UNIVERSITY FOR DEVELOPMENT STUDIES

CHALLENGES TO EFFECTIVE TEACHING AND LEARNING OF PRACTICAL AGRICULTURE IN SELECTED SENIOR HIGH SCHOOLS IN SAGNARIGU DISTRICT IN NORTHERN REGION OF GHANA

BY

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DECLARATION

Student,

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere:

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Supervisor,

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ABSTRACT

The purpose of this study was to determine the challenges to effective teaching and learning of practical agriculture in Senior High Schools in Sagnarigu District in Northern Region of Ghana. It was also to assess the attitudes of community members, students and teachers towards Agricultural Science. A sample of 80 Agricultural Science students and 10 teachers that teach the subject in the three public senior high schools in the district were selected. Data were collected using one-on-one interview with the aid of semi-structured questionnaire coded and analyzed using Statistical Package for Social Sciences (SPSS).The results from the survey showed that, due to inadequacy of materials for agricultural practicals, teachers used teaching techniques like lectures which was found to be inappropriate tools for impacting practical knowledge.The major reason for inadequacy of materials for practical agriculture was lack of funds. About 45% of funds came from capitation grant which was not a reliable source. The remaining 55% came from other sources such as PTA, student dues and special funds which were neither reliable. It was also found that boys had greater interest in the study of agriculture than girls. It was further noted that, even though 90% of the teachers are degree holders who are knowledgeable in agricultural science and have taught for more than five years, there was no enough community support for practical agriculture through the provision of the, required laboratory equipment. It was recommended that the community and PTA should be encouraged to contribute financially and with the relevant tools and equipment to support teaching and learning of practical agriculture in the schools studied.

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DEDICATION

This work is dedicated to my wife Mrs. Kusum and children Abdul Baki, Shakira, Mannah and Salwah for their understanding, support, patience and perseverance during my study period.

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ANFIS	Adaptive Neuro Fuzzy Inference System
AIC	Akaike Information Criterion
ANN	Artificial Neural Network
ADF	Augmented Dickey Fuller
ACF	Auto-Correlation Function
AR	Auto-Regressive
ARIMA	Auto-Regressive Integrated Moving Average
ARMA	Auto-Regressive Moving Average
BFI	Base-Flow Index
BGVAR	Bayesian Global Vector Autoregressive Model
BVAR	Bayesian Vector Autoregression
CSIR	Council for Scientific and Industrial Research
CPI	Consumer Price Index
DHI	Danish Hydraulic Institute

DARIMA	Deseasonalised Autoregressive Integrated Moving Average
DIC	Deviance Information Criteria
DEM	Digital Elevation Model
EPA	Environmental Protection Agency
EFAS	European Flood Alert System
FFNN	Feed Forward Neural Networks
FPE	Final Prediction Error
FOSC	First Order Spatial Contiguity
FEVDs	Forecast Error Variance Decompositions
GP	Gaussian Process
GCMs	General Circulation Models
GAMMs	Generalized Additive Mixed Models
GEV	Generalized Extreme Value
GLS	Generalized Least Squares
GLMMs	Generalized Linear Mixed Models
GRNN	Generalized Regression Neural Networks
GSTAR	Generalized Space-Time Autoregressive
GIS	Geographical Information Systems

GWI	Global Water Initiative
GRU	Grouped Response Unit
HQ	Hannan-Quinn
HMM	Hidden Markov Model
HEC	Hydrologic Engineering Centre
HMS	Hydrologic Modelling System
IWRM	Integrated Water Resources Management
KKF	Krigged Kalman Filter
LSSVM	Least Square Support Vector Machine
MCMC	Markov Chain Monte Carlo
MLE	Maximum Likelihood Estimation
MAE	Mean Absolute Error
MAPE	Mean Absolute Percentage Error
MAF	Mean Annual Flow
MSFEs	Mean Squared Forecast Errors
MA	Moving Average
MLR	Multiple Linear Regression
MNLR	Multiple Nonlinear Regression

NN	Neural Network
OLS	Ordinary Least Squares
PACF	Partial Auto-Correlation Function
PMCC	Predictive Model Choice Criterion
PCA	Principal Component Analysis
RWA	Random-Walk Averaging
RMSEP	Relative Mean Separation
RMSE	Root Mean Square Error
RMSPE	Root Mean Squared Prediction Error
SC	Schwarz Criterion
SARIMA	Seasonal Autoregressive Integrated Moving Average
SMA	Soil-Moisture Accounting
STARMA	Space-Time Auto-Regression Moving Average
STKF	Space-Time Kalman Filter
SBVAR	Spatial Bayesian Vector Autoregressive
SSVS	Stochastic Search Variable Selection
SHE	Système Hydrologique Européen
TOPKAPI	Topographic Kinematic Approximation and Integration

TOPMODEL	Topography-Based Hydrological Model
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCC	United Nations Framework Convention on Climate Change
VAR	Vector Autoregression
VARMA	Vector Auto-Regression Moving Averages
WRI	Water Research Institute
WRC	Water Resources Commission

CHAPTER 1

INTRODUCTION

1.1 Background

Civilization according to global perspective, began with agriculture, when our nomadic ancestors began to settle and grow their own food Human society was forever changed (Nova1996). Villages, towns and cities began to flourish, knowledge of art, science and technolodge began to take the center stage. (Baffour-Awuah, 1987) stated that agriculture is the main stay of the economy of most countries in the world providing food, fibre, employment, income, improving balance of payments etc. According to the World Commission on Environment and Development in (1987), Global food security depends not only on increasing global production but on decreasing distortion in structure of the world's food market and on shifting the focus of food production to food deficit countries, regions and households. This shift in agriculture production will be sustainably enhanced with a strong drive in agricultural education. Effective teaching of agricultural science at the senior high school level requires a sound background knowledge in theory and practical aspects by the teacher of agriculture science.A good knowledge of the principles and practices of agriculture science at all levels of education is therefore necessary to inculcate in student the interest and the desire to work in the sector by the teacher of agriculture.Teachers should evolve strategies that will ensure active participation of learners and be practical and project oriented (Uloko, 2006). Okoli (2011) in support of the involvement of students in practical exercis

stated that, training of farmers today is the duty of the teacher and that the teacher should make sure that the trainees (students) are fully involved in their training process and effectively supervised by the trainer (teacher).This would help the teacher to guide them to over come their weak points.Students appear to benefit from knowing *how* to execute a strategy (procedural knowledge), know *why* the strategy works (conceptual knowledge), and knowing *were* the strategy works (contextual knowledge).It further stated that, students will best learn if they realize that the concepts are directly applied to their future lives (Shinn, Briers, Christiansen, Edwards, Harlin, Lawver, Lindner, Murphy and Par, 2003).Tatto (2007) reported that success in teaching and learning had been determined largely by the ability to motivate both students and teachers along productive lines.Anderson (1994), concluded that students achievement may heavely depend on the teacher's instructional planning, teaching method selection, and having a variety of learning activities.He added that there is an assumption that students learn at different styles, speed, level of prior knowledge and environment when the subject matter is given by way of a variety of teaching methods. It is therefore necessary for agriculture teacher to consider these differences when planning the lesson.Cox and Connors, (Dec. 1996), reported that students, regardlesss of the age, gender, socioeconomic status or intelligence, learn differently.Ngesa (2006) observed that most African countries have low production in agriculture even though skills and knowledge for better agricultural production are learnt in both primary and post-primary education levels.(State Council,1999), reported that agriculture is the traditional foundation of Chinese society and China is now facing a great deal of challenge in restructuring its system to meet the need of the market

economy, since the country's economic system is shifting away from a centrally planned to a market-driven system. China's economic reform movement proposed Agriculturre Curriculum and strategies to meet the needs of the new economic realities in Chinese agricultural education, Xiarong and Thomas (2002).

Agriculture is the backbone of Ghana's economy.It is one of the major contributors of the country's gross domestic product(GDP).With regards to employment,many of the nation's economically active population are found within the agricultural sector.In brief, agricultural sector employs over 60% of the country's active population. Notablly among the areas it employs include farmers, farm labourers, traders of agricultural produce and workers of agricultural processing companies. According to Ministry of Food and Agriculture [MOFA] (2009), the Agricultural sector is particularly critical about women. It stated further that, about half of (48.7%) of the economical active women population were employed in the various sections within the Agricultural sector with majority of them being engaged in food production.In addition, the Agricultural sector contribute a lot to Ghana's revenue base, this is mainly through export duties on Agricultural commodities such as cocoa and other non-traditional exports. In the year 1990, the export of cocoa alone gave the nation 45% of the total foreign exchange.Amongs the priorities of past and present governments, have been the need to reduce poverty,ensure food security,and modernized the Agricultural sector through the application of modern technology which would make the Agricultural sector a catalyst for rural transformation which would be inline with the goal set for the sector in

Ghana's Poverty Reduction Strategy (GPRS1) (MOFA, 2009).These aims formed part that led to the introduction of the Youth in Agriculture Programme undre Ministry of Food and Agriculture in the year 1999 with the aim of mobilizing and encouraging the youth to take up farming and other agricultural related activities as a vocation.Also,Food and Agriculture Policy (FASDEP) was developed by the government to guide the development and interventions in the Agricultural sector. The first of the Food and Agriculture Sector Development Policy (FASDEP1) was formed in 2002 as a holistic policy building on the key elements of Accelerated Agriculture Growth and Development Strategy (AAGDS) and with the focus on strenthening the private sector as the engine of growth.It is against this background that the government of Ghana placed agriculture high on the priority agenda at the formative stages of the educational ladder. In support (Addo-Quaeye, Ibrahim, Kitson, Rockson-Akron, Tachei-Mensah & Tetteh,1995) stated that, one of the priorities of the present and past governments is to make Ghana self-sufficient in food production. Notable among them was the operation Feed Yourself Policy and Programme introduced by the National Redemption Council to increase food production in 1972 (Baffour-Awuah, 1987).As part of the programme schools were made to establish farms to produce food to feed them selves.

In Sub-Saharan Africa, the agricultural sector is still the dominant provider of employment and it remains crucial for economic growth. Moreover in most parts of Africa food security is still a crucial issue and therefore food production will continue to be a major focus of agriculture education and training institutions (Vandenbosch, 2006).Achor, (2003) reported that food

security is one of the major challenges facing the third world nations. Farauta, Yaro and Pev (2015) emphasized that national security cannot be actualized without food security.

Agriculture as a practical subject requires facilities like land, tools, equipment and a well-equipt laboratory for measurements (Wootoyide, 2010). This requires a lot of funds which may be difficult for many schools to secure in order to facilitate the practical teaching of the subject.According to Government of Ghana (2003), schools have inadequate funds to provide all the necessary materials for practical work some also have no school farms.This situation has reduced teaching practical subjects like agriculture into a theoretical exercise.Kidane and Worth (2013) reported that teaching and learning of Agricultural Science was greately impided by lack of fields for practical experience, laboratory and labraries to facilitate learning.They further stated that the availability and utilization of instructional materials during Agricultural Science lessons positively influence the students' attitude towards Agricultural Science.This implied that in the absence of or inadequacy of this, effective teaching and learning of practical Agricultural Science will be greately affected. Lauglo and Norman (1987) while carrying out a study on diversified secondary school education in Kenya questioned the economics of offering pre-vocational subjects at secondary school which might not be fully facilitated in terms of equipment and managerial expertise. This has led to inadequate practical and theoretical instruction in many schools. Ssekamwa (1997) observed that in the Ugandan education system, the high running cost of practicals reduced effectiveness of conducting practical education in

subjects like agriculture. According to (Awuku, Baiden, Brese & Ofosu1999), one major means by which Ghana agriculture could move from subsistence to commercial is by intensifying agricultural education. According to Dotse, (1994) the introduction of agriculture into educational institutions is an essential component of the curriculum and indicated strongly that policy makers realized the problem confronting Ghana's agriculture and needed solution through agricultural education.

In senior high school, the study of the pedagogy showed that agriculture is divided into General agriculture, Horticulture, Fishing and Forestry. Therefore the teacher who teaches the students should ensure that these are taught effectively. This would positively influence the students' knowledge, attitude and habits of mind which often affect the theory and practice of agricultural science.On graduation, Senior High School candidates are required by GES to demonstrate that they have gained practical experience in the area of crops, livestock and farm layout. According to Suleiman and Barry (1997) the school Agricultural Science curriculum is structured around three major concepts namely production, protection and economics, which should be taught practically to make an impression on society. UNEB (1991) also reported that the main aim of teaching agriculture in secondary schools is to impact practical skills to student of agriculture to enable them be self reliant resourceful and with problem solving skills. Among the aims of the Agricultural Science programmes in the senior high schools are to help learners develop self-reliance in agriculture, demonstrate that farming is a dignified and profitable occupation, and to enhance skills needed in carrying out agricultural practicals

(Vandenbosh, 2006). It is therefore important for all stakeholders in the educational system to ensure that practical agriculture is encouraged in schools to help the nation achieve her goal in food security.Food security is a situation where all the individual, household, national, regional and global levels at all times have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preference for active and healthy life Abbey (2011).Shimave, Kesiki and Yani (2013), reported that the introduction of Agricultural Science in the secondary school system is a strategy for increasing agriculture productivity on a long term bases.With these objectives in mind, the education industry is expected to provide effective and adequate practical training in Agricultural Science to students in order to enable schools and colleges provide qualified and competent graduates that can ensure food sufficiency in the country.Clapton and Cree (2004) concluded that there is the need for learning models that integrate theory and practicals in ways that brings the field into the classroom as well as take classroom into the field.They when on to say that this goal should be pursued throughout the student's education experience and not relegated to a single clinical intenship course.To achieve this, there should be an active learning environment.An active learning environment would promote students' interest in the subject and encourage their participation.They added that,they wanted their students to sense that they were enthusiastic about their teaching and confident in their learning abilities.Students will quickly determine if a teacher respects their contributions in class or even wants contributions at all. Both are critical in creating an active learning environment (Meyers & Jones, 1993).Chinwe (1994) stated that teaching of practical skills seems to be negleted as emphasis

on theoritical approach seems to dominate the teaching. However, Agricultural Science education is over the years plagued with problems such as, lack of textbooks, poor management, poor funding and poor use of pedagogy by teachers.These factors influence the outcome of the teaching-learning process. Thus, this study sought to assess the challenges to effective teaching and learning of practical Agricultural Science in Sagnarigu District within the Northern Region of Ghana and suggest solutions to the challenges.

1.2 Problem Statement

Agriculture is the main source of livelihood for majority of Ghanaians who live in the rural areas, as such effective teaching and learning of practical agriculture in the Senior High Schools is very important to boost and sustain production and rural food security.This is because at that level they have the potential to further build their capacity in the field of agriculture.Despite the importance of agriculture, there is evidence that the number of students taking Agriculture Science is low. This could be as a result of the low interest in Agricultural Science as reported by Akinmade (2002). This low interest could also be attributed to the usual approach of theory or abstract teaching of this practical oriented subject which is no longer enticing enough to boost the required interest. Apori, Zinnah & Annor, (2003) in reference to Ghana concluded that a student's decision to choose Agricultural Science subject is influenced by gender and socio-economic background of the student, the level of knowledge about prospects in choosing agriculture as a vocation, and the influence of parents, guardians and peers who accord agriculture low recognition compare to other professions such as pharmacy, law, architecture

and so on the student neglets agriculture. Educational programs in agriculture are in direct competition with engineering, business and medicine, which are judged as glamorous and promising careers, Thompson and Russell (1993).According to Dlamini and Ngwenya (2004) girls choose to study agriculture in High School in Swaziland because of economic, educational, family and social reasons. This is confirmed by the study conducted by Shiyan and Hyang- Abia (2011) which revealed that male students' attitude towards Agricultural Science subject was significantly higher than that of the female.Soboyejo, (2007) observed that male students have a little more positive attitude than the female students towards science.According to (Awuku, Baiden Brese & Ofosu, 1991) the best way the youth in school could be taught agriculture is by "doing". Ssekamwa (1997) observed that the high running costs of practical education reduce effectiveness of conducting practical education in subject like agriculture. According to Taylor and Mulhall (2004), students' field observations serve as a starting point for learning about wide range of topics, inspiring lessons in science, mathematics, art and language. In addition, the process of getting students out of the classroom and in to local fields can break the domain barriers between schools and local communities, encourage inter-generational learning and enhance the relevance of the curriculum to the needs of the rural people. Agriculture as a practical subject requires facilities such as land, equipments and laboratory to ensure effective teaching and learning of the subject. All these require funds without which it is not possible to develop sound attitudes to farming since the practical aspect cannot be provided. Although one objective for Agriculture education in the school curriculum is to make teachers and students

supplementary extension officers to local farmers (Awuku, Baiden, Brese & Ofosu, 1991).Most students learn Agriculture in the school mainly because it is a certificate requirement (Baffour-Awuah, 1996).Chief Examiner's Report on Agricultural Science indicated that fundamentals of agriculture and knowledge of practical agriculture were ignored by students (West African Examination Council, 2010).The report further stated that most students failed to perform simple experiments.Similar observation was made in the 2011 report which stated that,it appeared most students never stepped into a laboratory during the course of their study. UNESCO (1999) observed that lack of financial resources hindered the expansion of facilities which led to specific problems in vocational subject like agriculture. In addition, they stated that lack of funds prevents schools from developing their farms.Scawell (1990) and Bilgin (2006) confirmed that without adequate pieces of apparatus, Agricultural Science and Science lessons would become rigid, boring, dull and unrealistic. The unniqueness of the subject therefore results from the variety of materials and experiement neccessary for its effective teaching and learning. It is against this background that this study sought to assess the challenges to effective teaching and learning of practical agriculture in Senior High Schools in the Sagnarigu District in the Northern Region of Ghana.

1.3 Research Questions

The study was guided by the following questions:

1. What are the materials and funds available for effective teaching and learning of practical Agricultural Science?

2. What are the funds available for effective teaching and learning of practical Agricultural Science?
3. What are the teaching techniques commonly adopted in teaching practical Agricultural Science?
4. What are the attitude and observation of students concerning their practical agricultural sessions?
5. What is the attitude of the community towards the study of practical Agricultural Science?

1.4 Research Objectives

Study objectives were derived from the research questions stated above. These objectives were sub-categorized into the main objective and the specific objectives as follows.

1.4.1 Main Objective

The main objective was to find out the challenges to effective teaching and learning of practical agricultural science in selected Senior High Schools in Sagnarigu District in the Northern Region of Ghana.

1.4.2 Specific objectives

The main objective was divided into the following specific objectives listed below. They were to assess;

1. Materials and funds available for effective teaching and learning of practical Agricultural Science.
2. Funds available to purchase materials needed for effective teaching and learning of practical Agricultural Science.

3. The techniques commonly adopted in teaching practical Agricultural Acience.
4. The attitude and observation of students concerning their practical Agricultural Science.
5. Community attitude towards the study of practical Agricultural Science.

1.5 Delimitations

The study is delimited to Agricultural Science students in three Senior High Schools in Sagnarigu District. These students either offer Agricultural Science as an elective and/or core subject. The Agricultural Science syllabus is common to all schools in Ghana offering the subject. The key variables assessed include demographic characteristics of students and teachers, students' attitude and observations about their practical agriculture learning sessions, teaching techniques adopted, factors hindering practical agricultural science as well as community attitude towards practical Agricultural Science.

1.6 Limitations

- The limited area covered by this research namely Sagnarigu could decrease the generalizability of study findings for the Northern Region and Ghana as a whole.
- The design of the study adopted is descriptive cross section which falls short in establishing true causal links between dependent and independent variables.
- The purposefully sampled respondents used instead of the whole targeted population could minimize the representativeness of responses

for the target population. Also the non-probability sampling method adopted (purposeful sampling) does not provide all respondents an equal chance of being selected.

- Time, resource and other constraints prevented the coverage of a larger sample size or the entire northern SHS student population as a whole.

1.7 Significance of Study

The study sought to provide adequate information on challenges related to practical Agriculture Education in Senior High Schools to the District Directorate of Education and other stakeholders. The findings of this study would guide the Ministry of Education through the Ghana Education Service to organize pre-service and in-service trainings on pedagogy for teachers who teach Agricultural Science at the Senior High School level. The Ghana Education Service and management of Senior High Schools would use findings on students' attitude towards Agricultural Science to design programmes like excursions and field trips to boost students' interest. This would also help teachers to find better methods of handling the subject in order to arouse and maintain students' interest in agriculture and also help them choose it as a vocation. The findings from this study would also help GES to make changes to provision of logistics, infrastructure and personnel for effective teaching and learning of practical Agricultural Science. The results of this study would also help other researchers who may conduct further research to help improve the teaching and learning of Agricultural Science in Senior High School level in future.

1.8 Organization of Study

The study was divided into five chapters. Chapter one of this study, dealt with the introduction which covers the background of the study, problem statement, study objectives, research questions, the significance of the study, the delimitation and the limitation of the study as well as organization of the study.

Chapter Two is the review of relevant and related literature. Chapter Three highlights the methods used namely profile of the study District, research design, target population, sampling method, sample size determination, data collection method and tools and how the tool would be administered. Chapter Four detailed the analysis and presentation with discussion of the Findings. Chapter Five contained the Summary, Conclusion and Recommendation.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This study was aimed at investigating the challenges to effective teaching and learning of practical agriculture in selected Senior High Schools in Sagnarigu District. This chapter dealt with related literature on the area of research. It showed in the wider perspective, the importance of agriculture and what agriculture Education is as portrayed by other works. It took into account common problems faced by Agriculture Education in Africa as a whole and Ghana in particular. It also looked at the status of agriculture in the present society as well as student and community attitude towards it. Finally, it reviewed teaching techniques adopted in the school environment and their appropriateness for practical agriculture.

2.2 Conceptual Framework

This conceptual framework was adopted to describe the interplay between variables been assessed in this research. It was borrowed from the work of adopted from Sullivan, Johnson, Owens and Conway, (2014) who used it to portray Teachers' views of unproductive student behaviours in the classroom.

This research seeks to explore the challenges to effective teaching and learning of practical Agricultural Science. According to Figure 1 as shown below, behaviour, teaching and learning is influenced by four major factors. These are

physical setting factors, student-related factors, curriculum and resources factors and teacher-related factors.

Physical setting factors: these encompass the availability of structures like classrooms, how conducive they are to ensure comfort and unhampered teaching and learning. On a broader scale, the availability of school structures, climatic conditions, accessible water and food provision centers among others. In relation to this study, availability of ready lands for practical agro-activities is one physical factor of interest.

Student-related factors: this research assessed student attitudes and observations during practical agriculture learning sessions. Attitude towards a course is vital in the teaching and learning of that course. A positive attitude motivates keen interest which is a vital requirement of every learner. Students are also at the center of the teaching learning process because they are the primary beneficiaries. Therefore, their observations about the learning process are seldom unbiased compared to teachers or Head of Departments. Their observations about learning and teaching of practical Agricultural Science would be reported in this study.

Teacher-related factors: the importance of teacher's knowledge and use of appropriate teaching techniques cannot be overemphasized. Thus teaching styles adopted and those preferred would also be assessed in this research. Another teacher related variable was their socio-demographic characteristics with reference to age, experience, sex, level of education among others.

Finally, the availability of resource and logistics influence the provision of appropriate TLMs, the use of appropriate pedagogy and enhancement of the learning environment. In this research, the availability of funds, implements, machines and the frequency of supply of these crucial teaching and learning resources would be assessed.

Figure 1: Conceptual framework of behaviour, learning and teaching.

Adopted from Sullivan, Johnson, Owens and Conway, (2014)

2.3 The Meaning of Agriculture

According to Akinmade (2002), agriculture was derived from the words "Ager" meaning field and "cultural" meaning cultivation. He then defines agriculture as the production of plants and animals useful to man. He added that agriculture covers not only the cultivation of crops and livestock but also the preparation of plants and animal production for marketing.

(Awuku, Baiden, Brese, & Ofosu, 1991) defined agriculture as the science, art (skills) and business of cultivating the soil, producing crops and raising farm animals. According to them the science aspect is made of all the knowledge concerning agricultural production that enables us to understand and solve the problems in agricultural production. The "art" is the doing aspect and consist of the skills acquired and used by those engaged in some form of agricultural activity. Marriam-Webster (2010) defined agriculture as the science, a practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products. According to Rubenstein, (2003) agriculture is the deliberate effort to modify a portion of Earth's surface through the cultivation of crops and the raising of livestock for sustenance or economic gain. In another view Akinmade (2002) defined agriculture as the cultivation of land to produce plants and animals of direct value to man.

2.4 Meaning of Practical Agriculture

Practical agriculture is seen as the act and practices of the various agricultural activities. Practical agriculture involves the actual involvement in farming activities while agricultural education is the acquisition of skills and knowledge in Agricultural Science with the view to imparting these knowledge and skills into prospective farmers for better productivity. Practical work in agriculture should involve laboratory experiments farm work, observations carried out on the farm or garden, field trips, collection of spacemen and record keeping, (2007,syllabus). It added that practical skills refer to the psychomotor domain which involves the demonstration of manipulative skills

using tools, machines and equipment to carry out practical operations and to solve practical problems. The teaching and assessment of practical skills should involve experiment, project, case studies and field studies. Practical agriculture education encompasses farming agro-allied business organizations including others (Okorie, 2001). According to Phipps and Clarke (1993), the purpose of practical education in agriculture is to educate present and prospective farmers for proficiency in farming. They stated that such education provides systematize instruction in agriculture of less than college grade in the public schools for those persons who have entered up on, or who are preparing to enter up on, the work of the farm or the farm home. (Awuku,Baiden, Brese, & Ofosu, 1991) in the same vien reported that, it involved actual involvement in farming, while agricultural education is the acquisition of skills and knowledge and the dissemination of these skills and knowledge to the recipients. Practical Agriculture has enormous impact in Senior High Schools. It is generally agreed that practical work facilitates the process of acquisition of basic knowledge and practical skills that prepares students for occupation in agriculture, practical agriculture in secondary schools has been a strong base where young mind students are been introduced to the interesting and practical aspect of the subject Samuel (2004). Nsa, Ikot and Udo (2013), reported that, when instructional charts, pictures, posters, farm tools are used effectively to teach students they can perform better than those taught without instructional materials.These materials offered close representation of ideas and concepts.It makes students not to forget the facts that learned.This is in line with the findings of Abinbade (1999) who reported that,instructional materials help students have larger retention in memory.Ndangana and Onifade (2000)

reported that the entire practical oriented method of teaching motivate students more.This supported the view of many individuals in the society that a learner cannot forget what he learnt from his/her teacher if practical aspect of the teaching is given to him or her.Oloruntoba (2006) found out that practical teaching is important in any organization because it improves the competences of learners. Sifuna (1974) stated that practical teaching help students to learn by seeing and doing and to solve their problems with confidence. From the WAEC syllabus (2007) it stated that practical agriculture is an important requirement for the subject and that before any school would be certified fit to do or put in for Agricultural Science there must be provision for the practical aspect of the subject.

2.5 Role and Contributions of Agriculture

The main source of livelihood of many people is agriculture. For millennia, agriculture has been associated with production of essential food crops. At present, agriculture is above and beyond farming it includes forestry, diary, fruit cultivation, poultry, bee keeping, mushroom, arbitrary, fishery etc. These could be taught effectively through schools.

2.5 Agricultural Science Education

At the Senior High School level, the Agricultural Science teacher needs to have sound background knowledge in theory and the practical aspects of agriculture. The new 6-3-3-4 system requires that agriculture be taught as prevocational subject at the primary and junior secondary schools and as a vocational subject in senior secondary school level (National Policy on Education, 2004). Dunkin and Biddle (1974) stated that process variable

examines the actual activities that take place in classrooms. They comprised the observable behaviors of both pupils and teachers. As often assumed, the success of teaching is in the teacher's hand, how and why the teacher behaves in class affects teaching and learning of Agriculture. Children can be encouraged to relate the learning process in school with the natural learning process which exists outside the classroom, and began to provide the means by which the process of learning becomes continuous, in school and beyond. It could enable children to develop not only basic knowledge and skills but also higher-order competencies, such as problem-solving and thinking skills, and broader-competencies such as leadership skills, group skills and personal initiatives, (Black, Govinda, Kiragu, & Divine, 1993). The objectives of secondary school education are aimed at preparing students to make positive contribution to the development of society and to acquire knowledge, skills, and attitudes for the development of themselves and the nation (Mwiria, 2002). This would be to enhance interest and thus motivation.According to Mark (2008), the educational objectives of secondary school agricultural education and training in sub-Saharan African countries quoted in policy papers, curricula and studies include the following: (i) giving learners knowledge and skills for better agricultural productivity; (ii) making the teaching of sciences more relevant, effective and practical; (iii) influencing learners‟ attitudes, giving a positive motivation toward agriculture and rural development and (iv) preparing students for entry in higher and tertiary education institutions. Agricultural Science is geared towards the development of manual skills as well as knowledge and attitude required to manage agricultural resources and this requires that the teacher plans, executes and evaluates his teaching using

various methods which emphasize skill acquisition.However, Borg and Gall (2008) observed that the objectives have not been realised, there are still high levels of unemployment due to rural-urban migration, school leavers aspiring to get white collar-jobs, high levels of poverty and food insecurity in most African countries .Phipps, and Osborne, (1988, p.145) defined 'good teaching' or effective teaching' as 'the direction of the learning process so that desirable changes of a relatively permanent nature are brought about within the learner as a result of the instruction'. He further emphasized that effective instruction should result in the development of desirable attitudes, interests, ideas, appreciations, understanding, habits, and abilities. The teacher of agriculture in secondary school is expected to combine the teaching methods to make the students learn. He is expected to use the modern technologies which now stems in the use of ICT. Chimezie (2009) noted that diversification of instructional methods is necessary for inculcation of knowledge, skills and attitude to the students of secondary schools to enable them meet global standard but research have shown that teachers in urban areas utilize modern teaching facilities more than those in the rural schools. This may be as a result of not possessing ICT facilities and constant power failure as observed by Aneke (2014). Teaching of practical subject such as agriculture requires tools and equipment to be available and that teachers need to utilize them to make concept clear. If the school cannot afford the tools and equipment to learn, the teacher is required to improvise to make sure that he carries out his teaching task to enhance learning (Elobuike 2010)

Teaching and learning are complex processes that are subject to many social, cultural and economic influences. In order to succeed, teachers need to vary their teaching approaches, to be adoptable and to be vigilant gauging how pupils respond to their teaching style, the resources they use and the environment in which they are working. Pupils who have difficulties with learning will need longer time than others to acquire the core skills that are taught and are likely to need special attention and support. Pollard and Trigg (1997) have stressed upon the importance of talking to pupils about how they prefer to learn and about their understanding of teacher expectations. Good teacher is able to identify those critical components of what is being taught which pupil should master in order to make progress. According to Obi (2005) the delivery of practical agriculture at the senior secondary level should not be handled as a science per se but rather as a vocational subject for acquisition of practical skills for meaningful living. Olaitan (1988) stated that, the basic goal of our National Policy on Education is to make education both functional and utilitarian. According to Ikeoji (1999) vocational education is born out of the need for the system to make its products useful to them.

The practice of agriculture by all and sundry is a panacea to food security if only the youth are caught at their prime to pick interest and skills necessary to elevate agriculture as source of national income. This could enhance interest of the present government in repositioning agricultural sector through quality teaching and learning Agricultural Science in the Senior High Schools. FRN (2004) believed that education is a variable instrument for quality transformation of citizens as well as the nation. This education must gear

towards youth at various levels of education. These youth needs new orientation of values on life-long skills acquisition and vocational skill programmes with special reference to agriculture practices. According to Obi (2005), the Federal Ministry of Education in Nigeria stated the objectives of agriculture education at the Senior Secondary were to:

1. Stimulate and sustain students' interest in agriculture

2. Enable students acquire useful knowledge and practical skills in agriculture

3. Prepare students for further studies in agriculture and

4. Prepare students for occupations in agriculture

In relation to this Okorie (2001) outlined the aim of vocational education in Nigeria as follows;

1. Provide people who can apply scientific knowledge to the improvement and solution of environmental problems for use and convenience of humanity;

2. Provide the technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development and

3. Provide young men and women with intelligent understanding of the increasing complexity of technology.These objectives of agriculture education in Senior Secondary School and the aims of vocational education in Nigeria is relevan in Ghana. Epeju (1989) observed that the principle method of agriculture education in schools involves highly organized skill development and practice on school farms through demonstrations and project work.This helps student to understand the concepts of principles of agriculture.Azubuike

(2012), stated that the use of appropriate method of teaching like demonstration method plays significant role in the teaching of science subjects such as Agricultural Science.He further emphasis that demonstration method makes the teacher's job easier and helps the teacher to demonstrate complx concepts to learners for better understanding. The strength of the agricultural education profession hinges on several variables including state and federal legislation, funding, public perception and local administration, but also on the recruitment of graduates into the profession (Kantrovich, 2007).

2.7 Factors that Influence Learning in Pratical Agricultural Science

Pupils tend to learn better when they are engage in a task. According to Russell, (2006) crucial factor in adult learning is motivation, which depends on the level of engagement in the learning process, and how learning is applied. Furthermore, real settings and the tasks should be relevant to the learner's experience (Ertmer and Newby, 1993).Although experience may be the foundation of learning, it does not authomatically or even necessary always the lead to it (Boud, Cohen, & Walker, 1993).Using an active learning environment can enhance the integration of practical and theory in the classroom.We think of active learning as the use of instructional activities involving students doing things and thinking about what they are doing,These are some of the characteristics of active learning;

1. Students are involved in more than listening,
2. Less emphasis is place on transmition information and more on development of students' skills,

3. Students are involve in higher order thinking (analysis, synthesis and evaluation),
4. Students are engaged in activities such as writing, reading, dicussing, and observing and
5. Greater emphasis is place on students' exploration of their attitudes and values (Bonwell & Eison, 1991).

Effective teaching of any practical concept in Agricultural Science hinges on the availability of the required teaching and learning resources. Owino, Yungungu, Ahmed, and Ogolla (2015), posted that the availability of teaching and learning resources enhances the effectiveness of schools as these are the basic things that can bring about good accademic performance in students.Agriculture as a practical subject requires facilities such as land, equipments and laboratory to ensure effective teaching and learning of the subject. All these require funds, without these it would not be possible to build sound attitudes to farming since the practical aspect cannot be provided. Lauglo and Norman (1987), when carrying out a study on diversified secondary education in Kenya, questioned the economics of offering pre-vocational subjects at secondary school which are more expensive, and may not be fully facilitated in terms of equipment and managerial expertise. Ssekamwa (1997) in a similar view stated that, the high running costs of practical education reduce effectiveness of practical education in subject like agriculture. All learners need to be motivated and this begins with establishing a good relationship between the teacher and the leaner which is based on mutual trust, interest and respect. Environmental conditions and instructional

explanations should be built on learners' attitude, in addition previous experiences and belief, are also factors to consider (Ertmor and Newby, 1993). Martin and Adubiya, (1991) also stated that it is not easy to define good teaching practice. Teacher may appear to be well organized and efficient but this in itself will not guarantee that pupil learned. Teaching and learning are complex processes that are subject to many social, economics and cultural influences. In order to succeed, teachers need to vary their teaching approaches to be adaptable and to be vigilant in gauging how pupils respond to their teaching style, the resources they use and the environment in which they work. Otagburuagu (1997) asserts that method is an organized sequence of steps by means information is consistently presented to the learner in line with a given teaching approach. The teaching method employed by the teacher is an attempt to impact knowledge on the learner.In relation to this, Omotosho (1991) sees teaching method as the strategy or plan that outlines the approach that teachers intend to take in order to achieve the desirable objectives. It involves the ways teachers organize and use techniques of subject matter, teaching tools and teaching materials to meet teaching objectives. Fafunwa (1970) in Akinfe, Olofinniyi and Fashiku (2012) reported that, most untrained teachers point accusing fingers at students when the students are unable to carry out the expected behaviour at the end of the lesson or examinations rather than on themselves in failing to utilize appropriate and effective teaching methods in teaching the students.

2.8 Contextualization

In order to improve educational relevance to students in the Senior High School, new approaches to the contextualization of teaching and learning using environmental experiences offer encouraging options to improve educational relevance. The achievement of universal participation would depend upon the relevance of education available. Schooling is supposed to help learners develop creatively and emotionally and acquire skills, knowledge, values and attitudes necessary for responsible and productive citizenship. Taylor and Mulhall (2001), came out with three key learning environments for school-going children; the school, the home and the wider community. These three learning environments are often weakly linked and the experiences gained in each are seldom drawn together and integrated in the learning process. Agriculture and the local environment can be the basis of integrated projects incorporated in the school curriculum with academic activities chosen for their locally relevance, experimental attributes (Taylor and Mulhall, 2001).Students field observations serves as a starting point for learning about a wide range of topics inspiring lessons in science, mathematics, art and language. In addition, the process of getting students out of the classroom and in to local fields can break down barriers between schools and local communities and encourage inter-generational learning and enhance the relevance of the curriculum to the needs of rural people. The field surrounding homes and schools provide children with an ideal place for learning about a new wide range of issues (Barflett and Jatiket, 2004):

- Agricultural fields are good place for students to see biological and ecological processes taking place
- Scientific studies and experiments can be carried out without any expensive equipment, thereby improving the organizational and analystical abilities of students
- Information that students collect in the field can be used as basis for integrated learning, bringing together subjects such as science, mathematics, language and art.
- The study of local agriculture is an effective starting point for understanding health and environmental problems such as water pollution, soil erosion and the loss of biodiversity.

Agriculture brings rural schools into contact with the livelihood of local people creating a bridge between teachers, children and parents. Children can be encouraged to relate the learning process in school with the natural learning process which exists outside the classroom, and begin to provide the means by which the process of learning becomes continuous, in school and beyond. It could enable children to develop not only basic knowledge and skills, but also higher-order competencies such as problem-solving and thinking skills and broader competencies such as leadership skills, group skills and personal initiative (Black, Govinda, Kiragu, & Devine 1993).Epeju (1989) observed that the principal method of agricultural education in schools involves highly organized skills development practices on school farms through demonstrations and project work. According to Epeju (1989) a school farm should have a wide scope of enterprises which will adequately represents the

farming in the community in which it is located. It should be of an economic size with a good scope of livestock and crop enterprises. It should have sufficient facilities, equipment, machinery, and materials for its operation and the working capital to run it should be sufficiently available. In rural primary schools, most learners have direct, first-hand experience of agriculture, either as a result of their own activities, contributing to the family livelihood, or from observation of their immediate surroundings. An agriculture topic used as a medium for contextualization part of the curriculum could provide an avenue through which children can have repeated experiences which help them to master cognitive, physical and social skills.

2.9 Challenges in Practical Agriculture

General Agriculture is allocated six periods of 40 minutes each per week, of the six periods three should be devoted to practical work and the other three to theory. The practical aspect of the subject is essential and teachers should give adequate attention to it (2007, syllabus). In the syllabus it was suggested that schools offering general agriculture must keep a school farm, where this is not possible, a well-planned garden with small plots should be maintained for regular observation by the students. School farm is a component of the school activities which has link with the birth of a more productive agriculture. It is a selected plot of land in the school environment where students' carryout practical agriculture both in crop production and animal husbandry, Akinsorotan, (2007). This he added that it helps students to acquire knowledge and practical skills in agriculture and agricultural related opportunities.Williams and McCarthy (1985), outlined some of the benefits

of school farm to students as follows:

1) It generating circumstances for students to market agricultural products,

2) It provides students with supervised occupational experience in agricultural productivity, and

3) It encourages the use of records and reports similar to those used in agriculture.

Kochnen (1994), stated that school principals rated the school farm as very important in giving students practical experience, promoting agricultural skills by giving the students opportunities to carryout demonstration plots and conduct agricultural experiments among others. Generally, Agricultural Science is a subject in secondary school that is being taught by both male and female teachers.Kochnen, (1994), stated that most school farms are faced with lack of tools, equipment and other capital items. Lack of seeds, feeds, fertilizer and other operating suppliers, inadequate training for teachers to use the farms for instructional purposes.In addition, lack of staff personnel to run the farms was seen as the most serious problem facing the school farms. Closely followed by lack of updated equipment and machinery are inadequate state of the art facilities. Other problems include lack of agricultural inputs, lack of production of agricultural goods for internal consumption, Francisco and Radhakrisha (2003). Fautai (2000), stated that problems associated with school farm are; lack of adequate teachers, lack of laboratory facilities, lack of equipment, small amount of land and attitudinal problem of students, the host community and the unserious attitude on the part of the administrators. Poor

funding of the vocational agriculture in secondary schools, keeping abreast with development in the field of vocational agriculture and communication of such development to students and the administration of vocational agriculture by non-specialists were problems facing the school farms (Ikeoji, Agwubike and Disi 2007).Inability of the curriculum to transmit employable skills to students, lack of required materials and resources for vocational agriculture delivery and lack of interest on the part of students pose as a problem to school farm (Ikeoji, Agwubike and Disi, 2007).

Yakubu (2010) reported that students need practical skills and knowledge so as to enable them make an impact in the society and the world of work thus practicals should be given more attention in school curriculum.

Report has it that the primary role of practical agricultural teachers has always been to help students to learn knowledge and skills in agriculture (Matin and Odubiya, 1991). Several researches have shown that many teachers of agriculture at the secondary school leave the profession early in their life (Mayer, Dyer and Washbun, 2005; Heath-Camp and Camp, 1990, 1994). Creating effective agriculture teachers is important for long-term sustainability of agricultural education programmes.Ineffective teachers are likely to become dissatisfied with teaching as a career and seek other employment opportunities (Bennett, Iverson, Rohs, Langone, & Edwards, 2002). Ikeoji (1997a, 1998) observed that as laudable as the objectives of agriculture are; it may be impossible to achieve them due to poor delivery process of the programme and inappropriate method of evaluating the performance of students in practical agriculture at the senior high school. Amoah, (2009) stated that common

challenges facing agriculture practical lessons in developing countries included inadequate facilities,low proffessional and efficiency level of teachers, poor attitudes of teachers, poor funding, poor attitude of school administrators and parents towards agricultural education and political labses. Njoroge and Orodho (2014) reported that Senior High School students have a positive atitude and interest towards the Agricultural Science subject though the teaching and learning of the subject is constrained by inadequate instructional resources such as tools, demonstration lands and other agricultural equipments.Mutai (2006), reported that learning is strenthened when there are enouth reference materials such as text books, exercise books, teaching aids, and classrooms. Lack of these required resources in the Senior High School could have a great deal on the overall performance of students in Agricultural Science. Egbule (1998) noted that the teaching and learning activities of practical agriculture at the secondary schools are grossly insufficient to elicit the desire level of initiative and creativity in students. It noted that the recommended instructional strategies is full of “showing” “telling” and ‘observing’ with a few cases of ‘doing’ and ‘practice’ thus contradicting the recommended ‘learning by doing’ and guided discovery’ instructional strategies (National Policy on Education, 2004).The best way the youth in school can be taught agriculture is by ‘doing’ (Awuku, Baiden, Brese, & Ofosu, 1991) but most of the youth who completed SHS and were not able to pursue further studies in agriculture show disinterest and rather drift to urban centers to find jobs.Orodho (2014) observed that some student are of the perception that Agricultural Science has no future prospect for them.Others believed that it is not as important as Mahtematics and English Language

which they view as core subjects needed to get employment or admission into tertiary institutions. Studies of (Borg and Gall, 2008) showed that few students were willing to take up agriculture careers because of the formed attitude towards the subject. Most African countries have low production in agriculture even though skills and knowledge for better agricultural production are learnt in both primary and post-primary education level. Marches and Martin (2002) noted that there were internal factors being encountered within the school as the agriculture curriculum is being implemented in connection to teachers, students, and the teaching learning process. Teachers' characteristics are considered a key element for pupils‟ personal and academic development, the value given from teacher to pupil and vice-versa are usually reciprocal, highlighting additionally the personal relationship. Malila (2003) found that student performance is affected by different factors such as learning abilities because new paradigm about learning assumes that all students can and should learn at higher levels but it should not be considered as constraint because there are other factors like race, gender, sex that can affect student's performance. Process of teaching and learning involves teaching, learning strategies and teaching learning resources. Teaching process is therefore an important school factor affecting teaching and learning of Agriculture in Secondary schools (Fauziah, 2008). Agriculture as a practical subject requires facilities such as land, equipment and laboratory. These require a lot of funds which may be difficult for many schools to secure in order to facilitate the practical teaching of the subject. Langlo and Norman (1987), while carrying out a study on diversified secondary education in Kenya questioned the economics of offering prevocational subjects at secondary schools which are

more expensive, and which may not be fully facilitated in terms of equipment and managerial expertise. This had led to inadequate and theoretical instructions in many schools. Kalyango (1998) observed that, financial constraints or budget cuts inhibits the effective functioning of various educational institutions. In relation to this, Ssekamwa (1997) observed that the high running costs of practical education reduced effectiveness of conducting practical education in subjects like agriculture.In his findings, Omaren (1998) reported that, lack of funds to acquire educational facilities hinder the practical teaching of Agricultural Science and stimulation of food production as this activities depends largely on the timing availability of funds. UNESCO (1983) observed and came out with a statement that, implementation of secondary agricultural programmes faces a number of difficulties. In some cases the courses are largely limited to theoretical classroom presentations not only because of lack of farmland but mostly because of shortage of simple land tools, irrigation equipment and consumable such as fertilizers. In their study, (Darko, Offie-Ansah, Shouqi and Jun-Ping, 2015) revealed that frequent use of lecture method in teaching, inadequate teaching and learning materials and their availability and difficulty in planning field trips were the challenges to effective teaching and learning of Agricultural Science in the senior high schools.

2.10 The Role and Contributions of Teachers to Practical Agriculture.

The role of teachers in the teaching service cannot be over emphasised. Teachers play a vital role in the implementation and delivery of educational programmes and policies. A teacher of agriculture was described by Olaitan,

Asogwa and Umeh (2009) as someone who has undergone a teacher preparatory programme in the area of agriculture and is charged with the responsibility of managing the learning bevahiour of the students. Aneke (2012) described a teacher as somebody who teaches especially as a professional in the area of agriculture. This implies that teacher of agriculture could be a male or a female who is a professional in carrying out agricultural teaching tasks to enhance learning. Being a teacher is a responsibility, and the teacher of agriculture is a pivotal figure in implementing any agricultural programme at any level of education, more especially at the secondary school level where the students are youths who are innovative and zealous to learn. Owodunni (2010) stated that the onus of learning rest with the students, whether he learns or not depends on the teachers' effectiveness in giving instructions in the way that augments and promotes learning on the part of the students. It is therefore, paramount that any teacher of agriculture who wants the students to learn and become skillful must have good grasp of the knowledge. He or she is required to be well trained and equipped in the methodology to guarantee him/her effectiveness in instructional delivery in any location-rural or urban he/she is posted to teach. The Agricultural Science teacher cannot promote learning if he is ignorant of what it takes to learn or to be conversant with strategy or method which can promote learning. According to Anderson and Dyke (1963) teachers are the major input to produce the kind of educated manpower needed by the nation. Fullan and Hargreres (1996) believed that teachers have the ability to influence and develop the lifestyle of many young children and for that matter teachers play a significant role in the destiny of every generation. They maintained that

"with the decline of church, breakup of traditional communities and diminishing contact that many children have with parents who cannot "be today's teachers is probably greater than it has been for long a time". Teachers are the role model of students and they copy their teachers as they observe them. Egbule (2004) emphasized that every agricultural teacher must be effective, liberally educated, current in subject matter and its pedagogy, aware of what is expected of teachers and schools, skillfully and conscientious in planning, preparing for carrying out instructions, respectful towards students and concern about their welfare, actively involved in faculty, professional and community affairs.Students identified an effective agriculture teacher with the following characteristics: showing enthusiasm for teaching, serving as good role modles for student, being committed to helping students learn, showing their commitment to teaching belonging to professional teacher organizations, enjoying teaching,being self confident and poised, being prompt and on time,and being neetly dressed and well groomed Luft and Thompson (1995).Foster and Finley(1995) stated that,effective agriculture teaccher should be individually strong in human relation and personal attitudes, adopt at conflict resolution, highly motivated, committed to personal feelings, utilized good public relation skills, accepted by co-workers, demonstrate leadership and cooperation, possessed good human relation skills, and demonstrate good professional etiquete.As agricultural educator, the responsibility is to ensure adequate teaching and learning as necessary to meet the changing needs of the industries and the value of the society (Melion 1995.p5). Defining the major roles of the teachers of Agriculture in schools and college, Olaitan (2010), stated that a teacher of

Agriculture is not only a "common teacher" but also a technician in Agriculture. According to him, the roles of a teacher of Agricultural Science differ to some extent from that of the other teachers in the school system because they are expected to deal with cognitive, psychomotor and affective outcomes of teaching learning process. The teacher of Agricultural Science is often looked upon as a master of definite skills in mathematical and problem solving skills. This therefore means that the teacher of Agricultural Science is supposed to give all round education to their students as well as helping them to acquire definite skills that are necessary for efficient performance in all aspects of agriculture where the learner may wish to specialize.Teachers of Agriculture are expected to teach Mathematical aspect of the subject either in soils science, crop and livestock Husbandry, agricultural engineering or farm survey and the likes. Olaitan, (2010), said that although students might have studied Mathematics in school as a subject, teachers of Agricultural Science or Agricultural Education should not overlook the teaching of the application of Mathematics to Agriculture. According to him, Mathematics is very important in calculating the area of the school farm, yield of crop per hectare, profit or loss accruing from farm enterprise, amount of feed needed per head of animal per unit body weight gain, amount of work done by tractor to ascertain efficiency, the bulk density of soil, soil PH, soil analysis experiments and rate of fertilizer application among others. lack of effective technical skill in Mathematical calculations had been noted by Gliem and Warmdrod (1985) as being significant in creating problems on a long run, whenever a student of Agriculture is selecting and preparing for a life long career after graduating from school and colleges in Nigeria. Popoola (2013)

remarks that if student's studying Mathematics were not adequately prepared in basic skills development, he may experience difficulty in finding employment and in later performance on the job .UNESCO (1998) stated the following as some of the significant roles teachers play in the delivery of education;

1. Teachers serve as the primary source of removing ignorance and eradicating illiteracy.

2. Teachers play a central role in the delivery of learning opportunities and

3. The teacher acting through the school serves as the foundation for providing education that enables individuals to meet life's challenges for their own well-being and that of the society. UNESCO publication in 1998 sought to support the view that the role of teachers in delivery of educational policies and programmes is very vital and cannot therefore be over emphasized. Egwin (1982) stated that whatever innovation is to be made in the education of any nation would be implemented by the teacher.Thus as the pivot of the implementation of educational programmes like Agricultural Science. The failure of the teachers would ultimately lead to the failure of the programme.To ensure effective implementation of Agricultural Science programmes, teachers should be well trained, given incentives, provide with adequate teaching materials, being well supervised and appropriate teaching methods adopted by the teachers themselves.

The professional freedom of the teacher is of crucial importance in developing quality in education. This does not mean that the teacher can do

what he or she likes but the teacher who knows the students is the person best equipped to decide which methods to use in order to create an optional learning situation. Professional and academic freedom for teachers is also of crucial importance in achieving teaching that is independent of any political, economic, ideological or religious influence, in order to preserve young people's rights to earn democratic exercise of crucial creativity. Persenond (1999) outlined ten approaches of a good teacher;

1. Organizing student learning opportunities

2. Managing student learning progressing

3. Dealing with student heterogeneity

4. Developing student commitment to working and learning

5. Working in teams

6. Participating in school curriculum and organization development

7. Promoting parent and community commitment to school

8. Using new technologies in their daily practices

9. Tackling professional duties and ethical dilemmas and

10. Managing their professional development.

The teacher as an individual personality is an important element in the learning environment or in the failures and success of the learner. The way in which his personality interests with the personalities of pupils being taught helps to determine the kind of behavior which emerges from the learning

situation. According to Fishbein and Ajzen (1975), an individual will hold a positive attitude toward a given behavior if an individual believes that the performance of the behavior will lead to mostly positive outcomes. On the other hand, if the individual believes that mostly negative outcome will result from the behavior, an individual will hold a negative attitude toward it. According to Goliath (2008), academic and pedagogical coursework, field experience, technology use, participation in volunteer activities and the attitudes and abilities of those whom they study, among other factors can be expected to shape or form teachers planning and teaching behaviour. In a paper presented at a UUM conference in Langkawi discussed many difference stategies used by teachers to obtain feedback from leaeners in relation to the information that had been communicated (David, 1996a) stated that continuous feedback must be the teacher's goal in every lesson and within a lesson in every thing that is disseminated.In effect teachers and students build on each others' responses.Motivation of teachers also contributes inmensily to achieve effective teaching and learning. Within agricultural education, there is an overall lack of research in the area of teacher recruitment and what attracts students to a career in teaching secondary agricultural education. Hanushek and Pace (1995) argued that teacher salaries are not a powerful influence to recruit students into the profession. . Intrinsic, extrinsic and altruistic motivations have been identified as the most important factors to study teacher recruitment and career selection (Brookhart & Freeman, 1992; Seng Yong, 1995) .As school-based agricultural education programs continue to grow, the supply of highly qualified teachers is critical (Kantrovich, 2007). While there are no easy

answers to resolving the teacher shortage issue, understanding the beliefs, attitude and intentions of students who choose a career in secondary agricultural education is important. Agricultural education teacher preparation programs exists to develop teachers in a formal setting by establishing a common foundation of essential knowledge, skills and learning as well as encourage the development of the core elements of theory and practice (Dyson, 2005). . At the time when other careers offer higher salaries, promotion, social prestige, and better working conditions, teaching appears to be less attractive (Organization for Economic Cooperation and Development; Ramsay, 2000). This situation suggests that a different approach to teacher recruitment, induction and retention is called for (Richardson & Watt, 2006). Faculty in agricultural education teacher preparation programs must have the ability to recognize students' motivations to enter the ranks of a secondary agricultural education teacher and promote the positive aspects of the profession. It is necessary to determine the beliefs, attitudes and intentions of students' who chose to teach secondary agricultural education. Identifying those factors that influence students' choice to teach secondary agricultural education will assist teacher educators in promoting an attractive, vibrant profession .Park and Rudd (2005) reported that, secondary agriculture teachers influence many decisions about a student's career and further education through teachers' actions, comments, and instruction. These interactions between teacher and student influences student's choice of career and ultimately may lead to a career in agricultural education. Some students are interested in the job opportunities or high starting salaries, while others are influenced by the quality of instruction provided in a particular

department (Kim, Markham, & Cangelosi, 2002). Along with choosing an academic major, students must develop career goals for the future (Guerra & Braungart-Rieker, 1999). Ccolleges of agriculture traditionally expend a great deal of time, energy, and financial resources in the marketing and recruitment of students (Washburn, Garton & Vaughn, 2002). Therefore there should be a policy to guide the distribution of Agricultural Science teachers to schools that teach the subject.

2.11 Teaching techniques preferred and adopted in Practical Agricultural Science

A technique is a defined list of rules or guidelines for any teaching or activity. It is based on the description of steps or a set of dos and don'ts and can often be linked to a method or strategy.A method is a description of the way information or a behavior is carried for or consolidated during the instructional process. A teaching method can be referred to as the principles and methods used for instruction (Wikipedia online search engine, assessed 20th January, 2017). In using these methods the teacher play the role of a facilitator, providing guidance and support for students through the learning process (Wikipedia online search engine, assessed 20th January, 2017). Teaching methods was defined by Merlot (2015) as a plan of action designed to achieve learning programme design for a learner. It could be a master plan or program procedure schedule to achieve a particular objective. Heinrich, Molende and Russel (2003) describe instructional methods as procedures of instruction, selected to assist the learner achieve the objectives of teaching. This means that instructional method could be procedure adopted by the

teacher to aid students acquire knowledge, attitude and skills to manipulate agricultural produce for self-reliance. Teaching methods were categorized by Osinem (2008) into field- related and non-field related teaching methods. Field-related teaching include, teaching carried out within or outside the school setting. It may be organized trip or visit to a place of interest, experiment, in the labouratory, workshop, demonstration of concepts or any other outdoor teaching. In this method of teaching learners are actively involved, hence skill acquisition is emphasized. Osinem (2008) noted that teachers could use the discussed agricultural instructional methods to enhance learning:

1. Collaborative/cooperative learning: In this teaching strategy students' work together in small group to accomplish a common learning goal. It requires careful planning and execution and effective guidance by the teacher.

2. Mobile learning: Here the students' are exposed to use information and communication technology gadgets to gather information as directed by the teacher. Jim (2015) noted that learning of such enable learners to know what is happening in their various areas of study in other parts of the world and also use of ICT can help agricultural teacher to help students' develop research skills.

3. Game and Simulation: Here students' are encouraged by the teacher to solve real life problem in a safe environment using interactive tools such as; Internet

4. Field trip: This is an organized visit to a place to achieve an instructional objective. Most agricultural instructions are best taught using this method (Osinem 2008)

5. Demonstration: This method is used by the teachers to arrive at fundamental skills and practice in a very short time. Demonstration is use to teach manipulative skills, to develop learners understanding, etc. It could be carried out individually, in group, or in the class. The way and manner student perceived Agricultural Science course, arises from the fact that instructional approaches adopted by teachers both in the classroom and on the field during teaching and learning process are not impressive. The result of this is lack of interest and poor performance of students in the course. To arrest students' attention, interest, curiosity and promote their performance, the use of activity stimulating and student-centered approach like demonstration method instead of depending on the conventional approach needed to be embraced. Demonstration method is an activity oriented method which encourages students-teachers, students–students and students–material interactions. Other field methods of teaching as noted by Merlot (2015) include; inquiry guided learning, inter-disciplinary teaching, community learning, teaching with cases, giving assignments to students, giving project to students, team-based learning, exhibition of agricultural produce, workshop practice, task instruction sheets among others. The non-field teaching methods are mainly those instructions giving to the students, which involves more of theories.Osinem (2008) described the non-field teaching methods as classroom based strategies of teaching. Some of these methods include discussion, problem solving, humor

in the class, team based teaching, role play, problem solving, use of textbooks. According to Ogwo & Oranu (2006) the use of text book aids the learners to get primary source of information and detail explanations covering the fundamental operations as well as other relevant information that have bearing on the subject under discussion while discussion enables the learner to understand concepts to be learnt.The commonly used methods are demonstration, lecture, project work, discursion, field trips, excursions role play or a combination of these methods.Several researchers have shown that, museum field trips have long-lasting consequences for students, typically involving memories of specific social contexts, as well as specific content (Anderson and Piscitelli 2002; Falk and Dierking 1997; Wolins, Jensen, and Ulzheimer 1992). Falk and Dierking (1997) investigated the long-term effect of field trip experiences on elementary school students and found strong memories even after many years. Anderson and Piscitelli (2002) examined the aftermath of museum school field trips on childhood memories of 75 parents who had young children of their own.Half of the parents described the experiences as highly positive; the other half, however, reported negative memories, like feeling rushed, or visits that could be dull or even scary. Wolins, Jensen, and Ulzheimer (1992) concluded from a study of young children's memories of museum visits that personal involvement, links with the school curriculum, and multiple or repeated visits were critical factors in producing memorable meseum visits for young children. Field trips enhances learning.Many field trip researchers have examined strategies that enhances students' cognitive learning outcomes following a field trip experience.A number of studies have shown that school children gain most from a field trip

cognitively and emotionally when they are well prepared by the curriculum, when they participate actively during the trip, and when the information received during the trip is reinforced following the visit.In their study of field trip groups, Griffin and Symington (1997), reported that many teachers transferred classroom-style instruction to an informal setting, yet made little effort to link topics being studied in the classroom with the informal learning environment. They found that the teaching strategies used by teachers during the field trip tended to be task-oriented, focused on having students complete a particular assignment or worksheet to keep them occupied during the visit. A study by Michie (1995) examined teacher perceptions of field trips and found that communication between the field trip venue and schools plays an important role in teachers' planning for field trips. Michie (1998) reported that teachers agreed that field trips were valuable experiences for their students, while the barriers that kept teachers from doing field trips centered on the lack of support from school administrations and lack of time to prepare relevant teaching materials. He suggested that school administrators should recognize the value of field trips for student learning and that professional development programs could help teachers build confidence in field trip preparation. The use of field trip in teaching and learning leads to teacher-learner interaction outside the classroom. These interactions take place in a new learning environment and result in a meaningful teaching and learning process. Fakomogbon, Ibrahim, and Gegele (2007) noted that the basic technology curriculum requires child-centered and activity-oriented teaching and learning processes. Nowadays it is imperative to use different teaching methods and learning processes as well as strategies to ensure student understanding. Since

field trip is a method of teaching used to collect first hand information in the course of investigation, this will enable both teachers and students to create meaningful and productive learning both on the field and in schools. Omosewo (2009) explained that field trip can be used as a chance to collect data for later analysis, to generate artwork and stimulate discussions both on site and back at schools and universities in tutorials, seminars and workshops. The use of field trip as a method of teaching helps to bring about an effective learning of Basic Technology. It is of enormous benefit because it enhances the observation of learning experiences in the field of engineering works where engineering materials such as plastic, ceramics, rubber, wood and metals are used. Field trips are an interactive method of teaching which give both male and female students equal opportunity to widen their practical and cultural experience by varying their learning environments. Thus, Amosa (2013) remarked that no evidence of superiority is expected to be noticed in the academic performance based on gender, if both males and females students are exposed to learning experiences equally.

The mission of field trip is to enhance learning and academic success by providing activities and programs for the students by allowing community resource persons to share their skills, knowledge and expertise. Field trip provides learners the opportunity to be active learners instead of passive learners or mere recipients of knowledge which have been the major hindrane to effective teaching and learning (Yusuf, 2006). Field trips are an important aspect of every student's life, and they are acknowledged to be an important educational tool by almost everyone involved in schooling. Learners on field

trips form an important current and hopefully future audience for museums. Field trips ought to be fun, satisfying, educational, and pedagogically valuable experiences for children while simultaneously serving as a powerful advertisement for museums and an easy way to introduce students to community resources for lifelong learning. Yet many field trips may be far from achieving these goals, which at times lead to frustration on all sides.The teacher or the facilitator's choice of teaching method depends on what fits his or her educational philosophy, classroom demographic, subject area, and school mission statement. According to Farrant (1980), teaching is the process of facilitating learning. It involves the transfer of ideas, knowledge, skills, attitudes, beliefs and feelings to someone, with the aim of bringing about particular changes in a person. It is the teacher who transfers such skills, ideas, attitudes and beliefs to the learner with the aim of bringing about consistent change of behavior. Student's success in the classroom is largely depened on effective teaching method. For effective teaching to take place, a good teaching method must be adopted by the teacher. Agricultural education programmes provides a curriculum aimed at helping individual gain knowledge and skills in agriculture. Moore (1994), studied the historical teaching methodologies in agricultural education and fuond three major teaching approaches in agriculture: formal steps, project approach, and problem solving approach.With these the role of teachers and their teaching strategies are never ending topics in all educational setting, (Martin and Mahmoud 1986, Miller and Sheind, 1984). Ofoegbu, (2015) stated that in most cases, Agriculture Science teachers are fuond of using conventional methods particularly lecture method in teaching agriculture in Senior High

Schools.According to Daluba, (2013) lecture method causes the teacher to dominate the teaching and learning process with very little participation on the part of the learners. He threfore recommended a more interactive approach such as demonstration method which is found to have a significant effect on students' achievement compared to the conventional lecture method. But Sullivan & McIntosh (1996) said that with proper planning and effective presentation techniques, the lecture can be a highly effective and interactive method for tranfering knowledge to students. A study carried out by Benson, Schroeder, Lantz and Bird (2009), provides evidence to show that students may place greater emphasis on lecture materials than on textbooks. Lecturing is not simply a matter of standing in front of a class and reciting what you know.they further noted that the classroom lecture is a special form of communication in which voice, gestures, movement, facial expression and eye contact can either complement or detract from the content. Lecture method is the oldest teaching method. As used in education, the lecture method refers to the teaching procedure involved in clarification or explanation to the students on some major ideas (Obunadike, 2011). This method lays emphasis on the presentation of contents by the teacher (Gore, 1998). The teacher is more active and students are passive but he also uses questions and answers to keep them attentive in the class. It is used to motivate, clarify, expand and review the information. Domitrovich Cortis and Greenberg (2007) stated that, lecture method is associated with the telling or didactic teaching method. This means that the teacher centred teaching happens in a highly teacher dominated environment (Egbo, 2008). Teachers using the lecture method have very limited concern about student's ideas and

reasoning when they prepare their lessons (Olulube, 2006). Thus we can say that when teacher takes the help of a lengthy-short explanation in order to clarify his ideas or some fact that explanation is termed as lecture method. Usually teachers use lecture method because they are accustomed to them (most probably they were lectured at tertiary institutions).A plethora of evidence in the research literature on pre-service teacher training suggests that beginning teachers often resort to the pedagogical models they encountered as students (Blanton 2003; richardson 1996; lortie 1975; Wideen, Mayer-Smith, and Moon 1998). Lecture method allows easy control over students (Kirk, 2000). McCarthy, (1992) in article 'Common Teaching Methods' stated the strenghs of lecture method that it presents factual materials in direct, logical manner, contains experience which inspires, stimulates thinking to open discussion, and useful for large groups. Daluba (2013), recommended that, teaching should be more interactive approach such as demonstration method which is found to have significant effect on students' achievement compare to lecture method.The demonstration method demands that the teacher models the correct skill and procedure while the learner observes, at the end of which he (the learner) is asked to imitate what he has observed. According to Maduewesi (1999), demonstration is an example of teaching by showing. He went further to say that demonstration method employs sight and touch rather than hearing as the major means of communication. It is an activity which combines telling, showing and doing for the benefit of the students. However, it is more of a teacher-centred method of teaching because he does the demonstration using his voice, movement of the body, his chalk, drawing and illustrating. But it is the

teacher's greatest assets in arriving at fundamental skills and practice in a very short time. It is the basic method for introducing new skills to students and for developing understanding and getting them to accept new and better ways of doing something. The explanation, manipulative skills, physical principles and the working of mechanical devices are often more effectively taught by demonstration than by other methods. It is also good in developing and appeal to the sense of vision and also good in creating a desire to practice the concept been demonstrated by the teacher. Demonstration is a method and can also be used as a technique. Demonstration is not synonymous with "experiment", this is because demonstration is used to enable the learner see an object or the process of doing something while an experiment is carried out to verify a scientific principle or used as a means of observing, measuring and interpreting data in the laboratory, Abdullahi (1990). Demonstration method is used in our language classrooms teaching phonology; in teaching music we use it to demonstrate how to place fingers on the keyboard; in Fine-art we use it to show how to derive secondary colours or produce batik. In Agricultural Science, it is used to show how to cut and plant cassava stems or mulch the soil; In Physical and Health Education demonstration is used to show how to throw a javelin, discuss, or perform forward-roll. In using demonstration, the teacher should use simple explanations and explain only those things which are needed to perform the skills competently.The teacher should use diction or language that the students can easily understand and when a technical word is unavoidable, a thorough explanation is necessary.He He should speak clearly and distinctively. The demonstration is done by the teacher while the students watch.When deciding a teaching method to be used

the teacher needs to consider students' background knowledge, the environment and the learning goals.Among others in interactive methods of teaching is the discussion method.The discussion teaching method is a design that provides opportunity for discussion between teacher and students, and students to students. It is a strategy that centres on shared conversations, discussions, and exchange of ideas in class.This method provides opportunity for all to sit and listen, as well as talk and think, thereby emphasizing the process of "coming to know" as valuable as "knowing the right answer". This means that students in a discussion class are not passive listeners neither is the teacher a sole performer. Students have the oppotunity to develop critical thinking ability, leam to evaluate ideas, concepts and principles, procedures and even programmes and policies on the basis of clearly set criteria. For exmple, a student who participates in a discussion lesson learns to support his views rationally, based on facts, too. He appreciates the need to argue logically, define clearly concepts and terms, and examine critically rules, principles and constructs. Such a student learns to develop value processing skills in relation to changes that occur in his society. Most importantly, the discussion strategy encourages cooperative team work between teacher and students and amongst students. It emphasizes the need for all to work cooperatively while developing societal relationships. Students see themselves as contributory members of the group, instead of separate and odd. According to Bennett (1995), such cooperative learning improves both academic achievement and students' interpersonal relationship. He goes on to state that in most cases all students (including high, average and low achievers) tend to benefit from cooperative learning and team work. In the

same vein, Johnson, Johnson and Holube (1988), have confirmed that such cooperative spirit in learning help students work together to complete a task successfully.This promotes students' independency. Generally, in appraising the interactive nature of the discussion teaching method, that cooperative spirit of learning inherent is very important. It emphasizes (students) individual and group accountability, with the teacher giving the feedback. Also, through such shared learning students develop shared responsibilities for leadership functions.Interaction in the discussion strategy encourages rational arguments and logical reasoning. In doing this, the teacher helps to develop in his learners skills in conflict management and listening. Johnson and Johnson (1987) have stated that such interactions in the classroom that promote cooperative learning are successful strategy for reducing stereotyping and social rejection across disability, race and gender lines. They see themselves as members of a group as they participate in discussions. Listen to each other, views resolve differences, make suggestions and critically examine issues for the benefit of all. As students formulate their own views in the act of give and take, they also learn to resist the influences of their personal prejudices, commitments, stereotypes; likes and dislikes, at the same time continue to focus attention on the theme of problem at hand. Basically, teaching strategies stem from teacher's behaviour. This, in itself is further manifested in the teacher's effective use of academic learning time. Sadker and Sadker (1991) have reported that allocating adequate time to academic content is not enough. It is the teacher's ability to effectively use allocated time in classroom teaching that is the real key to student achievement.Thus Morse and Wingo (1969) have posited that the teacher

should not adopt any teaching strategies because it is convenient to him or her. (Blair and Simpson, 1975) have stated in their book of Educational Psychology that teaching techniques must embody the techniques for managing the learning environment, so as to effectively handle obstruction, instruction and disruptions, which occur naturally in every learning environment. When teacher effectively controls these occurrences an enabling learning environment for teaching and learning would be achieved. Ferrant (1980) stated that teachers with little skills tent to use authoritative and efficient methods that make pupils see school as a repressive place with little joy. Such methods hinder effective study of Government. The student should be guided by the teacher in discovering relevant information.Amadi (2001) reported that there are more qualified teachers of agriculture these days however the inbalance in skill acquisition still remained high. Farauta and Amuche (2013) submitted that the inability of secondary school graduates of agriculture to scure jobs or be self-employed have sustained the perciend generation gap, which has been blamed on the way and manner in which Secondary Education Agricultural Curriculum is implemented.On their work on the methods and techniques of teaching, (Nacino-Broven, Oke, & Brow, 1982) advocated for the inquiry method as against expository teaching. Clarke identified the benefits of the inquiry method as follows:

1. Students establish deep understanding and firm concepts.

2. It also helps students to clarify processes and relationships and to develop task, value and attitude.

3. Students develop their intellectual skills which include the ability to think rationally and critically.

4. Finally it motivates students to learn since students remember better the things they find themselves.When the government teacher implores the inquiry method of teaching students, it Prepare them to be critical and objective thinkers not only in their subject but in other subjects.Students by providing examples in their responses to information disseminated, check on their understanding of something that had been earlier taught.Students make inquiries to clarify doubt and teachers should never dismiss these quires (Jariah and David,1996).In view of this, (David,1993:74) stated that teachers should make use of any means possible to facilite learning and boost learners' self-esteem.One important way of boosting learners interest is by linking new inputs to familiar or old knowledge. Bain (2004) observed that learners construct meaning based on their previous experiences and knowledge.Individuals continually structure and restructure the meaning of their experience through self-regulated mental activity.He added learning occurs by matching new information against existing knowledge and establishing meaningful connections. Learners select and process new information to fit with, connect to or challenge their existing knowledge. Learning is affected by the context as well as the beliefs and attitude of the learner and therefore effective teaching and learning occurs by stimulating students to ask their own questions. Conceptions of teaching and learning differ in the details; however there is general agreement that effective teaching involves far more than just presenting content and methods used to

convey that content. Equally important are the affective or emotional processes involved in learning, the integration and application of the new information, and the social processes that take place between individual and their environments (Illeris, 2002).Vella (2002) articulated the importance of creating a relationship between teachers and learners that involvs respect, safety, open communication, affirmation, listening and humility.Cranton (2006), described authentic teachers as those who create a meaningful relationship with students in which both learners and teachers are able to be open and genuine, have an awareness of who students are as learners, are cognizant of the institutional and social constrains affecting the teaching and learning process and engaged in critical self-reflection on teaching practices.According to Hyland (2010), learning involves the development of knowledge, values, emotions, understanding, reason, skills, experience and insight (p.252).

Strategy defines the basic procedure of how the content is elaborated during the teaching process. There are two possible alternatives.

The cognitive approach and the affective approach, the cognitive approach is expository, as information is given in a structured and organized process (top-down). The students' role in this is passive consuming and breathing-in. The teacher informs, tells, shows, asks, corrects and so on. The affective approach is based on "discovering" and uses the curiosity of the student to let him or her find out something on his or her own. There is little or no information given, just issue to explore. Students have to be active and inquisitive to solve the problem. The teacher is not involved. In this student centered strategy,

students learn by doing and by experiencing. In his AATEA Distinguished Lecture, Crunkilton (1987) stated that problem solving, both as a method of teaching and as a skill that students need, is more critical today than it was years ago. In a study conducted by Flowers and Osborne (1988), secondary agricultural students were taught using a subject matter approach or a problem solving approach. The results showed that student achievement and attitudes towards the teaching method were essentially the same in the two groups. However, students taught using the problem solving approach had significantly less achievement loss. This study by Flowers and Osborne was the only research found that directly addressed the effectiveness of problem solving teaching in agriculture, as measured by student achievement.Using the correct teaching method helps any student to learn or master knowledge and skills, (Odubiyi, 1988). Current reform efforts in education have demanded that more attention be given to the development of problem solving, critical thinking, and decision making skills in students. As Phipps and Osborne (1988) and many other agricultural educators have suggested, problem solving teaching in agriculture develops students' thinking ability, stimulates student interest, and helps students evaluate, draw inferences, and make decisions. The empirical evidence reported by Flowers and Osborne (1988), showed that, the continuing promotion of problem solving teaching by the profession, and the declining use of problem solving teaching by agricultural teachers described by Crunkilton (1988) and others suggested the need to examine problem solving as a teaching method used by Illinois agricultural teachers. No studies have been completed that sought to describe the extent to which Illinois agricultural teachers used the problem solving

approach to teaching. Ndem (2012) reported that one of the appropriate methods of teaching is project medthod it makes learner to practicalize what is taught theoritically in the classroom.If the methods highlighted above are utilized by the teacher, students' skill acquisition will be enhanced and thus competent students' and self-reliance graduates, who will be employers of labour in agricultural sectors, will be produced.Enhancement means to improve on something for better performance. Olaitan, Amusu, and Asouzuin Ifeanyieze (2010) described enhancement as ability of making something better than before. Thus enhancement is adopting better teaching methods for agricultural instructions for adequate skill acquisitions Skill is well-established habit of doing things by people. Okorie (2000) noted that to possess a skill is to demonstrate, act, think and behave in specific activity in such a way that the process becomes natural to the individual through repetition or practice. Skills acquisition by students, make them competent to the extent of becoming self-reliance.

Self-reliance is a situation where one does not rely on paid salary or wage, rather the individual earns his living. Hornby, in Ifeanyieze (2010) described self-reliant as the ability to do or take decision by ones' self rather than depending on other people for help.This means that, self-reliance can be described as the ability of Agricultural Science students to manipulate agricultural products to create wealth for standard living, rather than depend on paid salary.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter looked at the research methods adopted. This include the profile of the study District, the study design, study variables, the target population, inclusion/exclusion criteria, Sampling procedure, the method and instrument used for data collection, data analysis and ethical considerations**.**

3.2 The Profile of the Study Area

3.2.1 Location

The Sagnarigu District with its capital at Sagnarigu is one of the six newly created districts in the Northern Region in the first half of 2012. It was carved out of the Tamale Metropolis by legistilative Instrument (LI) 2066. It was inaugurated on 24th June 2012.One of the reasons for the creation of the district was to redirect development al projects to the communities north and west of the Metropolis which were relatively less developed as compared to the urban areas in the Tamale Metropolis.The district is made of 79 communities comprising 20 urban, 6 peri-urban and 53 rural areas.

The district covers a total land size of 200.4Km2 and shares boundaries with the Savelugu-Nanton Municipality to the north, Tamale Metropolis to the south and east, Tolon District to the west and Kumbungu District to the north-west.Ghana Statistical Service, (2014).

3.2.2 Geographically

Geographically, the district lies between latitudes 9^o 16' and 9^o 34' North and Longitudes 0^o 36' and 0^o 57' West. Ghana Statiscal Service (2014).

3.2.3 Economic Activity

Agriculture is the main economic activity of majority of the people in the district are largely ingaged in both crop and animal farming.The main crops cultivated by farmers in the district include maize, yam, millet, cassava, cow pea, groundnuts, soya beans among others. Livestock farming is very important agricultural activity in the district.Animals such as cattle, sheep, goats and fowls are the main animals that are reared in the district.Services and manufacturing sectors also employed some proportion of the population of the district.Ghana Statistical Service,(2014).

3.2.4 Climatic Condition of the Area

The Sagnarigu District like other districts in the Northern Region has a single raining season, usually stretching from May to October, and this period naturally coincides with the farming activities in the district.The annual rainfall average ranges from 600mm to 1100mm.The peak being usually between July and August.

Daily temperatures of the area vary from season to season.During the raining season,there is high humidity with relatively less sunshine and heavy thundarstorms.The mean day temperatures ranges from 28^oC (December-mid-April) to about 38^oC(April-June) and the mean night temperatures ranges from 18^oC(December) to 25^oC(February –March).

The dry season (November-March) is characteristised by the dry Harmattan winds; the Harmattan season presents two extrem dry cold temperature of the early dawns and mornings and the very warm temperatures in the afternoons.Ghana Statistical Service,(2014).

3.2.5 Drainage and Vegetation

The District is poorly endowed with water bodies; this is attributed to the high underground water table.The only natural water bodies in the district are a few seasonal streams which have water during the rainy season and dry up during in the dry season.There are few dams and dug-outs such as the one at Kpene and that of Kanvilli-Kpamo.These are alternative source of water that provide water for animals and for domestic use.

Sagnarigu District lies within the Savannah Woodland Region.This is characterised by tree Savannah Vegetation of varying sizes and density.The major types of trees usually found in the district includes dawadaw, nim, acasia, mahogany, and baobab trees among others.

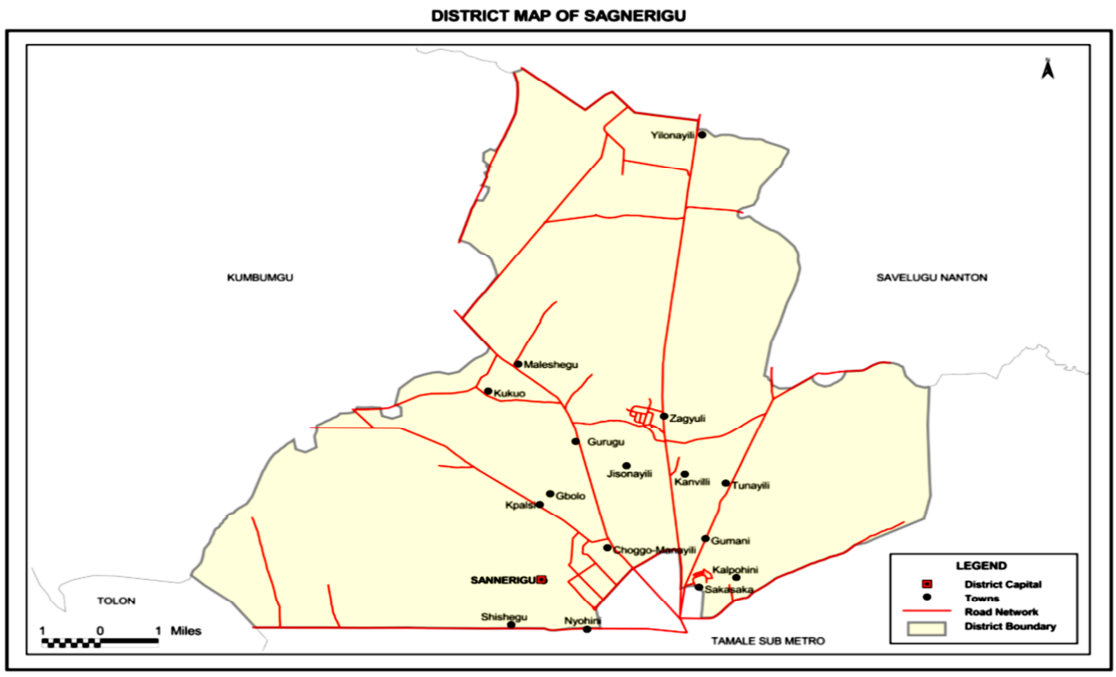

Figure 2: Sagnarigu District Map

Source: Ghana Statistical Service, 2014

3.2.6 Soil

The main soil types found in the district includes; sandstone, gravel, mudstone, and shale that have weathered into different grades of soil.Due to seasonal erosion, soil types emanating from this phenomenon are sand, clay, and laterite ochro-soil.The availability of these soil types has contributed to rapid real estate development in the area where estate developers have resorted to the use of local building materials such as sea sand gravel and clay.Ghana Statistical Service, (2014).

3.2.7 Transportation

The Tamale Airport,which is now serving as the gateway to Northern Ghana is located about 14 kilometres from Tamale town within the boundaries of Sagnarigu District.The Airport is use for national and regional scheduled flights between Tamale,Accra,and Kumasi and some other capital cities in West African countries.The most comonly used public transportation in the district is the tax and motor king.The most convenient and most popular means of transportation for the people in the district is the motorbike.Transportation out side the district to other towns and other disrict is facilitated by mini-bus system and Metro Mass Transit System.Ghana Statistical Service, (2014).

3.2.8 Road Network

Very few of the roads in the district are in good shape.Many of the roads in the farming and periurban communities in the district are in deplorable state and needed to be resurfaced or reconstructed.Roads in the urban and Tamale-North parts of the district are either asphalted or bitumen surfacing.Ghana Satistical Service, (2014).

3.2.9 Utility Service

Sagnarigu District is one of the districts that are endowed with basic utility services in northern region.Electricity,water,roads,markets,and communication services are mainly available in the urban areas in the district.In the rural areas in the district,these facilities are either non-existing or inadequate.Ghana Statistical Service, (2014).

3.2.10 Financial Institution

The district has two major banks; Ecobank and Barclays Bank which are both private owned and are both located in the same area Gumani along Bolga Road.There are some small financial institutions also operating in the district.Notable among them is the Baobab Microfinance Company Ltd.Ghana Statistical Service, (2014).

3.2.11 Chieftaincy Institution

The chieftaincy institution and the traditional setup in Sagnarigu District well revered and well structured.The chief with the highest authority in the district is the Sagnari-Naa, who is install by the overlord of Dagbon, the Yaa-Naa.They are twelve (12) subchiefs under the royal sking Sagnari-Naa.To whom all the subchiefs owe alligiance.The other communities and the chiefs are under the royal sking of the Gulkpe-Naa in Tamale Metropolis to whom they pay alligiance.Ghana Statistical Service, (2014).

3.3 Research Design

A Descriptive survey was used to collect the data. Descriptive survey offers the chance of gathering data from a relatively large number of cases at a particular time in order to make inferences and generalizations from the study of the sample. It is essentially cross-sectional (Best and Kaln, 1995; Gay, 1990; Osuola, 1987). According to Osuola (1995) descriptive survey could be used to obtain information concerning the current status of a phenomenon. Descriptive survey, therefore, is directed towards the determination of the nature of a situation as it exists at the time of the study. Moreover it gives

accurate information of a situation which is necessary for making a wide range of policy decisions. Descriptive survey is a research design that attempts to describe existing situations without actually analyzing relationships among variables (Fraenkel and Wallen, 2003). Fraenkel and Wallen (2000) defined descriptive studies as describing a state of affairs a fully and carefully as possible. Again Fraenkel and Wallen (2003) pointed out that in educational research, the most common descriptive methodology is the survey as when researchers summarize the characteristics as (ability, preferences, behaviors and so on) of individuals or groups. Gay and Arasian (2003) pointed out that quantitative or survey research involves collecting data in order to answer questions about the current status of the subject or topic of study.

Quantitative descriptive studies are carried out to obtain information about the preferences, attitudes, practices, concerns or interest of some groups of people (Gay and Arasian, 2003). The description of phenomena is the starting point of all research endeavors (Fraenkel and Wallen, 2000).'The basic purpose and rational for survey research" incorporates generalizing from a sample to a population, discover facts and test theories, descriptive survey design "can be discovered by asking questions and answers systematically" (Buckingham and Saunders, 2004. p. 20)" "Survey data consist of responses to questions which could be analyzed by means of statistical comparison" (Buckingham and Saunders, 2004. p. 21).

3.4 Study Variables

The variables assessed in this research include both dependent and independent variables. These sub-categories are described in the succeeding paragraphs.

3.4.1 Dependent Variables

The dependent variable in this study was the challenges to effective teaching and learning of practical agricultural science. This variable covered negative student and community attitude towards the course, major factors that militate against successful teaching of the course and inappropriate teaching techniques.

3.4.2 Independent Variables

The independent variables include the socio-demographic characteristics of both students and teachers.

3.5 Target Population

The population for this study was made up of Agricultural Science Students and teachers in the selected senior high schools for the study.

3.6 Inclusion/Exclusion Criterion

At the period of data collection all students enrolled for Agricultural Science was eligible to participate in the research. The teacher must also be an Agricultural Science teacher in Senior High School.

3.7 Sampling Methods and Sample Size

3.7.1 Sampling Methods

The study participants were selected using purposeful non-probability sampling. Three out of four Senior High Schools were first selected within the Sagnarigu District because they run Agricultural Science Programmes. Within each Senior High School, participants were purposefully selected because they

were students enrolled for Agricultural Science Studies or they were teachers of the course. As a result of time constraints and institutional curricular limitations, eligible students and teachers were sampled from the lot through convenience sampling. However, the use of non-probability sampling methods like purposeful and convenience sampling could limit every eligible participant having an equal chance of being selected.

3.7.2 Sample Size Determination

The sample size of study participants was ninety consisting of 10 Agricultural Science Teachers and 80 Agricultural Science students. In order to have a representative sample, 30 respondents were selected from each of the three Senior High Schools. In the first two schools, 27 students and three teachers each were selected. However, in the third school, 26 students and four teachers were selected.

3.8 Data Collection Method and Tools

Data were collected from study participants through interviews with the aid of a self-administered structured questionnaire.

3.8.1 Research Instrument

The structured questionnaire was designed for all respondents namely one section for students and the other section for teachers. Items on the questionnaire were formulated using the research questions and objectives as a guide. The questionnaire comprised of close-ended questions.

Section A of the questionnaire was designed to elicit students' responses. Some of the variables captured included: students' socio-demographic

characteristics, students' attitudes towards practical Agricultural Science and students' observations of practical agriculture lesson sessions.

Section B of the questionnaire was for Agricultural Science teachers and contained 26 items. Some of the variables in this section included teachers' socio-demographic characteristics, availability of farm implements and machines, frequency of requisition for materials, time elapsed between requisition and release funds for procurement of materials, reasons for inadequacy of materials, teaching techniques adopted and rating of community attitude towards agricultural practical.

Section C was an interview scheduled for the views of head teachers and agricultural teachers for the selected senior high schools in the Sagnarigu District.

3.8.2 Pretesting of the Research Questionnaire

The research questionnaire was pilot tested in the Tamale metropolis using Ghana Senior High School as a data collection point. Twenty six Horticulture students and seven of their teachers were interviewed.

The findings showed little or no problems of ambiguity, cultural sensitivity issues, grammatical errors and comprehension issues with respect to the study questionnaire. The average time of questionnaire administration was noted then to be 12 minutes for students and 4 minutes for the teachers.

3.8.3 Validation of the Research Questionnaire

The questionnaire was approved for data collection by the supervisor of this thesis. It was also subjected to expert scrutiny and second opinion by

colleagues and relatives. The study instrument was also pretested to ensure its feasibility for data collection. This was to minimize errors and increase the reliability of findings.

3.8.4 Procedure for Data Collection

In the process of data collection, the selected schools were visited and the heads of the various schools introduced the research team to their respective Agricultural Science teachers and students. Copies of the questionnaires were distributed to the teachers and the students. The head assigned a teacher to gather all completed questionnaires.

On the whole, all the distributed questionnaires were returned. The return rate was one hundred percent. This was due to the fact that the questionnaire was administered when schools were in session implying that teachers and students were available at the time.

3.8.5 Data Analysis Procedure

The statistical tool that was used for analyzing the data was the Statistical Package for Social Sciences version 21. The raw data collected were cleaned, coded and entered into SPSS. The data set were then analyzed and the information presented in simple frequency tables and charts. The percentages were used to analyze all the responses. The frequency and percentage tables portrayed an overall view of the findings, to identify the trends and to display the relationship between parts of the findings (Gay, 1990).

3.8.6 Ethical considerations

An institution-based ethical review of this proposed project was conducted to establish relevance, benefits and minimize harm to all participants prior to data collection. Also, an introductory letter from the University for Development Studies would be served to the selected schools to seek their clearance to carry out the research. During data collection process, a verbal or signed consent of the student would be sought before interviews. On the subject, the study team would assure them of the confidentiality of their individual responses.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Introduction

This study sought to ascertain challenges to effective teaching and learning of practical agriculture in Senior High Schools in Sagnarigu District in the Northern Region of Ghana.

This chapter presented the results of data based on the responses to the questionnaire distributed to respondents. The respondents included teachers and students.The results were also discussed in the current litereture.

4.2 Socio-demographic characteristics of respondents

An assessment of the distribution of students by gender showed that a majority of the respondent's representing 76.2% were males whereas the remainder 23.8% constituted females.

On age distribution, 2 out of 80 of the respondents, representing 2.5% were below 16 years.52 out of 80 representing 65 % were between the ages of 16 and 18 and 26 of the respondents representing 32.5% were between 19 and 20 years and none among the respondents was over 20 years of age.

The assessment of the highest qualification of Agriculture Science teachers'showed most teachers representing 90% were degree holders. The remaining one tenth of respondents, were Masters Degree holders. Several researches have shown that many teachers of Agricultural Science at the Secondary Schools have the profession early in their life (Myea, Dyer and

Washbur 2005). Myer et al. (2005), Camp et al. (2002), Mundt and Connors (1999), have conducted studies on the problems of beginning teachers of agriculture. These problems of beginning teachers included; classroom management and student discipline, balancing work and personal life, managing stress, lack of preparation time and motivating students.

When asked how long they have taught Agriculture Science since they qualified, the responses were that none of them taught for less than a year, One fifth of teachers (20%) taught for 1-3 years, another one fifth of the teachers (20%) taught for 4-5 years whereas majority of them representing(60%) indicated over 5 years.

Table 1: Socio-demographic characteristics of students and teachers

Socio-demographic variable		Frequency (%)
Age group of students in years	Below 16 years	2 (2.5)
	16-18 years	52 (65.0)
	19-20 years	26 (32.5)
	Over 20 years	0 (0.0)
	Total	80 (100.0)
Gender of students	Male	61 (76.2)
	Female	19 (23.8)
	Total	80 (100.0)
Highest qualification of teachers	Degree	9 (90.0)
	Masters Degree	1 (10.0)
	Total	10 (100.0)
Teaching experience of teachers	1-3 years	2 (20.0)
	4-5 years	2 (20.0)
	Over 5 years	6 (60.0)
	Total	10 (100.0)

Source: Field Survey Data, 2015.

4.3 Students' attitude and observation on Practical Agriculturelearning

The study results on students' attitude towards agriculture practical showed that most students (78.0%) were happy to have agriculture practical (Table 2). However, slightly higher than one fifth of respondents (22.0%) indicated that they did not like their agriculture practical learning periods. Also, respondents were asked whether their parents like the idea of them studying practical agriculture. Majority of respondents constituting 91.2% indicated that their parents approve of their choice to study Agricultural Science whereas a few responded (8.8%) contrary.

From Table 2: the students were asked whether they like how their teacher teaches and the responses were that a large majority of respondent (74.7%) affirmed that they liked the way their teacher taught. However, one fourth of the students (25.3%) do not. Pollard and Trigy (1997) have emphasized the importance of talking to pupils about how the prefer to learn and about their understanding of teacher expectations.

Table 2: Assessment of students' attitude towards Agriculture Practical Lessons

Students' attitude assessment variable		Frequency (%)
Do you always like it when it is time for practical agriculture?	Yes	62 (78.0)
	No	18 (22.0)
	Total	80 (100.0)
Do your parents like the idea of you studying practical agriculture?	Yes	73 (91.2)
	No	7 (8.8)
	Total	80 (100.0)
Do you like how your teacher teaches?	Yes	59 (74.7)
	No	21 (25.3)
	Total	80 (100.0)

Source: Field Survey Data, 2015.

For the 22.0% (18) of students who reported not liking their practical agriculture learning periods as shown in Table 2, Table 3 present the reasons why such students do not like practical agriculture. Six out of eighteen students (33.3%) stated that tools, equipments and materials were inadequate for lessons. 16.7% of them also reported that their teachers used Agricultural Science practicals as a yardstick to use students as labourers on the school farm. Two students (11.1%) reported that Agricultural Science practicals in the

school were only classroom oriented. Another two students (11.1%) also reiterated that practicals were one-sided with respect to coverage of all divisions of Agricultural Science. Among them one person stated that agriculture was not his/her preference and 16.7% stated that there were practicals. One of the students also believed there was lack of facilities to carry out some agriculture practicals.

Table 3: Students' reasons for not liking Practical Agriculture periods

Reasons	Frequency	Percentage (%)
Inadequate tools, equipments & materials	6	33.3
Using practicals as care of to use agric students as farm labourers	3	16.7
Practicals is only classroom oriented	2	11.1
One sided practicals	2	11.1
Agric not my interest	1	5.6
No practicals	3	16.7
Lack of facilities	1	5.6
Total	18	100

Source: Field Survey Data, 2015.

For the 25.3% (21) students who reported not liking the way their Agriculture Science teacher teaches as shown in Table 2, Table 4 below present the reasons why such students do not like their teachers' mode of lesson delivery. According to one fifth (20.0%) of such students' teaching was done in a hasty manner and some teachers jump topics. One quarter (25.0%) of them reported that teachers avoid answering questions. Also, majority (30%) reported that teachers do not teach to students' understanding. Furthermore, teachers had poorly organized materials according to 15.0% of the students. 5% say teaching was always theory and inadequate practicals and another 5% say it was only crop sided lessons. Using the correct teaching method helps any student to learn or master knowledge and skills, (Odubiyi, 1988).

Table 4: Students' reasons for not liking the way their teachers teach.

Reasons	Frequency (n=20)	Percentage (%)
Hasty and jump topics	4	20
Avoids answering questions	5	25
Does not teach to students understanding	6	30
Poorly organized materials	3	15
Theoretical and inadequate practicals	1	5
Only crop sided lessons	1	5
Total	20	100

Source: Field Survey Data, 2015.

Table 5 compared students' terminal examination performance in S General Agricultural Science to other elective subjects. With the range of 90-100, general agriculture recorded 1.3% but other electives recorded 0%. Also at the range of 80-89, general agric recorded 17.5% and other electives scored 8.8%. At the range of 70-79, 31.25% was recorded for general agriculture and 21.25% for other electives. At the range of 60-69, both general agriculture and ource: Field Survey Data, 2015 other electives recorded 35% each. With the range of 50-59, general agriculture recorded 13.75% and 25% for other electives. Only 1.25% of students had marks from 40-49 in general agriculture but 10% of the students got marks from 40-49 in other electives. It was clear that no student among the 80 students obtained a mark less than 40% in both general agriculture and other electives. The interest of the students in agriculture made them developed desirable attitudes, interests, ideals, appreciations, understandings, habits and abilities to learn other subjects. Phipps et al, (1988, p.145) defined 'good teaching or effective teaching' as the direction of the learning process so that desirable changes of a relatively permanent nature are brought about within the learner as a result of the instruction.They further emphasized that effective instruction should result in the development of desirable attitudes, interests, ideals, appreciations, understandings, habits, and abilities.

Table 5: **Student's learning outcome in Agricultural Science in relation to other elective subjects**

Range of marks (marked out of 100)	General Agriculture (%)	Other Electives (%)
90- 100	1.25	0.0
80- 89	17.5	8.75
70- 79	31.25	21.25
60- 69	35.0	35.0
50-59	13.75	25.0
40- 49	1.25	10.0

Source: Field Survey Data, 2015.

4.4 Factors hindering effective teaching and learning of Practical Agriculture

4.4.1 Availability of Funds

Scekamwa (1997) stated that, high running costs of practical education reduce effectiveness of conducting practical education in subjects like agriculture. Langlo and Norman (1987) also questioned the economics of offering prevocational subjects at Secondary School which are more expensive and which may not be fully facilitated in terms of equipment and managerial expertise. Inadequate provision of logistics could result in inadequate practical

lessons and a compromise for theoretical instruction in many schools. From Figure 2 below, the respondents were asked about the sources of funds for agriculture in their school and the responses were that 10% indicated special development funds, most of the respondents representing 45% indicated capitation grants and school fees, whereas an extra 17.5% of the respondents pointed out P.T.A funds.12.5% of the respondents indicated Students Association dues, and 15% of the respondents had no idea of the source of available funds for agriculture.

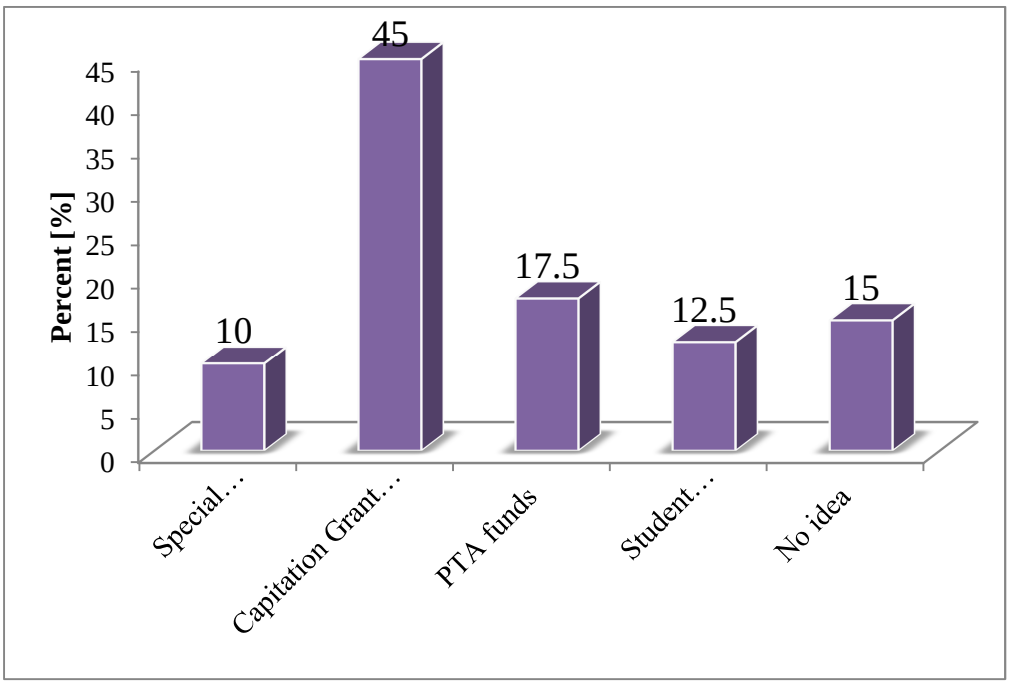

Figure 2: Sources of funds for agriculture activities

On the level of availability of funds to conduct agriculture practical, Table 6, below disclosed that 30% of the respondents indicated that the funds were available for crop production whereas a large number representing 70% indicated that, the funds were not available for crop production.

Also, as to whether the funds were there for animal production or not 43.8% of the respondents indicated that funds were available whereas a majority of the respondents constituting 56.2% indicated not available. Again 3.8% of the respondents indicated that funds were available for mechanization whilst 96.2% of the respondents believed that the funds are not available for mechanization.In addition, as to whether funds were available for field trips or not 16.3% of the respondents indicated that funds were available for field trips 83.7% pointed out that the funds were not available for field trips and for demonstration plots.Akuma and Okorie (2007),reported that field trip is one of the appropriate techniques of implementing educational objectives,it enable the learners to feel,touch,and see what is being taught.These create everlasting memory in learners ,they stated.Finally, the least of the respondents representing 3.8% thought that funds were available for exhibitions whereas a majority of respondents representing 96.2% also believed that funds were not available for exhibition.

Table 6: Level of availability of funds to conduct Agriculture Practicals

Item	Availability of funds Frequency (%)
Crop production	24 (30.0)
Animal production	35 (43.8)
Field trips	8 (10.0)
Demonstration plot	13 (16.3)
Exhibition	3 (3.8)

Source: Field Survey Data, 2015.

4.4.2 Availability of Practical Instructional Materials

In Table 7, the availability of funds for instructional materials and responses were that 20% of the respondents indicated that there were adequate farm tools, implements and machines were not adequate. Again 30% of the respondents believed that there are adequate funds to purchase animals and drugs for animals were not adequate.Moreover a large number of respondents representing 70% indicated that the funds for inputs for crops were not adequate and the representing 30% indicated adequate. Finally, 30% of the respondents pointed out that funds for demonstration plots and field trips were adequate respectively whereas 70% also indicated that funds for demonstration plots, field trips respectively were not adequate.

Table 7: Availability of funds for instructional materials

Item	Availability of funds Frequency (%)
Tools, implements and machines	2 (20)
Purchase of animal drugs for animals	3 (30)
Inputs for crops	3 (30)
Demonstration plots	3 (30)
Field trips	3 (30)

Source: Field Survey Data, 2015.

In Table 8 below, 80% of the teachers pointed out that winnowers and secateurs were available for use in agricultural science practical. Finally, 80% of teachers indicated that riggers and spades were available.

Table 8: Availability of farm implements for Agricultural Practicals

Item	Availability of implement Frequency (%)
Winnowers/secateurs	8 (80)
Spades	8 (80)
Old engine parts	4 (40)

Source: Field Survey, Data.

Frequency of Requisition for Agricultural Materials

From Figure 3, all Agricultural Science teachers reported that they make requisitions for funds for agriculture materials once a term. On the frequency at which these materials were needed 30% of teachers reported that it was during mock practicals, whilst weekly, monthly and never respectively recorded zero percent. Also, on how often the respondents receive materials they request for agriculture practical, most respondents(70.0%) indicated once a term and the rest representing 30% indicated never.None of the respondents indicated Daily, Weekly and Monthly respectively.

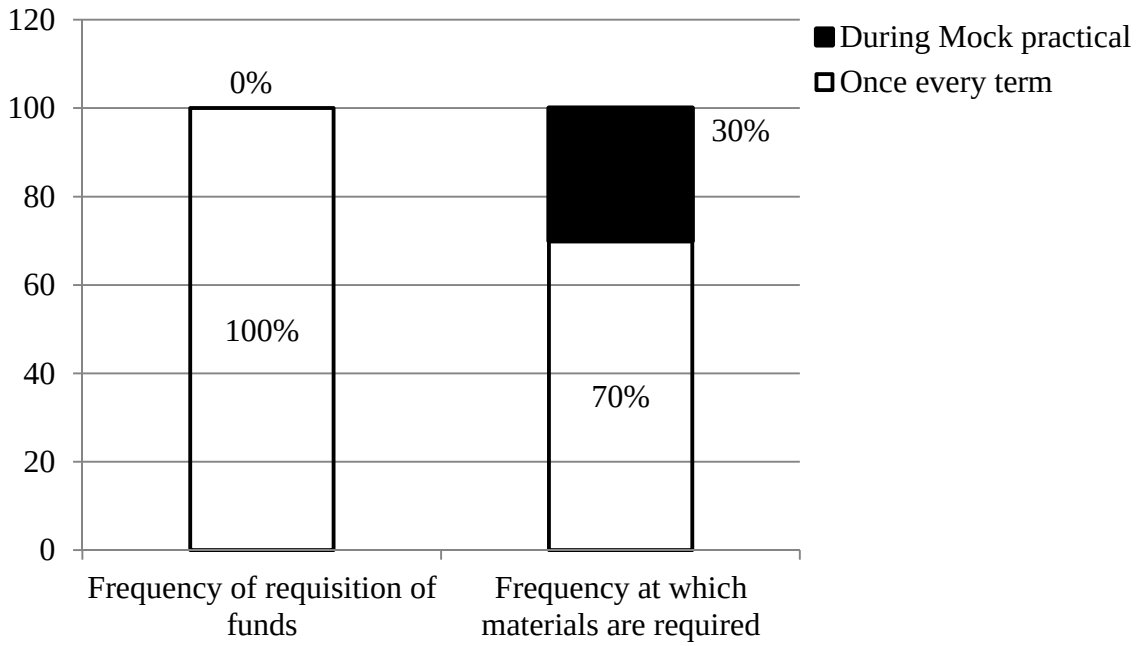

Figure 3: Frequency of requisition for agriculture materials

From Figure 4, the questionnaire seeks to find out whether the time between requisition and release of funds for agriculture practical teaching is too long, and the responses were that majority of the respondents (70.0%) agreed whereas 30 % of the respondents indicated disagree.

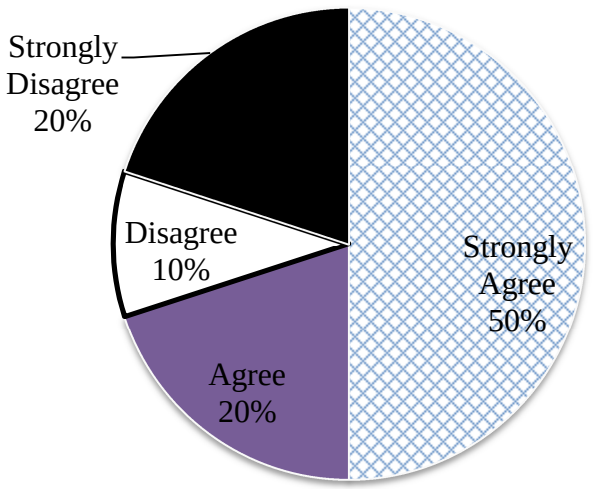

Figure 4: Time between requisition and the release of funds for Practical Agricultural

From Table 9, the questionnaire seeks to discover the major reason for the inadequacy of materials for agriculture practical. None of the respondents indicated that the "materials were expensive" and also due to unfair allocation of funds within the school. All respondents unanimously indicated "lack of funds" as the major cause of inadequate materials.

Table 9: Major reason for the inadequacy of materials for Practical Agricultural

Responses	Frequency	Percentage
Lack of funds	10	100

Source: Field Survey Data, 2015.

4.5 The techniques used in teaching practical Agricultural Science

In Table 10, the question relating to the methods used by respondents in teaching practical agriculture revealed that 50% of the respondents indicated that they used field trips, demonstration and discussion, 50% indicated that they used the hand-on-experience method. Dotse (1994) suggest that it is not always easy to define good teaching practice. Teachers may appear to be well organized and efficient but this in itself will not guarantee that pupil learns. Teaching and learning are complex processes that are subject to many social, cultural and economic influences.

Table 9: Teaching techniques adopted in teaching practical agriculture

Responses	Frequency	Percentage
Field trips	5	50
Demonstration	5	50
Hand-on-experience	4	40
Discussion	5	50
Total	10	100

Source: Field Survey Data, 2015.

Teachers cited several reasons for their choice of teaching method. Among them 20% indicated that their choice of teaching method was due to inadequate funds. For effective teaching and learning is the reason 40% of the respondents choose a particular teaching method. 40% of the respondents choose teaching method that seeks to ensure that students see and practice the concept.

4.6 Community Attitude towards teaching and learning of practical agriculture

With the attitude of the community, Table 11 revealed that when the respondents were asked whether the community helped provide land, 20% of the respondents agreed, whereas 80% also indicated disagreed. Moreover, as to whether they misuse the school farm and also steal from the school farm, 10% of the respondents indicated agree whereas a large number of the respondents representing 90% indicated disagree. In addition, as to whether the community

support financially 20% of the respondents indicated agree whereas majority of the respondents representing 80% indicated disagree. Finally, when asked whether the community helped to provide other equipment 20% agreed, but large number representing 80% disagree.

Table 10.Assessment of community attitude to School's Practical Agriculture

Statement	SA	A	SD	D	Total
	n (%)	n (%)	n (%)	n (%)	n (%)
They help provide land	2 (20.0)	------	4 (40.0)	4 (40.0)	10 (100.0)
They misuse the school farm	-----	2 (20.0)	5 (50.0)	3 (30.0)	10 (100.0)
They steal from the school farm	-----	1 (10.0)	5 (50.0)	4 (40.0)	10 (100.0)
They support financially	-----	2 (20.0)	4 (40.0)	4 (40.0)	10 (100.0)
They help provide other equipment	2(20.0)	------	4 (40.0)	4 (40.0)	10 (100.0)

Source: Field Survey Data, 2015.

4.7 Interview Schedule for the Views of Head teachers and Agricultural Teachers

The respondents were asked whether in their opinion there were available funds to conduct agricultural practical in their school. They responded that the funds were not adequate to conduct agricultural practicals for the fact that funds do not come from anywhere except the amount charged as part of the school fees and student dues. This challenge does not make it possible to conduct practical agriculture in many of the schools. The teachers also responded that they do not conduct practicals in all areas of agriculture as some area requires the use of materials which were not available. Lack of good maintenance culture does not also permit the use of such materials.The study also revealed that some schools organized field trips, demonstrations and exhibitions but quite a number do not because funds were not enough to organize these activities. It was also revealed that time allocated for teaching of agriculture science was not enough and also indicated that availability of land also affects the teaching and learning of agriculture science. The school authority also attributed some of the causes to the community. They believed that the support from the community in terms of funds and materials were actually not forth coming.

CHARPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the study

The purposeof this study was to assess factors affecting the teaching and learning of agriculture science in Senior High Schools in the Sagnarigu District. The study also examined the attitude of both community and students toward Agricultural Science.

The study was guided by research questions such as:

1. What are materials available for teaching and learning of practical Agricultural Science?
2. What are funds available to purchase materials for effective taching and learning of practical Agricultural Science?
3. What are the teaching techniques commonly adopted in teaching practical Agricultural Science?
4. What are students' attitude and observations concerning their practical Agriculture Sessions?
5. What is the attitude of the community towards the study of practical Agricultural Science?

The literature review covered issues such as the meaning of practical Agriculture Science, teaching and learning of Agricultural Science, factors that influence teaching, contextual summary of factors that hinder practical Agricultural Science, challenges in practical Agriculture Science, the role of teachers in the teaching service, teaching techniques and strategies. Descriptive

survey was the research design that was used for the study.A questionnaire was used to gather data from the respondents and interview schedule was used to support the questionnaire. The main respondents were students and teachers of Agricultural Science who were purposefully selected for the study.

5.2.1 Summary of the Major Findings

The study showed that ninety-one point two percent of parents were actually in support of the idea of their children studing agriculture. It was also revealed that some schools organized field trips and demonstrations but some quite number do not, because they were not enough funds to organize these activities.This confirm the findings made by Darko,Offie-Ansah,Shougi and Jun-Ping,(2015),which revealed that frequent use of lecture method in teaching, inadequate teaching and learning materials and availability and dificulty in planning field trips were the challengies to effective teaching and learning of Agricultural Science in the Senior High Schools.The results also agreed with the study conducted by Wootoyidde(2010) who stated that among selected Senior High School in Rakai District in Uganda which established that funds were generally not available for Agricultural Science practicals.It further stated that even where funds were available , they were not adequate for Agricultural Science practicals. demonstration method is very effective in developing , understanding and stimulate thinking and has the ability to improve the psychomotor skills of students in agricultural science . This is in agreement with (Nwachukwu, 2011) were he said that demonstration method involves the use of materials and provides visual experience, which is usually increased in value by verbal explanation. it is characterized by certain level of

skills and practical, introducing new skills, developing understand, showing the appropriate ways of doing things, enlist the various senses of a human being and get students convinced of the teachers command of the subject and gives a real life situation of source of study as students acquire skills in real life situation using tools and material. Demonstration method is one of the effective methods applied by teachers in achieving learning in real life situations in which agricultural science is deeply into and this is because it is practically oriented and therefore requires practical interactions and applications with the use of demonstration method.The study also showed that materials were not readily available for practical activities.

It was also revealed that non- availability of funds also affects the teaching and learning of Agriculture Science. It was revealed that some teachers do not teach to students understanding due to hasty and jump-up of topics and poorly organized materials which really lead teachers avoiding questions from students.

Most teachers resort to teaching theory instead of practicals. The community, the school authority and the PTA do not really support the teaching and learning of practical agriculture. Teachers attribute some of the causes of poor practical Agricultural Science teaching to the community. The community support to the school in terms of provision of funds, materials and land was not encouraging.

The study also revealed that funds for practicals were also inadequate. This sort to suggest that, the level of attention being given to practical aspect of

Agriculture Science in the schools by school authorities learns much to be desired.

The study showed that funds were not available for crop production, animal production, demonstration plots, field trips exhibitions and mechanization.The finding is in line with the findings of Amoah (2009) who stated that common challenges facing agriculture practical lessons in developing countries include inadequate facilities, low proffessional and efficiency level of teachers,poor attitudes of teachers, poor funding,poor attitude of school administrators and parents towards agricultural education and political labses.The respondents indicated that, there were no adequate funds for the teaching and learning of practical Agriculture Science. Acquisition of equipments for teaching and learning of practical agriculture has suffered the same fate.Due to this materials and equipment were acquired once in a term instead of when they were so needed.

The time that it takes for the requisite materials to be delivered for teaching and learning of practical Agriculture Science leaves much to be desired and this affects teaching and learning. Nsa, Ikot and Udo(2013),reported that,when instructional charts, pictures, posters,farm tools are used effectively to teach students, they can perform better than those taught without instructional materials.These materials offered close representation of ideas and concepts.It is also in line with the findings of Abinbade (1999),who reported that,instructional materials helps students larger retention in memory.The inadequacy of funds made it difficult to use practical oriented teaching techniques such as demonstrations, field trips and hands-on-experience to

teach practical Agriculture Science. These problems therefore forced most teachers to resort to the discussion methods. Morse and Wingo (1969) have indicated that the teacher should not adopt any teaching strategy because it is convenient to him or her.

The study further revealed that most of the students studying Agriculture Science were males. This showed that females were actually less interested in studying Agricultural Science.The finding confirmed the study conducted by Shiyan and Hyan-Abia (2011) which revealed that male students attitude towards Agricultural Science subject was significantly higher than that of the female.Also, Soboyejo, (2007) observed that male students have a little more positive attitude than the female students towards science. Most of the students indicated that the way their teachers teach was acceptable.This is in line with the findings of Pollard and Trigg (1997) who stressed upon the importance of talking to pupils about how they prefer to learn and about their understanding of teacher expectations. Comparatively there was no much difference in the performance in General Agriculture and other electives. Most of the agriculture teachers were had up to first degree education in Agriculture Science and therefore their level of knowledge in teaching and learning of Agriculture Science was high. Most of them also taught for more than a year.

5.3 Conclusions

The support from the support from government agency responsible for capitaion grant PTA and the community were not encouraging. The attention given to practical Agriculture Science was also not encouraging.The community rendered relatively insufficient support to the schools in terms of

provision of funds, materials or land for Agriculture Science practical activities. The teaching and learning of practical Agriculture Science was also affected by the unsupportive attitude of parents. Teaching and learning of practical Agriculture Science in the schools are facing challenges. These include:

- Inadequete funds and materials for practical Agricultural Science. Time associated with quality teaching and learning of practical Agriculture Science.
- Time associated with quality teaching and learning of practical Agriculture Science.

The time allocated for Agriculture Science is not enough. The non-availability of funds and the relevant tools makes it difficult to use the appropriate techniques for teaching the subject and reduced the number and frequency of demonstration, field trips and other hands-on-exerces.These problems therefore forced most teachers to resort theoretical discussions and lectures.

5.4 Recommendations

5.4.1 Recommended Practice

The study therefore made the following recommendations.

1. The Ghana Education Service should work through PTA sessions to educate parents of Agricultural Science students on the importance of learning Agriculture Science to the individual, community and to larger extent, the nation.

2. The school authority should make mterials available for effective teaching and learning of practical Agricultural Science.
3. School authorities should quota available funds purposely for the teaching and learning of Agricultural Science in their schools.
4. The school authority should build good relationship with the community leaders to see the need to allocate land for agriculture practicals or school farming.
5. Additional funds should be sourced through PTAs, NGOs and other philanthropists to support the teaching and learning of practical Agricultural Science in schools. Sadker. M.P. and Sadker. D.N. (1991), Teachers. Schools apd Society. New York; McGraw- HiU, Inc.
6. Students must be educated by teachers to understand careers available for them to exploit in agriculture so as to encourage the teaching and learning of the subject.

5.4.2 Recommendation for Further Studies

This study was to assess factors affecting quality teaching and learning of practical Agricultural Science in Senior High Schools in Sagnarigu

District.A further study could be organized to look into improving the teaching and learning of Agricultural Science in the Senior High Schools.

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APPENDICES

Appendix A: Questionnaire for students.

This study is being conducted on challenges to effective teaching and learning of practical agriculture a case study in Senior High Schools in the Sagnarigu District in the Northern-Region of Ghana.

Kindly complete this questionnaire as frankly as possible. You are assured that your identity and responses will be treated confidentially.

Thank you.

Kindly, read the questions and respond to these items as accurately as possible.

A. Personal Data.

Place a tick against your answers.

A. 1. Sex

Male [ ]

Female[ ]

2. Age

a) Below 16 years [ ]

b) 16-18years [ ]

c) 19-20 years [ ]

d) Over 20 years [ ]

3. Do you always like it when its time for practical agriculture? Yes [ ]

No [ ]

If no why?

.....

4. Do your parents like the idea of you studying practical agriculture? Yes [ ] No [ ]

5. Do you like how your teacher teaches? Yes [ ] No [ ]

If no why?

.....

.....

4. What are the sources of funds for agriculture in your school?

a) Special development funds [ ]

b) Capitation grants and school fees [ ]

c) P.T.A. funds [ ]

d) Others (specify).....

5. Indicate using a tick in the column to correspond to your response, the level of availability of funds to conduct agriculture practical.

Item	Available	Not Available
Crop production		
Animal production		
Mechanization		
Field trips		
Demonstration plots		
Exhibitions		

General Agriculture is allocated six periods of 40 minutes each per week, of the six periods three should be devoted to practical work and the other three to the

Appendix B: Questionnaire for Agricultural Science Teachers.

This study is being conducted on challenges to effective teaching and learning of practical agriculture a case study in Senior High School in the Sagnarigu District in the Northern Region of Ghana.

Kindly complete this questionnaire as frankly as possible. You are assured that identity and responses will be treated confidentially.

Thank you.

Please, kindly read the following questionnaire and respond to each and every item honestly.

Personal Data

Put a tick against your answer.

1. What is your highest qualification as an agriculture teacher?

a) Degree [ ]

b) Diploma [ ]

c) Certificate [ ]

d) Others specify.....

2. How long have you taught agriculture since you qualified?

a) Below 1 year [ ]

b) 1-3 years [ ]

c) 4-5 years [ ]

d) Over 5 years [ ]

3. Put a tick in the column to correspond to your response the availability of funds to purchase the following agricultural materials.

Item	Adequate	Not Adequate
Tools to implement and machines		
Purchase of animal drugs for animals		
Demonstration plots		
Field trips		

4. Farm Mechanization.

Item	Available	Not Available
Four-wheel tractor		

Plough Trailer Secateurs Winnowers Ox-plough Rigger Spades Old engines parts		

5. How often do you make requisition for agriculture materials?

a) Daily [ ]

b) Weekly [ ]

c) Monthly [ ]

d) Once a term [ ]

e) Never [ ]

6. How often do you acquire materialsyour requisition for agriculture practicals.

a) Daily [ ]

b) Weekly [ ]

c) Once Monthly [ ]

d) Once a term [ ]

e) Never [ ]

7. The time between requisition and the release of funds for agriculture practical teaching too long.

a) Strongly agree [ ]

b) Agree [ ]

c) Strongly disagree [ ]

d) Disagree [ ]

8. What is the major reason for the inadequacy of materials for agriculture practicals?

a) Materials are expensive [ ]

b) Unfair location of funds within the school [ ]

c) Lack of funds [ ]

d) Distance from the source [ ]

9. Which of the following method do you use in teaching practical agriculture?

a) Field trips [ ]

b) Demonstration [ ]

c) Hands-on experience [ ]

d) Discussion [ ]

10. Why do you use the method in item 9?

.....

.....

11. Attitude of the community.

Statement	SA	A	SD	D
They help provide land They misuse the school farm				

They steal from the school farm They support financially They help provide other equipment				

Appendix C: ***Interview schedule for views of head teachers.***

This study is being conducted on challenges to effective teaching and learning of practical agriculture a case study in Senior High School in the Sagnarigu District in the Northern Region of Ghana.

Kindly complete this questionnaire as frankly as possible. You are assured that identify and responses will be treated confidentially.

Thank you.

1. In your opinion are the funds given to the agriculture department enough to conduct agriculture practical in your school?
2. Do you conduct practical agriculture in all areas of agriculture?
3. If no, what areas of agriculture are practical mainly done and why?
4. What do you do for areas where you cannot perform practicals?
5. Does your school organize field trips and exhibitions?
6. If so, how are the field trips and exhibitions funded?
7. Are funds for agriculture practical release in time?
8. If no, what are the reasons for not releasing the funds in time?
9. In your opinion what may be the major reason for the inadequacy of materials for agricultural practicals?
10. Do you think there are other problems preventing teachers from demonstrating agricultural practicals and skills to students?
11. Is your agricultural department adequately facilitated? If no why?
12. How would you describe the attitude of the community towards the teaching and learning of practical agriculture?