EFFECTS OF SCHOOL FARM ON THE ACADEMIC PERFORMANCE OF SENIOR SECONDARY SCHOOL STUDENTS IN AGRICULTURAL SCIENCE IN KADUNA STATE, NIGERIA

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DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
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MAY, 2018

DECLARATION

I hereby declare that this dissertation titled **"EFFECTS OF SCHOOL FARM ON THE ACADEMIC PERFORMANCE OF SENIOR SECONDARY SCHOOL STUDENTS' IN AGRICULTURAL SCIENCE IN KADUNA STATE, NIGERIA",** has been written by me in the Department of vocational and technical education, Faculty of Education, Ahmadu Bello University, Zaria under the supervision of Dr. C. Uguru and Dr. M. Ayorinde. It has not been presented in any form for the award of higher degree in any institution of higher learning. All sources of information derived from the literature have been duly acknowledged in the text and list of references.

Name of Student	Signature	Date

CERTIFICATION

This research work titled **"EFFECTS OF SCHOOL FARM ON THE ACADEMIC PERFORMANCE OF SENIOR SECONDARY SCHOOL STUDENTS' IN AGRICULTURAL SCIENCE, IN KADUNA STATE, NIGERIA"** by Yango Tambaya Jonathan has been read and meets the requirements and regulations governing the award of the degree of Master of Science in agricultural education of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to my beloved children Jethro Jonathan Tambaya, Serah Isa'ac Tambaya and Isa'ac Jonathan Tambaya.

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ABSTRACT

The study was carried out to determine the effects of school farm on the academic performance of senior secondary school students in agricultural science in Kaduna state. Pre-test post test quasi-experimental design was adopted for the study. The study had three (3) specific objectives: (i) to determine the effects of school farm on academic performance of agricultural science students (ii) compare the academic performance of agricultural science students' taught with school farm and those taught without school farm (iii) to determine the difference between the academic performance of male and female agricultural science students taught with school farm. Three (3) research questions

and three (3) null hypotheses were formulated as a guide. 14,241 senior secondary school (SSSI) agricultural science students formed the population for the study. Two (2) schools and sixty (60) students were selected using random sampling techniques. The instrument used for data collection was a twenty (20) item multiple choices Achievement Test in Agricultural Science (ATAS), which was administered to the students. Scores obtained were analyzed using mean, standard deviation and t-test statistics. Mean and standard deviation were used to answer all the three (3) research questions while t-test was used to test all the three (3) null hypotheses at 5% level of significance (P = 0.05). The findings showed that, school farm significantly affect the academic performance of agricultural students. The result also revealed higher students' academic performance in agricultural science when exposed to school farm activities. The study further revealed that, the academic performance of male and female agricultural science students did not differ significantly when taught using school farm. It was concluded that school farm enhanced the academic performance of students in agricultural science. It is recommended among other things that, curriculum planners should emphasize the use of school farm in teaching and learning agricultural science in senior secondary schools by making provisions in the curriculum enough space and equipment's for effective school farm operations.

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ABBREVIATIONS USE

S/N	Abbreviation	Meaning
1.	ANOVA	Analysis of Variance
2.	ATAS	Achievement Test in Agricultural Science
3.	FRN	Federal Republic of Nigeria
4.	GSS	Government Secondary Schools
5.	LGA	Local Government Area
6.	NECO	National Examination Council
7.	SSS	Senior Secondary School

8. WAEC West African Examination Council

OPERATIONAL DEFINITION OF TERMS

For the purpose of this study, the following operational definitions were put forward

1. **Academic performance:** Refers students achievement in the topic being taught based on the stated objectives.
2. **Agricultural science:** the production of crops and animals for man's use.
3. **Effect:** A change produced or result obtained due to present or absent of certain thing.
4. **School farm:** Is as an area of land, and the buildings on it used for growing crops or keeping animals managed by students under the supervision of their teacher.
5. **Teaching:** The art of imparting knowledge to students by the teacher.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture is defined as the production of crops and animals for man's use (Iwena, 2008). Agricultural science is one of the core subjects taught in secondary schools in Nigeria. The objectives of teaching agricultural science at senior secondary school level are as follows:

a) To stimulate and sustain student's interest in agriculture.
b) To inculcate in students farming skills.
c) To enable students acquire basic knowledge and practical skills in agriculture.
d) To prepare students for future studies in agriculture and to produce prospective future farmers Federal Republic of Nigeria (FRN) 2009:28).

The above objectives are achievable within the provision of stipulated agricultural science curriculum currently being implemented in secondary schools nationwide. A holistic implementation of agricultural science curriculum in secondary schools is expected to embrace classroom instruction and practical experiences for students of agriculture (Adegeye and Dittoh, 1985). Beside, adequate and qualified agricultural science teachers, adequate classrooms, agricultural science laboratory and school farms are prerequisites to teaching and learning of agricultural science in senior secondary schools. These requirements are complementary to school farms according to West African Examination Council (WAEC) (2013) who recommends that schools must keep school farms where crops and livestock are grown Therefore, school farm is an area of land, and the buildings on it used for growing crops and/or keeping animals managed by students under the supervision of their teacher (Ani, 1997). School farms are expected to have adequate equipment, farm implements/tools, farm structure and regular supply of inputs in addition to farm space to accommodate crops and livestock managed by students under the supervision of their teachers (Ani, 1997).

Children and adults alike truly learn best by doing. The school farm is important for giving students the opportunity to get outdoors and experience. It is in line with this that John Dewey and Jean Piaget advocated a hands-on approach to learning. Piaget believed that involvement is the key to intellectual development. Getting students actively involved in school farm not only helps them to understand, but gives them an appreciation of the natural world, something that is slipping away in today's society. School farms are ideal settings for learning.

In the measurement of students' academic performance in agriculture as a school subject, various tasks are undertaken within the school and outside the school. Within the school, such exercises include, farm practice, assignments, and field work supervised by the agricultural science teacher, teacher made tests, terminal examination etc. Outside the school, external and independent examination bodies have emerged over the years to validate the assessment of student academic performance. The examination bodies include the WAEC and National Examination Council (NECO). These examination bodies use standardized tests to measure students in agriculture. Such test items measure student's performance in all the secondary schools with respect to the stipulated national curriculum

Many factors have been known to influence the academic achievement of agricultural science students in their various school endeavours. These factors can be either personal or environmental factors. Environmental factors include school farm and laboratory. Edinyang, (2012) defines academic performance as the outcome of education which reveals the extent to which a student, teacher or institution has achieved educational goals. Catherine, (2013) on the other hand sees academic performance as students' achievement in the topic being taught based on the stated objectives. It is further stated in the senior secondary school curriculum that students' performance should be continuously assessed through various forms of tests and during field and laboratory practical. This is necessary to ascertain the progress of students' academic performance. Academic performance refers to students' achievement in

the topic taught based on the stated objectives. Student academic performance in agriculture as a school subject can be measured through various tasks within the school and outside the school.

Many teachers go to classes to teach agricultural science as liberal arts without any material to assist them or the learners. Abdullahi (1992) reveals that it does not promote meaningful learning of agricultural science as it appeals only to the sense of hearing. Agricultural science is a doing subject, and for effective learning to take place many senses must be involved. Hearing alone easily leads to forgetting. Remember the Chinese proverb says: I hear- I forget, I see- I remember, I do- I understand (Abdullahi, 1992). The fundamental of an operational school farm is to transfer classroom instruction to practical experiences in the field. In line with this, the school farm offers students the opportunity to acquire knowledge, skills and competencies, and demonstrate farm principles and practices, carry out field experiment which cannot be accommodated in the laboratory (Ani, 1997).

School farms are not just for practical experiences but embracing several other benefits. In view of this background, the study aimed at determining the effects of school farms on the academic performance of senior secondary schools students in Agricultural Science in Kaduna State, Nigeria.

1.2 Statement of the Problem

School farm is one of the prerequisites for effective implementation of agricultural science curriculum in secondary schools (Ladele and Agbebaku, 2006). A holistic implementation of agricultural science curriculum in secondary schools is expected to embrace classroom instruction and practical experiences which the students in agriculture are exposed to.

WAEC (2013) recommends that schools must keep school farms where crops are grown with at least one species of livestock, from each of the following two group: pigs, rabbit and poultry; goat, sheep and cattle and where feasible fish pond. School farms are

expected to have adequate equipment, farm implements/tools, farm structure and regular supply of inputs in addition to farm space to accommodate crops and livestock managed by students under the supervision of their teachers. According to Smith, Peterat, and Bartosh (2006) school farm provides greater appreciation of the farming enterprise, changes students perception of farm and farmers as well develop a sound understanding of land, crops and animals and its significance in supporting human life and development of social skills. Lack of school farm creates unawareness of the natural beauty of green plants and disrespect for nature and lack of understanding of food and land uses (Whyte, 2005).

In Kaduna State, it has been observed that in many secondary schools, school farms lacked requisite structures, implements and other facilities, while in others these facilities are in a state of complete dilapidation leading to total neglect of practical lessons in the school farm. This may led to many teachers to go to classes to teach agricultural science as liberal arts without any material to assist them or the learners. The poor state of the school farm and lack of school farm has contributed to the students' development of negative attitude to agricultural science and also affects students' academic performance in agricultural science. The fundamental of an operational school farm is to transfer classroom instruction to practical experiences in the field. The problem of this study hinges on the determination of the extent to which school farm affects academic performance of senior secondary school students in agricultural science in Kaduna state, Nigeria.

1.3 Objectives of the Study

The major objective of the study was to determine the effects of school farms on the academic performance of senior secondary school students in agricultural science in Kaduna State. The following specific objectives were formulated to;

1. Determine the effects of school farm on students' academic performance in agricultural science.

2. Compare the academic performance of agricultural science students taught with school farm and those taught without school farm
3. Determine the difference between the performance of male and female agricultural science students taught with school farm.

1.4 Research Questions

The following research questions were answered in this study:

1. What is the effect of school farm on the academic performance of agricultural science students?
2. What is the difference between the academic performance of agricultural science students taught with school farm and those taught without school farm?
3. What is the difference between the performance of male and female agricultural science students taught with school farm?

1.5 **Research Hypothesis**

The following null hypotheses (Ho) were formulated and were tested at 0.05 level of significance.

1. There is no significant difference between the academic performance of students with school farm and those without school farm in agricultural science.
2. There is no significant difference between the academic performance of agricultural science students taught with school farm and those taught without school farm
3. There is no significant difference between the academic performance of male and female agricultural science students taught with school farm.

1.6 Significance of the Study

The study would benefit agricultural science teachers, students, curriculum planners, and the government.

This would help to improve the effectiveness of agricultural science teachers in carrying out their task. The findings of this work would benefit students when the most appropriate school farm is established and used by agricultural science teacher, it will improve students' performance and interest in the subject.

The result of this study would also be beneficial to curriculum planners by creating awareness of the importance of using school farm for effective teaching and learning, so that, such consideration can be made when designing the curriculum and relevant facilities can be indicated. Furthermore, this research study would be of great significance to the government at all levels. The work is in line with the Federal governments' effort to enhance teaching of science syllabus in the country. The work would also create awareness to the government on the importance of establishing standard school farms for effective teaching and learning of agricultural science in secondary school.

1.7 Basic Assumption of the Study

1 School farm found in senior secondary schools promote students academic performance.

2 Students perform differently when taught with school farm.

3 The performance of male and female students differs when taught with school farm.

1.8 Delimitation of the Study

This research was delimited to the effects of school farm on the academic performance of senior secondary schools students in agricultural science in Kaduna State. This will allow the researcher to determine the importance of school farm on the academic performance of students in agricultural science. The study was also delimited to Senior Secondary School students in Kaduna State. It was further be delimited to SS1 students that offer agricultural science. This is because SS1 students have the background knowledge of agricultural science

for four year in the school and had taken series of internal exams and are about preparing for external examination (WAEC and NECO). The study was also delimited to the three objectives of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviewed literature related to the study under the following subheadings:-

2.1 Theoretical Framework

2.2 The School Farm

2.3 Types of School Farm

2.4 Purpose of School Farm

2.5 Effects of School Farm

2.6 Activities of School Farm

2.7 School Farm Tools/Equipment

2.8 Concept of Academic Performance

2.9 Review of Empirical Studies

2.10 Summary of Literature Reviewed

2.1 Theoretical Framework

The theoretical framework of this research hinges on cognitive theory of learning by Piaget, constructivism theory of learning by Piaget and Prosser first theory. Piaget cognitive theory of learning states that, for a child to have knowledge of the world the child must act on objects and it is this action which provides knowledge of those objects; the mind organizes reality and acts upon it (Piaget, 1920). A central component of Piaget's theory of cognitive learning is that it involves the participation of the learner. Piaget observes that knowledge is not merely transmitted verbally but must be constructed and reconstructed by the learner. In the natural environment of the object(s) the learner will have the ability to act on object(s) by observing, identifying, classifying and even by manipulating the object(s) in its natural environment. Piaget further observes that learning occurs by self-discovery. That is, exploration, that is motivated by curiosity. The students are exposed to basic concepts to discover things for themselves. This could be through practical orientation by the teacher and the learner. Thus experience and the child's environment is a strong base in students learning. The school must therefore be within the experimental world of the child. Hence, it involves leaning by doing between the child and his environment.

Constructivism theory of Piaget is a contemporary learning school of thought which postulates that students create their own maps and theories of the world (Piaget, 1967). The constructivist school of thought views learning as a process in which students actively construct their own knowledge of the situation at hand based on the existing previous knowledge. According to constructivism theory, students engage their minds very actively in

constructing meaning out of their interaction with the environment. They make their own connection between experiences and the words other people are teaching them to use., and they create their own network of relationships and patterns of thinking (Bichi,2008). Sesen and Tarhan, (2010) concluded that constructivist learning strategy has; an advantage of increasing students' self confidence in relation to science, generate a more active participation in science activities and lead not only to greater understanding but also greater interest in the subject.

Prosser first theory on the other hand hinged on work states in which "vocational education will be efficient in proportion as the environment where the learner is trained in a replica of the environment in which he most subsequently work" (Prosser, 1949). This theory dictates that the types, kind, amount use and arrangement of space, materials, equipment and supplies for a preparatory program be a replica of those in employment. It relates directly to the efficiency with which a student transfers their understanding. Secondary school students who are taught in school farm will be interested in agricultural science and their academic performance will also be improved.

The experiences involved in school farm strategy are thus that of learning by doing, problem solving and practical work which agrees with the theory. These theories are related to this research studies in the sense that if agricultural science students are exposed to the natural environment (school farm) and the practical aspect of agriculture learning will increase, thereby promoting academic performance of students.

2.2 The School Farm

Agricultural science curriculum in secondary school is practical oriented, aimed at suitable skill acquisition for a successful academic performance and transition to the world of work in agri-business endeavours. But, the emphasis of integrating productive academic performance and productive work into the educational programme could fail if school farm

with farm resources are not available in schools to actualize the vocational ends to which agriculture curriculum in secondary schools is aimed at.

In transforming the agriculture curriculum into practical and/or vocational parlance, various teaching aids, specimen, crop and animal species constitute the major facilities at the disposal of the teacher and students of agriculture (Akpan, 2008). Olatitan (1984) stresses that students and teachers should be aware of the potentials of various instructional materials/farm facilities in the school and should be encouraged to use them in creative ways to further enhance their academic performance and vocational competence in productive agriculture. One of such facilities that is of vital importance to any school running agricultural science program is the school farm. School farm is an area of land, and the buildings in it, used for growing crops and/or keeping animals under the control of the teacher/students.

2.2.1 Types of School Farm

Adebayo (2009) identifies the following as types of school farm

I. Crop farm

   This type of school farm is used for growing crops which may be annual, perennial or biennial crops e.g. millet, maize, rice, soya beans, cotton, cassava, cocoa, coffee etc.

II. Horticulture (ornamental plant)

   It deals with the growing of vegetables, fruits, and ornamental plants (flowers).

III. Livestock farm

   This is a farm for farm animals e.g. cattle's, sheep, goats, poultry, pigs, rabbits, etc.

IV. Bee farm (Apiculture)

   Is a type of school farm that is used for keeping bees.

V. Fish farm

   Is an area of land that is used for the rearing of fish.

VI. Snail farm

This is the type of school farm for snail.

2.2.2 Purpose of School Farm

The school farm has a prominent place as a laboratory in the agricultural school where students learn by doing. Subramaniam (2002), identifies the following as the purposes of school farm:

a. To provide meaningful and life like experiences to the students which will assist in developing operational and managerial skill which the real farmers must have.

b. To demonstrate recommended practices on the school farm. This will be useful to the students and to the community.

c. To provide experiences in cooperation to the students.

d. To provide the opportunity for conducting individual farming programmes for students who have inadequate facilities elsewhere.

e. The school farm can provide facilities not only for the use of students studying agriculture but also can provide facilities for the high school science teachers or primary school teachers.

f. The school farm can serve as a demonstration place for showing the value of various improved farm practices to the community.

g. To supply foundation stocks; breeding services, plants, seeds etc., to students for their use in the supervised farm programmes.

h. To develop public relations with the community through demonstrations of new agricultural practices.

I. To provide opportunities in conducting the activities of the future farmers of individual organisation.

2.2.3 Effects of School Farm

The school farm program, if properly executed will be of obvious effects to the student directly. Ladele and Agbebaku (2006) reported that students would be

(a) Able to appreciate the practice of farming within the provision of available technology;

(b) Better motivated toward making a career in agriculture;

(c) Appreciative of the profitability of farming as a venture;

(d) Able to have experiences of different aspects of farming activities.

According to Whyte (2005) the school farm provides awareness on the students of the natural beauty and the gift the green planet has to offer, concern, respect for nature and an understanding of food and land uses, learn respect and care for the earth if they have a direct physical experience nurturing living things, working with their hands and the soil to grow plants. It also offers opportunity for students to meet and work side by side with people in the community who have spent their lives working with and learning from the land.

According to Smith, Peterat, and Bartosh (2006) the school farm has the following effects on students:

(a) Changes in the students' views of the environment,

(b) Development of scientific farming and environmental knowledge,

(c) Have more personal relationship with the environment,

(d) Shift from seeing the environment as an object or a place, to a view characterized by the inter-connectedness of humans and environment,

(e) a greater appreciation of the farming enterprises gained, knowledge of scientific and environmental concepts and learning about caring for and helping plants to grow,

(f) Changes in students perception of farm and farmers as well develop a sound understanding of land and its significance in supporting human life and

(g) Development of social skills.

According to Adeboyeye and Afolabi (1991) citing the national objectives of agricultural education in Nigeria, agricultural education is to train students so that they will improve their self-employment capabilities after school, thus creating jobs for themselves and others. Olaitan (1984) stated that the school farm provides a means by which students can develop their farming skills in planning, management and evaluation of farming enterprise and a useful background for future agriculturalists.

2.2.4 Activities of School Farm

Ugochukwu, Otegbade, Okeke and Idris (2007) identifies the following as activities carried out in crop school farm, they include:

(a) Land preparation (planning, clearing, marking out the plot, bed preparation and tillage operations

(b) Nursery preparation

(c) Crop propagation and maintenance

(d) Harvesting, processing and marketing of crops

(e) Seed storage for the next growing seasons.

(f) Keeping farm records.

In livestock school farm, activities include:

(a) Selection of breeding stock or types of animals to keep

(b) Construction of livestock pens/houses

(c) Rearing the animal i.e. feeding, watering, culling, disease and pest control.

(d) Sales of animal products.

However, Akubuilo (1991) contends that all aspects of field demonstrations (methods and results) which includes, debeaking of birds, vaccination of birds, application of fertilizer to named crops, preparing pre-nursery and nursery, application of crop protectants are carried out on the school farm.

According to Ojoko (1994), students could observe the feeding habits of livestock, and the wild creatures, listen to the calls of the birds and animals, appreciate the intriguing and hard life of the geologists and seismologists in our forests, taste the flavor of roots, smell the aroma of basil and feel under their feet the springiness of the forest carpets, the fallen leaves. These are all parts of learning in practical terms to which vocational agriculture advocates. Ani (1997) noted that learning takes place faster under natural environment. This notwithstanding, man's love for natural beauty has made natural environment a vital element in an ideal school.

2.2.5 School Farm Tools/Equipment

Farm tools, equipment and agricultural specimen have been identified as important component of a school farm. Farm tools and equipment expected in schools according to West African Examination Council (2006) include simple farm tools (hoe, cutlass, garden trowel, hand fork, shovel, rake, budding knife), tractors and animal drawn implements (plough, harrow, ridgers etc), harvesting, processing and storage equipment (shellers, dryers, graters etc), livestock and fishery equipment (waterers, feeders, milking machine, nets, hook and line, incubators, egg candlers etc) and surveying equipment (measuring tape, ranging poles, compass, chains, pegs etc). The above resources are expected to equip the school farm and ensure that activities carried out in it produce results beneficial and worthwhile to the students, the school and the community at large.

As a pre-condition for successful implementation of vocational agriculture curriculum in secondary schools, West African Examination Council (2006) reported that each school was expected to have adequate equipment and facilities, farm structure; regular supply of inputs coupled with farm spaces, at least two farm animals to be managed by the students. Akubuilo (1991) identifies some of the farm structures and equipment to include poultry houses, animal pens, incubators, tractors, processing mills, etc. school farm should embody ponds for the class to visit to study the life cycle of frogs and aquarium for the study of fish.

2.3 Students' Academic Performance

Academic performance is seen as individual or self-defining complete performance in the domains of school, sports, and work; however, "achievement" is conceptualized by meaning of "competence," which has a substantial impact on emotion and well-being. Academic performance is how well an individual has done his cognitive tasks (Oladejo, Olosunde, Ojebisi, Isola, 2011). According to Nsa, Ikot and Udo (2013) academic performance refers to the criterion of excellence. The term as well means the attainment of success of a student in his school work among his classmates**.** Catherine, (2013) defines academic performance as the outcome of education, the extent to which student, teacher or institution has achieved their educational goals. Therefore, Academic performance refers to the learning outcomes of an individual which the knowledge skills and ideas acquired and retain through their course of study within and outside the classroom situation.

All students are required to maintain a satisfactory academic record and meet the obligations of the course in which they are enrolled. Failure to do so will be dealt with as the school and its designated boards shall determine. In educational institutions, success is measured by academic performance or how well a student meets standards set out by local government and the institution itself. Although education is not the only road to success in the working world, much effort is made to identify, evaluate, track and encourage the progress of students in schools (Catherine, 2013). It has been observed that parents care about their children's academic performance because, they believe good academic results will provide more career choices and job security.

Generally, performance refers to an accomplishment of a given task measured against pre-set known standards of accuracy, completeness, and speed. Edinyang (2012) defines academic performance as the outcome of education which reveals the extent to which a student, teacher or institution have achieved their educational goals. Students' academic

performance refers to students' achievement in the topic being taught based on the stated objectives (Catherine, 2013).

2.4 Review of Empirical Studies

Researches that contributed to the study of school farm on academic performance include:

Klemmer, Waliczek and Zajicek (2005) carried out a research titled: Growing minds: the effect of a school gardening program on the science achievements of elementary students in Texas. A sample of 647 was used for the study. Quasi experimental design was used. Two objectives and one research question were used. Analysis of variance (ANOVA) was used to analyze the data. The result of the study showed that science achievement of students who participated on school gardening program was higher than that of students who did not participate in gardening activities as part of their science curriculum.

This present research study is similar with the past research study in the area of students' academic performance. The present research study differs from the past research study in the following ways: the present research study used three (3) objectives while the past research study used two (2) objectives, the present research study used three (3) research questions while the past research study used one (1) objectives, the present research study was conducted in Kaduna state, Nigeria while the past research study was conducted in Texas USA, the present research study was conducted in 2016 while the past research study was conducted in 2005.

Emeya and Ojimba (2012) carried out a research study titled: Social Benefits of Secondary School Farms in Rivers State, Nigeria. Three (3) specific objectives and two (2) research questions were stated. 560 samples were used; questionnaire was the instrument for data collection. The data were analyzed using simple percentages. Social benefits derived from school farms among others include enabling students to develop their farming skills, helping students form a useful background as future agriculturalists, helping students

appreciate the fact that profitable farming was possible within the provision of available technology.

The present research is similar to the past research in the target population which was secondary school students, both the present, and the past study looked at school farm. The present study differs with the past study in the following ways: the present study was carried out in Kaduna State while the past study was carried out in Rivers State, the present research used three (3) specific objectives and three (3) research questions while the past study used (3) three specific objectives and (2) two research questions. The present research looked at effects of school farm on the academic performance of agricultural science students while the past research was on the social benefits of school farms. The present research was conducted in 2016 while the past research was conducted in 2012.

Auwal (2013) carried out a research study titled: Effects of teaching method on retention of agricultural science knowledge in senior secondary schools of Bauchi Local Government Area, Nigeria. The study was guided by two research questions, two objectives and three null hypotheses. The pre- test post- test control group quasi-experimental design was employed. The findings revealed that both the two teaching methods (demonstration and discussion)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.

The present research is similar with the past research in the subject (agricultural science) the present research used three (3) null hypotheses while the past research used three (3) null hypotheses. However, the present research used three (3) objectives while the past research used two (2) objectives; the present research was conducted in 2016 while the past research was conducted in 2013. The present research looked at academic performance in agricultural science among secondary school students while the past research looked at the retention of agricultural science knowledge by secondary school students. The present

research was conducted in Kaduna state while the past research was conducted in Bauchi state. The present research determined the effects of school farm on the academic performance of Agricultural science senior secondary school students in Kaduna state.

Chukwudum and Ogbuehi (2013), carried out a research titled: effective utilization of school farm as instructional initiative for developing agricultural interest among primary school children in Nigeria. Survey design was used for the study, random sampling was used in selecting the population of the study and questionnaire was the instrument for data collection. Mean was used to answer research questions. The finding of the study revealed that school farm add agricultural orientation to children especially those without agricultural background and increased pupils interest in agriculture.

The present research is similar with the past research as both of them are looking at school farm. However, the present study used quasi experimental design while the past research used survey design, the present study used secondary school students while the past study used primary school students, the present research deals with academic performance while the past research deals with students interest, the present study was conducted in 2016 in Kaduna State, Nigeria while the past research was conducted in 2013 in Anambra state, Nigeria.

Chudi (2013) carried out a research study titled "farm management survey in Enugu south local government council of Enugu state". The study surveyed the management of school farm in secondary schools in Enugu south local government area. 4 research questions were used, questionnaires was used as instrument for data collection. The results of the research study discovered that agricultural science teachers weakened students' interest, it also result to the poor performance of agricultural students in practical agricultural science.

The present research study is similar to the past research study on the used of school farm as the dependent variable and the research work studied secondary school situation. The difference between the present research study and the past research study are in the following

ways; the past research work was carried out in Enugu state while the present research work was carried out in Kaduna state, the past research work used 4 research questions while the present research work used 3 research questions.

Famiwole (2013) carried out research study titled "Measures to improve the declining usage and operation of school farm in secondary schools in Ekiti State". It was observed by Famiwole (2013) that only few secondary schools has operational standard school farms, where practical agriculture can be learnt to complement classroom instructions in secondary schools. The main focus of Famiwole (2013) research study was to evolve the measures that can be adopted to improve the declining usage and operation of standard school farm in all secondary schools in Ekiti state. The study was a descriptive survey research. The population used was 160 agricultural science teachers in both public and private secondary schools in the state. Constructed questionnaires were used for generating data. Frequency counts, percentages, ranking order, mean, standard deviation and t-value were used to analyze the data used for the study. The findings of the study revealed that, the major cause in the usage of operational school farm is lack of farm implements.

The present research is similar to the past research in the use of school farm. The present research work id different from the past research work in the following ways: the past research work was carried out in Ekiti state while the present research work was conducted in Kaduna state, the past research work t-value in data analysis while the present research work used t-test, the past research used teachers as respondents while the present research used students.

Ogbuluijah (2014) carried out a research study titled: The Impact of Student's Field Trips on Academic Performances in Agricultural Science in Selected Secondary Schools in Rivers State. Three (3) research questions and two (2) hypotheses were formulated. 300 samples were used for the study. Ex- Post facto design was used. Questionnaire was the instrument for data collection. Reliability coefficient was tested at 0.88. Descriptive statistics

and chi – square was used for data analysis. The findings of the study revealed that agricultural field trips in secondary schools broaden student's knowledge, and exposed students to modern methods of farming. Field trip enhances knowledge on agricultural processing methods, and improves farm product utilization.

The present research is similar with the past research as both are looking at academic performance of agricultural science secondary students. However, the present study used three (3) research questions and three (3) hypotheses while the past research used three (3) research questions and two (2) hypotheses. The present research was conducted in Kaduna state while the past research was conducted in Rivers State. The present research was conducted in 2016 while the past research was conducted in 2014. The present research looked at school farm while the past research looked at field trips.

2.5 Summary of Literature Reviewed

In this chapter, the researcher reviewed the literature related to the study. The theoretical framework is based on cognitive theory of learning by Piaget. Conceptual frameworks of effects of school farm on academic performance focused on concept of school farm, The purpose of school farm includes: To provide meaningful and life like experiences to the students which will assist in developing operational and managerial skill which the real farmers must have, to demonstrate recommended practices on the school farm. This will be useful to the students and to the community, to provide experiences in cooperation to the students, to provide the opportunity for conducting individual farming programmes for boys who have inadequate facilities elsewhere.

Types of school farm which includes crop farm, livestock farm, snail farm, fish farm etc. Activities carried out on school farm are: Land preparation (planning, clearing, marking out the plot, bed preparation and tillage operations, nursery preparation, crop propagation and maintenance, rearing the animal i.e. feeding, watering, culling, disease and pest control were reviewed. The empirical studies used are: Klemmer, Waliczek and Zajicek (2005), Emeya

and Ojimba (2012), Auwal (2013), Chudi (2013), Famiwole (2013) and Ogbuluijah (2014). Effects of school farm on the academic performance of senior secondary school students' in agricultural science formed the gap that this research intends to filled.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter describes the methods and procedures used to conduct the study. The chapter is discussed under the following sub-headings:-

3.1 Research Design

3.2 Population for the Study

3.3 Sample size and Sampling Procedure

3.4 Instrument for Data Collection

3.4.1 Validity of the Instrument

3.4.2 Pilot Study

3.4.3 Reliability of the Instrument

3.5 Procedure for Data Collection

3.6 Procedure for Data Analysis

3.1 Research Design

The research design for this study was pre-test and post-test quasi experimental design. Two groups of students were involved, these were experimental and control groups. The pre-test/post-test was adopted for the purpose of data collection. Experimental group were exposed to school farm while control group was not exposed to school farm. A pre-test was given for the purpose of determining the equivalence of the two groups before treatment. A post-test was administered after the treatment administration to determine whether school

farm had effect on academic performance of secondary school students in agricultural science.

3.2 Population for the Study

The total population for the study was 14,241 agricultural science students in senior secondary school one (SSI) in 285 government secondary schools in Kaduna State.

3.3: Sample size and sampling procedure.

Random sampling was used in selecting two (2) schools that were used for the study. Names of all the twelve 285 senior secondary schools that were written on pieces of paper, folded, rolled and mixed thoroughly. Government Secondary School (GSS) Saminaka and Government Secondary School (GSS) Yarkasuwa were picked randomly by the researcher which served as schools for the study. GSS Saminaka served as group A (experimental group) while GSS Yarkasuwa served as group B (control group).

Random sampling technique was used in selecting 60 students (respondents) 30 students from each school. In each school 15 males students and 15 females students were selected. There were 67 SSI students that offered agricultural science in GSS Saminaka 42 males and 25 females and 84 SSI students that offered agricultural science in GSS Yarkasuwa 53males and 31 females. In selecting the male students in GSS Saminaka, numbers 1-15 were written on pieces of paper. The papers were folded, rolled, and mixed thoroughly and put in a plate. Students were asked to pick numbers. Only those that picked numbers one to fifteen (1-15) were used as sample. In selecting the female students, numbers 1-15 were written on pieces of papers. The paper was folded, rolled, and mixed thoroughly and put in a plate. Students were asked to pick numbers. Only those that picked numbers one to 1-15 were used as sample. The same procedure was used in selecting 15 males and 15 females students in GSS Yarkasuwa. This makes a total of 60 (30 males and 30 females) each group having 30 students (15 males and 15 females).

Students from GSS Saminaka were taught husbandry of crop (maize and groundnut) with the used of school farm and also participated in land clearing, land preparation, planting, weeding, thinning and supplying while students from GSS Yarkasuwa were taught husbandry of crop (maize and groundnut) without the use of school farm and participation in land clearing, land preparation, supplying, thinning, weeding

Table 1 Sample Size for the Study

Treatment	male	female	total
G.S.S. Saminaka	15	15	30
G.S.S Yarkasuwa	15	15	30
Total	30	30	60

3.4 Instrument for Data Collection

The instrument used for data collection was a modified multiple-choice test consisting of 20 – item; Agricultural Science Achievement Test (ASAT). Each of the question items had four 4 options, A-D. The test items were on husbandry of maize and groundnut (land preparation, planting, weeding and fertilizer application). The test items were used for both pre –test and post – test.

3.4.1 Validity of the Instrument

The instrument was vetted by two (2) experts in the Department of curriculum and foundation, and three (3) experts in the Department of vocational and technical education, Ahmadu Bello University, Zaria. This was done to determine the face and content validity of the instruments. All necessary corrections and modifications made by the supervisors and experts were incorporated in the final copy

3.4.2 Pilot Study

A pilot study was conducted on SSI students in GSS Jengre, Bassa Local Government Area (LGA) of Plateau State which is outside the study area but has similar characteristics with the study area. A total of thirty (30) students of agricultural science were involved in the

pilot study. The aim of the pilot study was to help the researcher to determine the reliability of the instruments, check the difficulties of the instrument, and determine whether the questions are free from ambiguity, determine whether the instrument has the power to discriminate over result and made all necessary adjustment.

3.4.3 Reliability of the Instrument

The reliability co-efficient of the instrument was determined by the statistical analysis of the data collected from the pilot study. Split-half method using Spearman Brown Prophecy Formula was used to calculate the reliability coefficient of the instrument. The instrument was divided into two ‘’halves of ‘odd’ and ‘even’ numbers’’. The computation gave the reliability coefficient of 0.81.

3.5 Procedure for Data Collection

Data collection lasted for six (6) weeks from 23rd May, 2016 to 4th July, 2016. The students were divided into two (2) groups; A and B. Group A (experimental group) were taught husbandry of maize and groundnut(land preparation, planting, weeding and fertilizer application) on the school farm while group B (control group) were taught husbandry of maize and groundnut (land preparation, planting, weeding and fertilizer application) in the classroom. On the first day 23rd May, 2016, the researcher sought the permission of the school authority of GSS Saminaka (group A) and then introduced himself to students. On the next day 24th May, 2016, the researcher administered the pre-test group (A). On the following day 26th May, 2016, the researcher taught group A students land preparation, planting, weeding and fertilizer application on the school farm. The lessons lasted for 80 minutes (1 hour, 20 minutes) (8:40am – 10:00am). One week interval was given and revision was done on 2nd July, 2016. Five days was given before post – test1 was administered on 7th June, 2016. On 13th June, 2016, group A students carried out land preparation, planting, weeding and fertilizer application of maize on the school farm by themselves, and on 16th June, 2016, they carried out land preparation, planting, weeding and fertilizer application of groundnut by

themselves on the school farm. On 4th July, 2016 post – test II was administered to group A (experimental group). On the 30th May, 2016 the researcher went to GSS Yarkasuwa which served as the control group (group B), the researcher sought the permission of the school principal and then introduced himself to the students. On 31st May, 2016 the researcher administered the pre – test to group B. on 1st June, 2016, Group B were taught land preparation, planting, weeding and fertilizer application of maize and groundnut in the classroom.. The lesson lasted for 1 hour, 20 minutes (from 8:40 – 10:00). Revision with group B was done on 8th June, 2016. Post – test1 was administered to control group (group B) on 15th June, 2016.

Pre-test and post – test1 was taken by the two groups (group A and B). The post-test II was taken by groups A (experimental group) after the students were involved in land preparation, planting, weeding and fertilizer application on the school farm. The whole exercise lasted for six (6) weeks. The test was marked over 20 and the scores were coded and subjected to statistical analysis.

3.6 Procedure for Data Analysis

Descriptive statistics (means and standard deviations) were used to answer research question 1, 2 and 3. t-test statistics was used to determine the effects of school farm on the academic performance of senior secondary school students in agriculture and to compare the academic performance of students that were taught and participated in school farm activities with those that are taught without the use of school farm and participation in school farm activities as well as the academic performance of males and females students taught with school farm and participation in school farm activities. All the four (4) null hypotheses were tested at 5% level of significance (p=0.05).

Decision rule: When t- calculated was greater or equal to t-tabulated (t- cal $\geq$ t-critical), the null hypotheses of no significant difference was rejected but when t-calculated was less than

t- tabulated (t-cal<t-critical) the null hypotheses of no significance difference was retained (Ozioma, 2011).

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

In this chapter, the data collected analyzed was and discussed and presented in tables accordingly. .

4.1 Answers to research questions

Research Question One: ***What is the effect of school farm on the academic performance of agricultural science students?***

To answer research question one, the post test I scores of students for school farm and the post test I scores of the control group was presented. The analysis of data generated is as presented in Tab le 2

Table 2: Mean and standard deviation of students with school farm (post test I) and those without school farm.

Group	N	Mean	SD
Experimental group	30	15.3	3.33
Control group	30	8.0	1.7

Data generated to answer research question one were analyzed using mean and standard deviation. The result in Table 2 indicates that the performance of students taught with school farm was better than that of students taught without school farm. This therefore showed that school farm likely has effect on students' academic performance. The calculated mean for students with school farm is 15.3 while that of students without school farm is 8.0. This showed that, students performed better when they have school farm.

Research Question two: ***What is the difference between the academic performances of agricultural science students taught with school farm those taught without school farm?***

To answer research question two, data generated was analyzed using mean and standard deviation.

Table 3: Mean and standard deviation of students taught with school farm (post test 2) scores and students taught without school farm (control group) scores.

Group	N	Mean	SD
Experimental group	30	17.8	1.1
Control group	30	8.0	1.7

Table 3 presents the mean and standard deviation of students' scores taught with school farm and those taught without school farm. The mean scores of students taught with school farm is 17.8 which is greater than the mean scores of students taught without school farm 8.0.This therefore showed that, students likely performed better when taught with school farm.

Research Question Three: ***What is the difference between the performance of male and female agricultural science students involved in school farm activities?***

To answer research question Three, mean and standard deviation of post test 2 scores for male and female students were used.

Table 4: Mean and standard deviation of male and female students taught with school farm

Group	Variable	N	Mean	SD
Experimental group	Male	15	17.9	1.09

Control group	Female	15	17.6	1.19

Table 4 presents the mean and standard deviation of post test 2 scores of male and female students taught with school farm. The result of data analysis showed a mean score of 17.9 for male students which is higher than that of female students 17.6. This therefore showed that, there is likely difference between the performance of male and female students taught with school farm. However, the difference is not significant.

4.3 Test of Null Hypotheses

Results of data used to test the null hypotheses are presented in table 5 to 7

Null Hypotheses One: ***There is no significant difference between the academic performance of students with school farm and those without school farm in agricultural science.***

To test null hypotheses one, post test 1 scores of students with school farm was compared with post test 1 scores of students without school farm using t – test statistics at 5% level of significance.

Table 5: t –test analysis showing effects of school farm on students' academic performance

Group	**N**	**Mean**	**SD**	**t-cal**	**t-crit**	**Decision**
Experimental group	30	15.3	3.33	10.4	2.0	sig
Control group	30	8.0	1.7			
P = 0.05						DF = 58

The t-test analysis used to test null hypotheses one is presented in table 5 showed that, t - calculated is 8.0 which is greater than t – critical 2.0 at 5% level of significanc (p = 0.05). The analysis therefore shows that, school farm has significant effect on the academic performance of agricultural science students. Therefore, the null hypotheses which states that,

there is no significant difference between the academic performance of students with school farm and those without school farm in agricultural science was rejected.

Null Hypotheses Two: ***There is no significant difference between the academic performance of agricultural science students taught with school farm and those taught without school farm***

To test null hypotheses two, post test II scores of students taught with school farm was compared with post test I scores of students taught without school farm using t-test statistics at 5% level of significance.

Table 6: t – test analysis showing effects of students' taught with school farm on the academic performance of agricultural science students.

Group	N	Mean	SD	t-cal	t-crit	Decision
Experimental group	30	17.8	1.1	26.5	2.0	sig
Control group	30	8.0	1.7			
P = 0.05						DF = 58

The result of t-test analysis used to test null hypotheses three is as presented in Table 6. From the Table, the t-calculated is 26.5 which is greater than the t-critical 2.0 at 5% level of significant (P=0.05). The analysis therefore showed that, students' taught with school farm has significant effect on the academic performance of agricultural science students. Therefore, the null hypotheses which states that, there is no significant difference between the academic performance of agricultural science students taught with school farm school farm and those taught without school farm was rejected.

Null Hypotheses Three: ***There is no significant difference between the academic performance of male and female agricultural science students taught with school farm.***

To test null hypotheses three, the post test II score of male students taught with school farm was compared with the post test II scores of female students taught with school farm at 5% level of significance (P-0.05)

Table 7: t – test analysis showing difference between the academic performance of male and female students taught with school farm.

Group	Variables	N	Mean	SD	t-cal	t-crit	Decision
Experimental group	Male	15	17.9	1.09	0.71	2.1	NS
	Female	15	17.6	1.19			
P =0.05						DF = 28	

Table 7 presents the difference in academic performance between male and female students taught with school farm. The result of t-test analysis revealed that t-calculated 0.71 is less than the t-critical 2.0 at 5% level of significance (P=0.05). This implies that, there is no significant difference between the academic performance of male and female students taught with school farm. Therefore, the null hypotheses which states that, there is no significant difference between the academic performance of male and female agricultural science students taught with school farm was retained.

4.4 Summary of Major Findings.

The findings of this work which was carried out to determine the effects of school farm on the academic performance of senior secondary school students in agricultural science in Kaduna State were based on the results of descriptive statistics (mean and standard deviation) and t-test analysis. The major findings of this research work were summarized as follow:

1. The result of this work indicated that, school farm has significant effect on the academic performance of agricultural science students in senior secondary schools.

2. The study revealed that, students taught with school farm performed better than students taught without school farm.
3. The study also revealed that, there is no significant difference between the academic performance of male and female students taught with school farm.

4.5 Discussion of Major Findings.

The study revealed that, school farm has significant effect on the academic performance of agricultural science students in senior secondary schools. As shown in the findings in Table 2 where the mean score of students with school farm is 15.3 which is greater than the mean score for students without school farm 8.0. The result of t-test analysis on Table 5 also revealed that school farm has significant effects on the academic performance of senior secondary school students in agricultural science. This is because; t-calculated (10.4) was greater than the t-critical 2.0 at 5% level of significance (P=0.05). This finding agrees with the findings of Klemmer*et-al* (2005) they found that school farm has significant effect on the academic performance of agricultural science students. Ogbuluijah (2014) also reported that school farm promote students' academic performance in agricultural science. Emaya and Ojimbo (2012) found that school farm promote academic performance in agricultural science.

Table 3 showed, the mean score of students taught with school farm and those taught without school farm. The Table revealed that, students taught with school farm performed better than those taught without school farm. This is because; the mean score of students taught with school farm is 17.8 which is greater than the mean score of students taught without school farm 8.0. The t-test analysis in Table 6 showed a significant difference between the academic performance of agricultural science students taught with school farm and those taught without school farm, t – Calculated is 26.5 while the t-critical is 2.0 which means there is a significant difference. This implies that, exposure and involvement in school farm activities is more effective in enhancing students' academic performance in agricultural

science. This finding agrees with that of Ogbuluijah (2014) who found that students' exposure in school farm activities enhances academic performance of student in agricultural science. Klemmer*et al* (2005) observed that students' taught with school farm promote academic performance of students in agricultural science. Ladele (2006) found that academic performance of students in agricultural science was enhanced when students are taught and exposed to school farm.

Another finding of this study is that there is no significant difference between the academic performance of male and female students with school farm as shown in Table 4 and 7. Table 4 showed that the mean score of male students taught with school farm 17.9 is greater than the mean score of female students taught with school farm 17.6. Table 7 indicated that, t-calculated (0.71) is less than t-critical (2.1) at 5% level of significance. This showed that, there is no significant difference between the performance of male and female students taught with school farm. This finding agreed with the finding of Emaiku (2012) who found that, there is no significant difference between the academic performance of male and female students taught with school farm. This was supported by Abdulhamid (2010) who found that male and female students performed the same when taught with school farm.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

The summary, conclusion and recommendation as well as suggestion for further studies are presented in this chapter as follows:

5.1 Summary

The study was carried out to determine the effects of school farm on the academic performance of senior secondary school students' in agricultural science in Kaduna state. Pre-test and post test quasi-experimental design was adopted for the study. The study had 3 specific objectives, 3 research questions and 3 null hypotheses as guide. The entire 14,241 SSI agricultural science students formed the population for the study and 60 students were randomly selected for the study. This was then divided into two groups A and B with each group having 30 students consisting of 15 males and 15 females for each group. Data collection lasted for 6 weeks, where pre-test was given before exposing the students to the treatment variable (exposure and involvement of students in school farm activities).

Mean and standard deviation were used to answer all the research questions, while t-test statistics was used to test all the 3 null hypotheses. All null hypotheses were tested at 5% level of significance (P=0.05). The analysis of data used to answer research question one revealed that, students with school farm performed better than students without school farm. The test of null hypotheses also revealed a significant difference in performance between students with functional school farm, were the t-calculated value of 10.4 is greater than t-critical value 2.0.

The study also showed that, students taught with school farm performed better than those taught without school farm and did not participate in school farm activities. The test of null hypotheses two also showed that, there was a significant difference between the academic performance of agricultural science students taught with school farm and those taught without school farm. This was shown by the calculated value of t- calculated 26.5 which was greater than t-critical 2.0.

However, the analysis of data used to answer research question three showed that male students taught with school farm performed better than the female students taught with school farm. But t-test analysis used to test null hypotheses three revealed that, the difference between the academic performance of male and female students taught with school farm did not significantly differ. This is because t-calculated 0.71 is less than t-critical 2.1.

5.2 Contribution to Knowledge

The following are the contribution of this research work to existing body of knowledge

1. School significantly enhanced retention of agricultural concepts (t =26.5)
2. School farm has significantly improved the practical skills of both male and female students in agricultural science when exposed to practical (t = 0.71)

5.3 Conclusion.

Based on the findings of the studies. The researcher concluded that school farm have positive effects on the academic performance of senior secondary school students in agricultural science. Both male and female agricultural science students should be taught with school farm.

5.4 Recommendation.

Based on the findings and conclusions of the study, the following recommendations were made by the researcher:

1. There is need for curriculum planners to insist that school farm be established in schools and used by teachers to teach agricultural science.
2. Teachers in secondary schools should make use of school farm during teaching and learning in order to enhance their academic performance in agricultural science.
3. Both male and female agricultural science students should be involved in school farm activities.

5.5 Suggestions for Further Study

a. Similar study can be conducted in other parts of the country to see if similar result will be obtained for proper comparism.
b. Further study can be carried out using other methods to see whether there can be any significant difference between the performances of male and female students in other methods.

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APPENDIX I

LESSON PLAN

Treatment Group (Group A)

Name Jonathan TambayaYango

Reg. Number M.Sc/Educ/27067/2012-2013

Course Agricultural Education

Degree in view M.Sc Agricultural Education

Class SSII

Number of students 30 students

Sex of students Males and Females

Subject Agricultural science

Topic Maize Production

Methods of teaching Discussion method, and demonstration method

Teaching Aids samples of maize seeds, fertilizer, hoe chalkboard, chalk and duster

Time 8:40 – 10:00

Duration 80 minutes

Behavioral Objectives at the end of the lesson the students should be able to

1. Mention the botanical name of maize
2. List the ways of land preparation for maize production
3. Identify the soil and climatic requirement of maize
4. List the cultural practices of maize production

Previous Knowledge: students are used to cultivating maize in their various locality

Introduction: the teacher introduces the lesson by asking the students oral questions on how maize is cultivated in their locality

Presentation: The teacher presents the lesson in steps

Step I the teacher mention the botanical name of maize *Zea mays*. Maize is propagated by seed.

Step II the teacher list the ways of land preparation for maize. This is done by clearing the land or bush with cutlass, making ridges or heaps manually with hoe or mechanically by ploughing, harrowing and ridging.

Step III The teacher identify the soil and climatic requirement of maize

Soil: well drained sandy loam soil

pH: 6-7

Temperature: 26°C - 30°C

Rainfall : 75cm – 150cm per annum

Step IV The teacher list, demonstrate and explain the cultural methods of maize production.

Supplying: replanting of seeds to replace those seeds that did not germinate

Thinning: removal of weak plants from a stands and leaving one or two vigorous stands/plant.

Fertilizer Application: Apply N.P.K 15:15:15 200kg/Ha (4 bags) at planting and N.P.K 15:15:15 250 Kg/Ha (5 bags) or 150kg/Ha of urea (3 bags) five to six weeks after planting. Farm yard manure, poultry droppings/organic manure can also be applied.

Weeding: it can be done manually by hoeing, using cutlass etc, or chemically with the used of specified herbicides and mechanically with machine.

Harvesting: maize can be harvested with hand, sickle, corn picker etc. maize matures 90 – 120 days after planting.

Processing and Uses: maize can be eaten either boiled, roasted or processed into flour, corn flakes, corn meal, beer, baking flour and animal feed

Storage: it can be stored in cribs, rhombus, silos, bags, cans etc.

Evaluation: the teacher evaluates the lesson by asking the students oral questions based lesson

a) What is the botanical name of maize

b) List two cultural practices involved in production of maize

c) List three uses of maize

Summary and conclusion: the teacher concludes the lesson by highlighting the main points of the lesson.

APPENDIX II

LESSON PLAN

Control Group (Group B)

Name Jonathan TambayaYango

Reg. Number M.Sc/Educ/27067/2012-2013

Course Agricultural Education

Degree in view M.Sc Agricultural Education

Class SSII

Number of students 30 students

Sex of students Males and Females

Subject Agricultural science

Topic Maize Production

Methods of teaching lecture method

Teaching Aids chalkboard, chalk and duster

Time 8:40 – 10:00

Duration 80 minutes

Behavioral Objectives at the end of the lesson the students should be able to

5. Mention the botanical name of maize
6. List the ways of land preparation for maize production
7. Identify the soil and climatic requirement of maize
8. List the cultural practices of maize production

Previous Knowledge: students are use to cultivating maize in their various locality

Introduction: the teacher introduces the lesson by asking the students oral questions on how maize is been cultivated in their locality

Presentation: The teacher presents the lesson in steps

Step I the teacher mention the botanical name of maize *Zea mays*. Maize is propagated by seed.

Step II the teacher list the ways of land preparation for maize. This is done by clearing the land or bush with cutlass, making ridges or heaps manually with hoe or mechanically by ploughing, harrowing and ridging.

Step III The teacher identify the soil and climatic requirement of maize

Soil: well drained sandy loam soil

pH: 6-7

Temperature: 26°C - 30°C

Rainfall : 75cm – 150cm per annum

Step IV The teacher list and explain the cultural methods of maize production

Supplying: replanting of seeds to replace those seeds that did not germinate

Thinning: removal of weak plants from a stand to give rise to one or two vigorous crop plant

Fertilizer Application: Apply N.P.K 15:15:15 200kg/Ha (4 bags) at planting and N.P.K 15:15:15 250 Kg/Ha (5 bags) or 150kg/Ha of urea (3 bags) five to six weeks after planting. Farm yard manure, poultry droppings/organic can also be applied.

Weeding: it can be done manually by hoeing, cutlassing etc, or chemically with the used of specified herbicides and mechanically with machine.

Harvesting: maize can be harvested with hand, sickle, corn picker etc. maize matures 90 – 120 days after planting.

Processing and Uses: maize can be eaten either boiled, roasted or processed into flour, corn flakes, corn meal, beer, baking flour and animal feed

Storage: it can be stored in cribs, rhombus, silos, bags, cans etc.

Evaluation: the teacher evaluates the lesson by asking the students oral questions based lesson

d) What is the botanical name of maize

e) List two cultural practice of maize

f) List three uses of maize

Summary and conclusion: the teacher concludes the lesson by highlighting the main points of the lesson.

APPENDIX III

LESSON PLAN

Treatment Group (Group A)

Name Jonathan TambayaYango

Reg. Number M.Sc/Educ/27067/2012-2013

Course Agricultural Education

Degree in view M.Sc Agricultural Education

Class SSII

Number of students 30 students

Sex of students Males and Females

Subject Agricultural science

Topic Groundnut Production

Methods of teaching Discussion method, and demonstration method

Teaching Aids samples of maize seeds, fertilizer, hoe chalkboard, chalk and duster

Time 8:40 – 10:00

Duration 80 minutes

Behavioral Objectives at the end of the lesson the students should be able to

9. Mention the botanical name of groundnut
10. List the ways of land preparation for groundnut production
11. Identify the soil and climatic requirement of groundnut
12. List the cultural practices of groundnut production

Previous Knowledge: students are use to cultivating groundnut in their various locality.

Introduction: the teacher introduces the lesson by asking the students oral questions on how groundnut is been cultivated in their locality

Presentation: The teacher presents the lesson in steps

Step I the teacher mention the botanical name of groundnut *Arachis hypogea*. Maize is propagated by seed.

Step II the teacher list the ways of land preparation for groundnut. This is done by clearing the land or bush with cutlass, making ridges or heaps manually with hoe or mechanically by ploughing, harrowing and ridging.

Step III The teacher identify the soil and climatic requirement of groundnut

Soil: Groundnut requires a coarse texture sandy – loam soil, which is slightly acidic to neutral. The soil should be rich in calcium and phosphorus which is needed for pod formation.

pH: 5-7

Temperature: 25°C - 30°C

Rainfall : 70cm – 100cm per annum

Step IV The teacher list, demonstrate and explain the cultural methods of groundnut production

Supplying: replanting of seeds to replace those seeds that did not germinate

Thinning: removal of weak plants from a stand to give rise to one or two vigorous crop plant

Weeding: it can be done manually by hoeing, cutlasing etc, or chemically with the used of specified herbicides and mechanically with machine.

Harvesting: groundnut can be harvested with hand by uprooting. Groundnut matures within 120 – 150 days after planting.

Processing and Uses: groundnut can be eaten either boiled, roasted or processed into groundnut oil and animal feed

Storage: it can be stored in cribs, rhombus, silos, bags, cans etc.

Evaluation: the teacher evaluates the lesson by asking the students oral questions based lesson

g) What is the botanical name of groundnut

h) List two cultural practice of groundnut

i) List three uses of groundnut

Summary and conclusion: the teacher concludes the lesson by highlighting the main points of the lesson.

APPENDIX IV

LESSON PLAN

Control Group (Group B)

Name Jonathan TambayaYango

Reg. Number M.Sc/Educ/27067/2012-2013

Course Agricultural Education

Degree in view M. SC Agricultural Education

Class SSII

Number of students 30 students

Sex of students Males and Females

Subject Agricultural science

Topic Groundnut Production

Methods of teaching lecture method

Teaching Aids chalkboard, chalk and duster

Time 8:40 – 10:00

Duration 80 minutes

Behavioral Objectives at the end of the lesson the students should be able to

13. Mention the botanical name of groundnut

14. List the ways of land preparation for groundnut production

15. Identify the soil and climatic requirement of groundnut

16. List the cultural practices of groundnut production

Previous Knowledge: students are use to cultivating groundnut in their various locality.

Introduction: the teacher introduces the lesson by asking the students oral questions on how groundnut is been cultivated in their locality

Presentation: The teacher presents the lesson in steps

Step I the teacher mention the botanical name of groundnut *Arachis hypogea*. Maize is propagated by seed.

Step II the teacher list the ways of land preparation for groundnut. This is done by clearing the land or bush with cutlass, making ridges or heaps manually with hoe or mechanically by ploughing, harrowing and ridging.

Step III The teacher identify the soil and climatic requirement of groundnut

Soil: Groundnut requires a coarse texture sandy – loam soil, which is slightly acidic to neutral. The soil should be rich in calcium and phosphorus which is needed for pod formation.

pH: 5-7

Temperature: 25°C - 30°C

Rainfall : 70cm – 100cm per annum

Step IV The teacher list and explain the cultural methods of groundnut production

Supplying: replanting of seeds to replace those seeds that did not germinate

Thinning: removal of weak plants from a stand to give rise to one or two vigorous crop plant

Weeding: it can be done manually by hoeing, cutlassing etc, or chemically with the used of specified herbicides and mechanically with machine.

Harvesting: groundnut can be harvested with hand by uprooting. Groundnut matures within 120 – 150 days after planting.

Processing and Uses: groundnut can be eaten either boiled, roasted or processed into groundnut oil and animal feed

Storage: it can be stored in cribs, rhombus, silos, bags, cans etc.

Evaluation: the teacher evaluates the lesson by asking the students oral questions based lesson

j) What is the botanical name of groundnut

k) List two cultural practice of groundnut

l) List three uses of groundnut

Summary and conclusion: the teacher concludes the lesson by highlighting the main points of the lesson.

APPENDIX V

LESSON NOTE

MAIZE PRODUCTION

BOTANICAL NAME: *Zea mays*

LAND PREPARATION

This is done by clearing the land or bush with cutlass, making ridges or heaps manually with hoe, or mechanically by ploughing, harrowing and ridging

VARIETIES/CULTIVARS:

These include dent maize, flint corn, flour corn, sweet corn and pod corn.

CLIMATIC AND SOIL REQUIREMENT

TEMPERATURE: 26°C - 30°C.

RAINFALL: 75CM – 150CM per annum

SOIL: well drained sandy loam soil

pH 6 -7

METHOD OF PROPAGATION

Maize is propagated by seeds. It is planted manually by stick, small hoe or cutlass or mechanically by planter.

PLANTING DATE

It is planted when rain is fully established and depends on the location. Early planting March/April and late planting July/August. Seed rate is between 25kg – 30kg/hectarage at either two or three seeds per hole.

SPACING

90cm x 30cm at one seed per hole or 75cm x 25cm at two seed per hole.

CULTURAL PRACTICES

a) **SUPPLYING**: Replanting of seeds to replace those seeds that did not germinate

b) **THINNING:** Removal of weak plants from a stand to give rise to one or two vigorous crop plants

c) **FERTILIZER APPLICATION**: Apply N.P.K 15:15:15 (200kg/ha) at planting and 250kg urea per hectaerage five to six weeks after planting. Farmyard manure, poultry droppings/organic manure can also be applied as dressing or by broadcasting method.

d) **WEEDING:** This is done three to four times at regular intervals. Weeding can be done manually by hoeing, cutlassing or chemically with the use of specified herbicides or mechanically with machine.

e) **CONTROL OF PESTS AND DISEASES:** This is done anytime at regular intervals to prevent it completely, using appropriate chemicals.

f) **HARVESTIG:** Maize can be harvested by hand, sickle or corn picker by combined harvester. Maize matures 90 – 120 days after planting. It is harvested either green or dry.

g) **PROCESSING AND USES:** Maize can be eaten either boiled or roasted or processed into corn flour, corn flakes or used for corn meal, beer, baking flour and livestock feed.

h) **STORAGE:** Dried maize can be stored either in cribs, rhombus or in a fireplace, on a small scale or in silos, on a large scale.

GROUNDNUT PRODUCTION

BOTANICAL NAME:*Arachis hypogea*

LAND PREPARATION

The land is cleared, stumping is done and land can also be prepared mechanically by ploughing, harrowing and ridging.

VARIETIES/CULTIVERS

Bench or erect type, creeping type, kano local, kano 50 and castle cary.

CLIMATIC AND SOIL REQUIREMENTS

TEMPERATURE: 25°C - 30°C

RAINFALL: 70cm – 100cm per annum

SOIL REQUIREMENT: It requires a coarse texture sandy – loam soil, which is slightly acidic to neutral. The soil should be rich in calcium and phosphorus which are needed for pod formation.

pH: 5 – 7

METHOD OF PROPAGATION: Seed

PLANTING DATES: March – April in the South and May/ June in the North

SPACING: 40cm -60cm x 20cm for creeping type and 60cm x 15cm for the bunch type. Seedrate is 30kg – 35kg/ha at two to three seeds per hole.

CULTURAL PRACTICES

a) **WEEDING:** Regular weeding should be done with hoe before flowering. This should be stopped immediately when the flowers appears. It enables the pods to get into the soil properly.

b) **FERTILIZER APPLICATION:** Groundnut does not require fertilizer except on poor soil

c) **MATURITY PERIOD:** It matures between four to six months.

d) **HARVESTING:** Harvesting is done when the lower leaves turn brown and begins to fall. Harvesting is done by using native hoes or by pulling the plants up by hand. The nuts are then picked from the plant root and stem.

e) **PROCESSING:** Harvested nuts are dried properly. The seeds are then removed from the shells by pounding them slightly in mortars or by beating them with sticks. Small shelling or decorticating machine can also be used to remove the seeds from the pod.

f) **STORAGE:** Dried groundnuts can be stored in clean rhombus or silos. The unshelled pods are stored in sacks while the shelled nuts are stored in bags. The shelled nuts are treated with insecticides before storage

APPENDIX VI

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

FACULTY OF EDUCATION

AHMADU BELLO UNIVERSITY ZARIA, NIGERIA

Achievement Test in Agricultural Science (ATAS) developed by the researcher

PRE – TEST

TOPIC: Crop production (maize and groundnut)

INSTRUCTION: Answer all questions by ticking the correct answer. All questions carry equal marks

TIME: 30 Minutes

1. Maize is propagated by (a) suckers (b) seeds (c) tubers
   (d) rhizomes

2. The following are necessary operations in maize cultivation EXCEPT
   (a) weeding (b) thinning (c) nursery practice (d) fertilizer application

3. *Arachis hypogea* is the botanical name for (a) maize (b) rice
   (c) groundnut (d) cassava

4. Which of the following is NOT a method of storage of maize (a) barn
   (b) silos (c) rhombus (d) cribs

5. The best soil for groundnut cultivation is (a) a coarse loamy soil (b)a coarse texture sandy loam soil (c) a coarse sandy soil (d) a coarse clay soil

6. Maize can be processed into the following EXCEPT (a) water (b) corn flour (c) corn flakes (d) beer

7. Groundnut is propagated by (a) leaf (b) flower (c) seeds (d) stem

8. Which of the following equipment can NOT be used for harvesting of maize (a) sickle (b) cutlass (c) watering can (d) corn picker

9. The PH range for the production of maize is (a) 5 -7 (b) 6 -7 (c) 7 -9
   (d) 6 -10

10. Weeds in groundnut farm can be controlled chemically by the use of (a) cutlass
    (b) herbicides (c) machine (d) hoe

11. All the following are post – planting operations EXCEPT (a) thinning
    (b) weeding (c) harvesting (d) ploughing

12. Which of the following is NOT a pre – planting operation in groundnut cultivation

(a) seed selection (b) ploughing (c) weeding (d) land clearing

13. Maize grown in nitrogen deficient soil show the following characteristics EXECPT

(a) timely ripening of fruit (b) yellowing of lower leaves (c) stunted growth

(d) chlorosis in growing crops

14. Which of the following is NOT a cultural practice of maize production (a) supplying (b) thinning (c) harvesting (d) weeding

15. Which of the following crops is BEST harvested using a combine harvester? (a) maize (b) cassava (c) groundnut (d) yam

16. Which of the following is NOT a method of storage of maize (a) barn

(b) silos (c) rhombus (d) cribs

17. Which of the following is the correct order for land preparation? (a) land clearing, ploughing, ridging, harrowing (b) land clearing, harrowing, ploughing, ridging

(c) land clearing, harrowing, ridging, ploughing (d) land clearing, ploughing, harrowing, ridging

18. The scientific name of maize is (a) *zea mays* (b) *Zae may*

(c) *Zea May* (d) *Mays zea*

19. All the following are varieties of groundnut EXCEPT (a) erect type (b) creeping type (c) Kano red (d) castle cary

20. Maize can be planted mechanically through the use of (a) leg (b) planter

(c) cutlass (d) stick

APPENDIX VI

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

FACULTY OF EDUCATION

AHMADU BELLO UNIVERSITY ZARIA, NIGERIA

Achievement Test in Agricultural Science (ATAS) developed by the researcher

POST – TEST I

TOPIC: Crop production (maize and groundnut)

INSTRUCTION: Answer all questions by ticking the correct answer. All questions carry equal marks

TIME: 30 Minutes

1. Reduction of five seedlings of maize to two per stand is referred to as (a) pruning (b) thinning (c) uprooting (d) weeding

2. Which of the following type of fertilizer is recommended for use in high quantities for groundnut production (a) nitrogen fertilizer (b) compost (c) potassium and calcium fertilizer (d) phosphorus fertilizer

3. Maize grown in nitrogen deficient soil show the following characteristics EXECPT (a) timely ripening of fruit (b) yellowing of lower leaves (c) stunted growth (d) chlorosis in growing crops

4. Which of the following is the correct order for land preparation? (a) land clearing, ploughing, ridging, harrowing (b) land clearing, harrowing, ploughing, ridging (c) land clearing, harrowing, ridging, ploughing (d) land clearing, ploughing, harrowing, ridging

5. The following are necessary operations in maize cultivation EXCEPT (a) weeding (b) thinning (c) nursery practice (d) fertilizer application

6. Maize is propagated by (a) suckers (b) seeds (c) tubers (d) rhizomes

7. The replanting of seeds to replace those seeds that did NOT germinate is called (a) supplying (b) thinning (c) weeding (d) planting

8. The amount of temperature needed for groundnut production is between (a) 25°c - 26°c (b) 20°c - 25°c (c) 25°c - 28°c (d) 25°c - 30°c

9. The scientific name of maize is (a) *zea mays* (b) *Zae may* (c) *Zea May* (d) *Mays zea*

10. Which of the following sequence of pre – planting operations is correct (a) bush clearing, farm layout, burning and stumping (b) stumping, bush clearing, farm layout and burning (c) burning, farm layout, clearing and stumping (d) bush clearing, burning, stumping and farm layout

11. Which of the following is NOT a method of storage of maize (a) barn (b) silos (c) rhombus (d) cribs

12. The amount of rainfall required for maize production is (a) 60cm 70cm (b) 50cm – 60cm (c) 75cm – 150cm (d) 75cm – 190cm

13. Which of the following is NOT a method of storage of maize (a) barn (b) silos (c) rhombus (d) cribs

14. Groundnut is propagated by (a) leaf (b) flower (c) seeds (d) stem

15. Which of the following equipment can NOT be used for harvesting of maize (a) sickle (b) cutlass (c) watering can (d) corn picker

16. The PH range for the production of maize is (a) 5 -7 (b) 6 -7 (c) 7 -9 (d) 6 -10

17. The best soil for groundnut cultivation is (a) a coarse loamy soil (b)a coarse texture sandy loam soil (c) a coarse sandy soil (d) a coarse clay soil

18. Maize can be processed into the following EXCEPT (a) water (b) corn flour (c) corn flakes (d) beer

19. Maize can be planted mechanically through the use of (a) leg (b) planter (c) cutlass (d) stick

20. *Arachis hypogea* is the botanical name for (a) maize (b) rice

(c) groundnut (d) cassava

APPENDIX VII

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

FACULTY OF EDUCATION

AHMADU BELLO UNIVERSITY ZARIA, NIGERIA

Achievement Test in Agricultural Science (ATAS) developed by the researcher

POST – TEST II

TOPIC: Crop production (maize and groundnut)

INSTRUCTION: Answer all questions by ticking the correct answer. All questions carry equal marks

TIME: 30 Minutes

1. Which of the following is the correct order for land preparation? (a) land clearing,ploughing, ridging, harrowing (b) land clearing, harrowing,

ploughing, ridging (c) land clearing, harrowing, ridging, ploughing (d) land clearing, ploughing, harrowing, ridging

2. Which of the following equipment can NOT be used for harvesting of maize

   (a) sickle (b) cutlass (c) watering can (d) corn picker

3. Groundnut is propagated by (a) leaf (b) flower (c) seeds (d) stem

4. The replanting of seeds to replace those seeds that did NOT germinate is called (a) supplying (b) thinning (c) weeding (d) planting

5. The following are necessary operations in maize cultivation EXCEPT

   (a) weeding (b) thinning (c) nursery practice (d) fertilizer application

6. Ground nut can be planted mechanically through the use of (a) leg (b) planter (c) cutlass (d) stick

7. Reduction of five seedlings of maize to two per stand is referred to as (a) pruning (b) thinning (c) uprooting (d) weeding

8. Which of the following type of fertilizer is recommended for use in high quantities for groundnut production (a) nitrogen fertilizer (b) compost (c) potassium and calcium fertilizer (d) phosphorus fertilizer

9. The amount of temperature needed for groundnut production is between (a) 25°c - 26°c (b) 20°c - 25°c (c) 25°c - 28°c (d) 25°c - 30°c

10. All the following are varieties of groundnut EXCEPT (a) erect type

    (b) creeping type (c) Kano red (d) castle cary

11. Which of the following crops is BEST harvested using a combine harvester?

    (a) maize (b) cassava (c) groundnut (d) yam

12. Weeds in groundnut farm can be controlled chemically by the use of (a) cutlass (b) herbicides (c) machine (d) hoe

13. All the following are post – planting operations EXCEPT (a) thinning (b) weeding (c) harvesting (d) ploughing

14. Maize can be processed into the following EXCEPT (a) water (b) corn flour (c) corn flakes (d) beer

15. Which of the following post planting operations is carried out purposely for the control of weeds (a) planting (b) weeding (c) fertilizer application (d) harvesting

16. The chemical used for the control of insects in ground nut farm is called? (a) herbicides (b) pesticides (c) fungicides (d) insecticides

17. The scientific name of maize is (a) *zea mays* (b) *Zae may* (c) *Zea May* (d) *Mays zea*

18. The best soil for groundnut cultivation is (a) a coarse loamy soil (b)a coarse texture sandy loam soil (c) a coarse sandy soil (d) a coarse clay soil

19. Groundnut is propagated by (a) leaf (b) flower (c) seeds (d) stem

20. Which of the following is NOT a method of fertilizer application (a) broadcasting (b) ring method (c) foliar application (d) integrated method

APPENDIX VI11

Pre – test Marking Scheme

1. B
2. C
3. C
4. A
5. B
6. A
7. C
8. C
9. B
10. B
11. D
12. C

13. A
14. C
15. A
16. D
17. D
18. A
19. C
20. B

APPENDIX IX

Post – test I Marking Scheme

1. B
2. C
3. A
4. D
5. C
6. B
7. A
8. D
9. A
10. D
11. A
12. C
13. D

14. C

15. C

16. B

17. B

18. A

19. B

20. C

APPENDIX X

Post – test I Marking Scheme

1. D
2. C
3. C
4. A
5. C
6. B
7. B
8. C
9. D
10. C
11. A
12. B
13. D
14. A

15. B

16. D

17. A

18. B

19. C

20. D

APPENDIX XI

PRE- TEST AND POST TEST SCORES

PRE-TEST SCORES

Group A (Experimental Group)

5	7	6	4	8	10	8	11	9	7
6	5	7	6	7	11	12	9	4	12
4	6	8	6	9	9	5	12	10	3

Group B (Control Group)

6	7	3	5	4	4	5	8	7	1
3	5	9	6	11	5	7	8	8	8
7	6	4	7	4	5	7	8	4	6

POST TEST

Group A (Experimental Group Post Test 1)

15	19	17	17	15	19	13	15	19	9
16	14	19	12	15	13	5	15	14	16
17	17	18	18	8	19	18	17	16	14

Group A (Experimental Group Post Test 11)

17	20	18	18	17	19	18	18	19	17
16	17	19	19	17	18	16	17	19	18
19	19	18	16	17	20	16	17	17	17

Group B (Control Group)

13	10	15	9	8	6	4	5	11	9
6	10	4	8	11	12	7	7	7	8
11	7	12	11	6	9	12	8	11	8

6.