Descriptive Statistics

	N	Sum	Mean	Std. Deviation	Variance
Audio-VisualPre	62	4181.00	27.7419	10.92738	167.936
Audio-VisualPost	42	3124.00	43.7000	14.35021	246.980
Valid N (listwise)	42				

Research Question Five

Descriptive Statistics

	N	Sum	Mean	Std. Deviation	Variance
ConvPost	50	2155.00	42.2619	14.35021	102.094
AudioPost	46	4651.50	38.4783	10.58666	193.556
VisualPost	53	1462.00	33.8679	8.96797	174.690
Audio-VisualPost	42	1771.50	43.7000	15.14976	103.612
Valid N (listwise)	42				

Research Question Six

Descriptive Statistics

	N	Sum	Mean	Std. Deviation	Variance
FemalePre	50	2155.00	27.9752	11.00338	102.094
MalePre	51	4651.50	28.6919	8.96367	193.556
FemalePost	107	1462.00	42.1429	15.22131	174.690
MalePost	84	1771.50	34.5098	12.21699	103.612
Valid N (listwise)	51				

Hypothesis One

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5131.249[a]	2	2565.624	15.010	.000	.238
Intercept	20666.191	1	20666.191	120.905	.009	.557
Pretest	539.833	1	539.833	3.158	.000	.032
Group	4590.203	1	4590.203	26.854	.009	.219
Error	16409.241	188	170.930			
Total	333125.500	191				
Corrected Total	21540.490	190				

a. R Squared = .238 (Adjusted R Squared = .222)

Hypothesis Two

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5138.642[a]	2	1712.881	9.921	.000	.239
Intercept	9368.004	1	9368.004	54.260	.032	.364
Pretest	542.926	1	542.926	3.145	.000	.032
Gender	4597.596	1	2298.798	8.751	.032	.219
Error	16401.848	188	172.651			
Total	333125.500	191				
Corrected Total	21540.490	190				

a. R Squared = .239 (Adjusted R Squared = .215)