UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE.

SCHOOL OF GRADUATES STUDIES

FACULTY OF EDUCATION

ENHANCING SENIOR HIGH SCHOOL STUDENTS' PERFORMANCE IN AGRICULTURAL SCIENCE USING ACTIVITY-BASED TEACHING STRATEGY AT BEPOSO SENIOR HIGH SCHOOL, BOSOMTWE DISTRICT, GHANA.

BY

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DECLARATION

I, Manu Isaac, hereby declare that except references to other research's work or authors work, which have been duly cited and acknowledged, this thesis, is the result of my own work and that neither in whole or in any part has been presented for another degree in the University or elsewhere.

STUDENT'S SIGNATURE: …… DATE……

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SUPERVISOR'S DECLARATION

I, Rev. Fr. Dr. Thomas Asante hereby declare that the preparation and presentation of this thesis was supervised by me in accordance with the guideline on supervision of thesis laid down by the University for Development Studies.

SUPERVISOR'S SIGNATURE: …… DATE……...

SUPERVISOR'S NAME: Rev. Fr. Dr. THOMAS ASANTE

ABSTRACT

The study investigated the use of Activity-Based method of teaching to enhance the academic performance and retention in Agricultural Science concepts among Senior High school students. A total of 100 respondents comprising of 94 Senior High School form two Agricultural Science students and 6 Agricultural Science teachers of Beposo Senior High School in the Bosomtwe District in the Ashanti Region were purposely selected for the study. The main objectives of the study were to assess the effectiveness of the Activity-Based teaching approach on students' academic achievement in Agriculture, raise the level of students' performance in Agricultural science and examine the extent to which Activity-Based teaching Strategy could enhance students' retention of Agricultural Science knowledge. The research instruments used for the study were observations, questionnaires, pre-test and post-tests. Two major research questions guided the study. The students were engaged in nine activities particularly the soil science aspect after which a post-tests were organized. Analysis of the data collected revealed that students performed better in the post-tests than the pre-test. On the basis of the findings, some recommendations were made, one of which is that Agriculture is a science subject and therefore its teaching should not only be limited in the classrooms alone but aspects and activities that need to be done in the field and in the laboratory should be done there in order to enhance students' performance in the course.

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DEDICATION

This research is dedicated to my lovely wife, Grace Ama Kwartemaa, my three sons- Nathanael Attakora Manu, Adom Yeboah Manu and Darkwa Nyamebeye Manu - to Desmond Nyarko and finally to all 2015/2016 Med Agric Students.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

ACRONYMS

ASAT-	Agricultural Science Achievement Test
GES-	Ghana Education Service
SBA-	School Based Assessment
SHS-	Senior High School
WAEC-	West African Examination Council
WASSCE-	West African Senior Secondary Certificate Examination
UNESCO	United Nation Educational, Scientific and Cultural Organization
UDS-	University for Development Studies

CHAPTER ONE

1.0. Introduction

This chapter includes the background of the study, perceived problem, problem diagnosis, problem statement, Purpose of the study, objectives of the study, research questions and significance of the study.

1.1 Background of the Study

Agriculture from ancient times has been one of the major occupations in the world. According to Nova (1996), from a global perspective, civilization began with agriculture, when our nomadic ancestors began to settle and grow their own food, human society was forever changed. Knowledge, arts and technology improved and villages, towns and cities also began to flourish through agriculture. The role that agriculture play in terms of world food supplies, hunger alleviation, economic development and provision of employment cannot be overemphasize. Agriculture sector continues to be the most dominant provider of employment and remains crucial for economic growth in the Sub-Saharan Africa. Therefore, agriculture can be considered to be the pillar for human survival and hence the importance of agriculture being taught at all levels of education. (Kabuigi, 2013).

Agriculture is taught as a course at secondary school levels as either a compulsory or as an optional subject in many countries in Sub-Saharan Africa. It is a course of study in which many areas must be learned .In Ghana, agricultural science is one of the aspects in the Integrated Science subject and it is offered as core by all students in the Junior

and Senior Secondary School levels. As an optional subject, it is offered at the Senior Secondary School level in particular where students who opt for Agricultural science as a major course of study can choose from two of the following subjects: General Agriculture, Crop Husbandry and Horticulture, Animal Husbandry, Fisheries and Forestry and two pure science subjects namely Chemistry, Physics and Mathematics. Learners are taught agriculture at the secondary school level to develop self-reliance in agriculture, to demonstrate that farming is a dignified and profitable occupation and to enhance skills needed to carrying out agricultural policies (Kabuigi, 2013). This is to develop occupational outlook in agriculture and enable schools to take an active part in national development through agricultural activities (Vandenbosch, 2006). Thus, it has been given importance comparable to that of other examinable subjects in the senior secondary school curriculum. The objectives of the secondary school education are aimed at preparing students to make a positive contribution to the development of society and acquire knowledge, skills and attitudes for the development of self and the nation (Mwira, 2002). Education has the potential to empower people, by enhancing their self-confidence, building their capacity to improve their livelihoods and their participation in wider process of social and economic change.

In line with government policy in Ghana, the Ministry of Education has the responsibility to review agricultural education to ensure the development of well-trained agricultural work-force including managers and specialists of various kind. There is therefore the need for a broad-based training in agriculture to equip agricultural students scientifically, vocational and technical competencies to enable them fit into various sectors of agriculture. The agriculture training offered at the SHS

level particularly in the study of General Agriculture, lays foundation for further work in agriculture at the tertiary level (Addo-Quaye et al., 1993). Ghana Education Service (GES) is the institution that is mandated to ensure that the subject is properly taught in Schools for this rational to be achieved.

The Rational for offering agriculture to secondary school students counter the apparent negative attitude to farming by many secondary school students, whose occupational choices are often limited, and thus exposing them to the knowledge and skills that they would require in agricultural production, should they choose to become farmers (Abalu, 2001). It is important that aspects of agriculture science like understanding of basic scientific concepts, problem solving based on observed phenomenon require a good understanding as well as explanatory and problem solving ability of student concerned (Darko et al., 2015).

The teaching of this subject requires the strategy that would enhance students understanding so that their academic achievement can be improved. Thus, in the teaching and learning of this course, students must fully get involved in order to grab the basic concepts and skills that would be needed for further studies or personnel development. It is therefore prudent for agriculture science teacher to use instructional method that would get students involved throughout the teaching learning process. Activity –Based teaching approach is one of the instructional methods that get students involved in the course of study. Activity –Based teaching strategy is a method that enables students to learn with the same vigor that marks their natural activity (Inekwe, 2002). This study investigates the use of Activity-Based strategy to improve the performance of Agricultural Science in the soil science aspect among Senior High

School Students at Beposo Senior High School in the Bosomtwe District in the Ashanti Region.

1.2 Perceived Problem

The General Agriculture subject at the Senior High School (SHS) level is divided into aspects which are leant by student. The aspects are introduction to Agriculture, Mechanization, Soil Science, Crop and Animal production and Agriculture Economics and Extension. If a student performs poorly in one aspect, it would lead to poor total performance in the subject. Of these aspects, the soil aspect is the one that requires activities most and therefore students do not perform well because it is perceived as difficult. Therefore, the overall total performance by students in the subject is always not good.

Performance in the subject revealed by literature is very disappointing. Every year Students do not perform completely well as expected of them. According to the May/June 2011 West African Senior School Certificate Examination (WASSCE) General Resume of Chief Examiners' reports, candidates were not able to answer most of the questions especially the soil aspect correctly which affected their performance greatly. The summary of the Chief Examiners report on the weaknesses of General Agriculture subject indicated that Candidates' observation of specimen were inaccurate in certain areas. The main weakness of the candidates in agricultural subjects such as General Agriculture were:

i. Candidates failed to critically observe the external features of specimens and used them to answer the questions

ii. Poor understanding of agricultural terminologies;

iii. Poor mathematical skills.

iv. Poor Candidates' performance in soil aspect.

Again in questions 1a, 2c, 3c, 4a, b and c, and 10c in General Agriculture, the report stated emphatically that candidates' performances were poor and only few candidates were able to provide correct responses to these questions. The same applied to the previous year's performances in Agriculture subjects.

1.3 Problem Diagnose

A careful observation of student's performances in General Agriculture among form two students in Beposo Senior High School revealed that there was a problem with regards to their performance in the subject. Below is the performance of form two students who took examinations in General Agriculture for five consecutive times at Beposo SHS.

Table 1.0. Statistics of performance in General Agriculture test among form two students.

Type of Test	No. of Students	No. Passed	% Passed	No. Failed	% Failed
Class test 1	47	20	42.56	27	57.44
Class test 2	47	18	38.30	29	61.70
Term1 test	47	21	44.68	26	55.32
Class test 3	47	20	42.56	27	57.44
Term 2 test	46	19	41.30	27	58.70

Source: field work, 2017

An interview with the students about their poor performance in the soil science aspect revealed that they do not understand the basic concepts that they are taught because of lack of practical activities which would help them get proper understanding.

A research done by Azwifarwi (2004) in the three districts in the Limpopo district in South Africa showed that out of 145 number of students who took final examination in agricultural science, a whooping number of students fell below the pass mark. 53 students scored between 0-25%, 43 students scored between 26-39%, 27 students scored between 40-49%, 19 students scored between 50-59%, 3 students scored between 60-69% and no students scored mark above 70%. The poor performance is evident from the fact that no student achieved a result of 70% or more.

A number of factors account for poor performance of students in agricultural science. Agricultural science is a practical subject and most of the concepts needs to be

demonstrated and done practically but most often teaching of the subject is based on theory. According to Azwifarwi, theory and practical must go hand in hand so that the gap between theory and practice can be bridged to help students understand the subject matter very well so that students' performance can be better. Ornestein (1992) opined that practical activities enhanced more understanding of subject matter. True knowledge of teaching is achieved by practice and experience in the agricultural classroom laboratory. The teaching of agricultural science theoretically without practice account for the poor performance by students. Eisner (1983) said that if there is too much theoretical teaching on the aspects that needs practical activities and fail to do, there is a problem. Lack of practical activity -based approach give rise to limited scientific basis of teaching which at the end result in abysmal performance of students.

Agricultural science teachers in secondary schools are not able to apply the practical skills in a classroom and this give rise to poor performance in agriculture (Barron and Orwig, 1995). Study have revealed that if teachers have problems on the subject matter itself, it become worse on the part of the learners. Teaching must move from being teacher centered to student centered so that discovery learning by students can be instilled.

The unavailability and distribution of reference materials including agricultural textbooks in schools also account for the inability of students to perform well in agriculture. Again the poor performance in agricultural science could be attributed to the fact that learners are not aware of their weakness or poor performance in the subject. They estimate higher scores for themselves during examinations which at the

end become unrealistic. The possible poor performance by students could, if we are aware of it, be used to motivate learners towards more input and harder work.

This research which focus on the use of Activity–Based method of teaching would help students improve their performance and retention of knowledge in General Agriculture.

1.4 Problem Statement

Lecture method has failed educators as an effective tool to present information to students (Halpern, 2000). In the case of public school such as Beposo Senior High School, the best method for teaching Agriculture is often not economically feasible. Nevertheless, the teaching resume that best suit students such as Activity–Based approach that would make students show interest in Agriculture and enhance their knowledge retention and higher performance may not be available to the teacher.

Therefore teachers must find the suitable methods to teach the students in order to determine the best practices for classroom delivery and minimize achievement loss, using the resources available to them (Williams and McClure, 2010). Agriculture science is to be taught and practiced in a practical way but teachers give no room for students to practice partly due to hurry to complete the bulky syllabus within the stipulated three year period required for the students to write the WASSCE. This affects students' performance in the course. According to Mari (2008), the use of activity makes learners learning centered, give students opportunity to make plausible hypothesis and test them to generate ideas, which are expected in their own language. Lecture method is viewed by majority of science educators as inadequate in promoting meaningful learning among all categories of learners (Bichi, 2002).

Despite the importance of Agriculture, there is evidence that the number of students taking Agriculture is low (Kabuigi, 2013). This, he said can be contributed to institutional and non-institutional challenges. Lack of financial resources hinder the expansion of facilities which lead to specific problems in vocational subject like agriculture (UNESCO, 1999). This factors contribute to the rampant use of traditional lecture method resulting in low performance of students in Agriculture in terms of their academic achievement. It is upon this background that this study aimed at using an Activity-Based teaching strategy to enhance students' performance in agricultural science particularly the soil science aspect.

1.5 Purpose of the Study

The purpose of the study is to enhance the performance of students in Agricultural Science in the Senior High School using Activity-Based teaching method. Students would be engaged in activities particularly the soil science aspect both in the field and in the laboratory.

1.6 Objectives of the Study

The concern of the study is to improve the performance of agricultural science among senior high school students through Activity-Based teaching approach. Specifically, the objectives of the study are to:

(1) Assess the effectiveness of the Activity-Based teaching approach on students' academic achievement in Agriculture.

(2) Raise the level of students' performance in Agricultural Science.

(3) Examine the extent to which Activity-Based teaching method would enhance students' retention of Agricultural Science knowledge.

1.7 Research questions.

1. What is the effect of Activity-Based teaching approach on Students' academic performance in Agriculture?.
2. What is the rate of students' retention in agricultural science when students are taught using Activity-Based teaching method?.

1.8. Significance of the Study

Several methods of teaching agriculture in senior High Schools has been emanated recently. The ideal method is the one that would not be teacher centered but rather students' centered. This study is trusted to bring an interest of agricultural science particularly the soil science aspect among learners and also teachers teaching the subject. It may be helpful in the evaluation of teaching and learning of Agriculture thus, helping in putting in place the strategies aimed at improving the learning of the subject particularly in the aspects that requires field and laboratory settings. Again, the ministry of Education may use the findings of the study to design training courses for teachers of Agriculture. It is also hopeful that curriculum developers may find it useful for curricular/syllabi development, according to the country's needs in the labour market and entrepreneurship.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Analysis

The study adopts Mitzel's (1969) model concepts: The presage, context, process and product variables. Presage variable relates teacher experiences and preparedness towards lesson delivery.

Context variables are independent variables that show learners attitude and motivation as well as school and classroom environment.

Process variables are dependent variables teaching activities in the classroom, interaction between the teachers and learners. Smith, Kistler, Williams & Baker (2004) reported that all activities within the classrooms are considered process variables.

Product variables are also dependent variables that involves students' knowledge and skills gained and attitudes modified. They are variables associated with the effect of instruction (Mitzel 1969). This study was intended to adopt Mitzel's model and used the process variables which is the activities done to enhanced students' performance in Agricultural Science.

2.2 Theoretical Framework of the Study

This chapter makes use of the ideas from different sources to inform the decision regarding the area under investigation. With that, corrections between the study and the existing theories can be made which would enhance better understanding on the issues surrounding the study, thus, making it necessary to working towards the improvement of the students' performance at the secondary school level. Theories that provide the

framework of the write-up as understood and employed by various scholars as well as the concepts relevant to the subject matter were looked at.

Literature under the following sub-headings were therefore reviewed:

- Meaning and Scope of Agricultural Education
- The role of Agricultural Education
- Curriculum of Agricultural Education
- Instructional Strategies of Agricultural Education Teaching
- Agricultural Facilities and Equipment in the Classroom and Laboratories
- Techniques and Forms of Assessment Used in Agricultural Science Education
- Implications of the reviewed literature to the present study

2.3.1 Meaning and Scope of Agricultural Education

Agriculture education is instruction about crop production, livestock management, soil and water conservation and various other aspects of agriculture (Schuttzz, Wiekert, Howard and Dickson 2008). Agriculture education also includes instruction in food education, such as nutrition which improves the quality of life for all people by helping farmers increase production, conserve resources and provide nutritious food. It is an aspect of general education which applies the principle and practice of agriculture to prepare the youth for farming and related occupations (Ministry of Education, 1993). Agricultural education is the teaching of Agriculture, Natural Resources, Land management through hands on experience and guidance to prepare students for entry level jobs or to further education to prepare them for advanced agricultural jobs.

Agricultural education covers four main areas: General Agricultural Education, Vocational Agricultural Education, Certificate Agricultural Education and Professional Agricultural Education.

2.3.2 General Agricultural Education

This type of agricultural education aims at broadening the minds of students in getting them to acquire some knowledge of simple agricultural practices (Ministry of education, 1993). It starts from junior secondary school through senior secondary school and to the tertiary level. It is designed to serve students who wish to pursue agricultural education in the broad area of Agriculture. Students who are enrolled in general agricultural education have the opportunity to explore various career options available to them in agriculture before selecting a major. It provides a broad based program in agriculture for students who wish to have a diversified programme of study that emphasizes several agricultural disciplines, (www.ndsu.edu.).

2.3.3 Vocational Agricultural Education

Vocational agricultural education encompasses farming and agro-allied business organizations including others involved in services and sales in agriculture (Okorie, 2001). The purpose of vocational Agricultural education is to educate present and prospective farmers for proficiency in farming (Phipps, 1963). He opines that such education provides systematic instruction in agriculture of less than college grade in the public schools for those persons who have entered upon, or who are preparing to enter upon, the work of the farm or the farm home. Vocational agriculture equips recipients with desirable skills and knowledge in order to excel in the production face of

agriculture**.** Vocational Agriculture trains people who would either go out as farmers or would work as skilled hands in the technical grades of agricultural employment. (Ministry of Education, 1993). One aspect of vocational agricultural education course is an experience programme. Experience programme in vocational agriculture is where student are offered the opportunity to undertake projects to learn approved practices, practical and managerial skills in agriculture under the supervision of agricultural science teacher and adult farmers (Ministry of Education, 1993). Here, there are established farms where students' are normally sent so that they can learn certain skills that are not found in the school or home farms. Vocational agricultural students initiate the project they want to undertake by liaising with teachers and parents to get approval if the project is to be undertaken on the home farm. Projects are planned by the students, secure inputs and implements themselves all under supervision. The following are the advantages of experience programmes in vocational agriculture listed by Ministry of Education, (1993).

- Experience programmes help students to apply theory learnt in the classroom in practical field situations so that they can acquire practical skills and managerial abilities.
- Students learn to cooperate with one another by engaging in groups in their youth clubs.
- Student learn and develop the ability to save and use money properly.
- Students become less dependent on guardians for support since some of the experience programme can help them to earn money.

- Learners become more confident as farmers, and can practice agriculture with confidence as their experiences increase.
- Students learn to participate in the politics of their country through agricultural clubs. This help the students to grow up as mature persons to play useful roles in the development of their nation.

2.3.4. Certificate Agricultural Education

This type of Agricultural education trains students and equips them with knowledge of the theory and practice of agriculture so that they can eventually be employed in intermediate positions in the fields of research, production and extension (Ministry of education, 1993). Certificate Agricultural Education provides students a broad experience to all types of agriculture; an internship experience is also included to provide students with practical knowledge and skills. Certificates obtained from this type of agricultural education can also be used for obtaining admissions to higher institutions of learning.

2.3.5 Professional Agricultural Education

Professional Agricultural Education provide courses in Agriculture that produce University graduates and other qualified technicians of equivalent status for appointments to administrative and research posts (Ministry of education, 1993).

Any of these agricultural education programmes require some amount of practical training in proportion to the time spent in theoretical training. As part of the overall educational programme, agricultural education is designed to provide students with the

competencies to make them aware of and prepare for the world of work. Therefore, aside all the classroom and laboratory work, one needs to link this learning with actual field operations and practical training in order to instill confidence in him or herself when it comes to putting what has been learnt into practice.

2.4. The Role of Agricultural Education.

The role that Agricultural education play cannot be overemphasize. Agricultural education prepares people for entry and advancement in agricultural occupations and professions (Phipps, Osborne, Dyer& Ball, 1988). According to them, agricultural education includes occupational or career awareness, exploration, orientation and preparation depending upon the age of the students enrolled. Again, agricultural education also purposed for job creation, entrepreneurship and agricultural literacy (Phipps, Osborne, Dyer& Ball, 1988). After successful graduation in agricultural education, people find jobs or become entrepreneur in the field of agriculture such as crop production, animal rearing, and establishment of agribusinesses, among others. According to Phipps, Osborne, Dyer& Ball (1988), agricultural education in the secondary schools also play an important role in enhancing students' achievement in the core subject areas, particularly science. They opined that the mission of agricultural education is career development, science education as well as leadership development.

2.5 Curriculum of Agricultural Education

Curriculum is the formal and informal contents and processes by which learners gain knowledge and understanding, develop skills and alter attitudes, appreciation and values under auspices of the school to enable the learner to increase his or her control

of knowledge and experiences (Tanner and Tanner, 1980). The curriculum development process systematically organizes what will be taught, who will be taught and how it will be taught. Each of the components affects and interacts with other components. For example what will be taught is affected by who will be taught (e.g., their stage of development in age, maturity and education). Agricultural education must change its curriculum, its focus, and its mission (Broyles, 2004). The new image of agricultural curriculum includes integrating academics into the curriculum. Change in the agricultural curriculum must also alter the nature of the classroom and laboratory (Colling & Farnsworth, 1969; Sledge & Bjoraker, 1980). Agriculture education has change its focus to incorporate more science into the curriculum (Stanley, 2004.). There have been changes in agricultural education that involved changes in the curriculum from the traditional curriculum area of production to a more technological and science related curriculum (Sikinyi and Martin, 2002). Change is necessary as agricultural educators strive to keep curriculum content with technological innovations. Agricultural educators must plan curricula to meet the educational needs of the students. The content of the agricultural science curriculum is based on the functional analysis of problems. Activities in a curriculum is expected to mould the character of pupils and assists in their personal development (Ovwata, 2000). Thus the content of agricultural curriculum in the senior high schools is structured in a way that, the activities would equipped students for personal job creation and other job placement.

2.6 Instructional Strategies of Agricultural Education Teaching

Agriculture education and training is special in comparison with other forms of education and training in that agriculture cannot be learned solely in the field or in the

classroom (Vandenbosch, 2006). Modern trends in teaching emphasize certain approaches which determine the strategy to use. (Kabugi, 2013). According to Kabugi Salome Waithera, the approaches include interaction approach, collaborative approach, experiential approach and facilitation approach. Interaction approach is where there is exchange of ideas between the teacher and the learner or among the learners themselves as in group work. Collaborative approach is where learners share ideas in groups or projects. Transmission approach is where the teacher dominates the lesson by the use of lectures. In experiential approach, learners' life experiences are explored and used as the basis for development of new knowledge and passing judgment. He opined that learning is based on the learners' experiences in the community. In facilitation approach, the teacher provides the stimulus for the learners' interaction with new knowledge and also provides opportunity for the learners. Here, the teacher is merely a guide and director of learning. The National Council for Agricultural Education (2000) in the United States devised a strategic plan that called for all students to have access to seamless, lifelong instruction in agriculture, food, fiber and natural resources system through a variety of delivery methods and educational settings. One of the strategic plans stated that Agricultural education instructional system and materials must be in diverse learning styles. Thus different learning strategies must be employed by the teacher in lesson delivery in agricultural science.

Teaching learning strategies are traditionally referred to as methods of teaching (Kisirikio, Wachira & Malusu, 2008). A teaching method is a plan of action designed to achieve learning programme design for a learner (Merlot, 2015). It could be a master plan or programme procedure schedule to achieve a particular objective (Aneke C.U,

2015). Methods of teaching can be categorized into Field and Non-field related teaching methods (Osinem, 2008). According to Osinem, field teaching methods include teaching carried out within or outside the school setting of which laboratory instruction is an example. Non-field teaching methods include classroom based strategies of teaching. Some of these methods include discussion, problem solving, and role play among others. Some of these instructional methods according to literature are:

2.6.1 Activity-Based Teaching Method

Activity-Based teaching is a learning method in which students are engaged in the learning processes (Prince, 2004).

Higgins (1977) defined Activity-Based learning as the learning process in which student is actively involved in doing or in seeing something done. In this method, students learn by doing. It is employed when the teacher allows students to do piece of work and they learn at the same time. In Activity –Based teaching /learning environment, the teacher is a facilitator, motivator, guide and a coach not a sage on the stage (Stolen 2009).

In Activity-Based method, the learner examines learning requirements and thinks how to solve a problem in hand. The students do not learn about the content. Rather they learn about the process to solve the problem. As they go towards the solution of the problem, they also learn about the content (Churchill 2003). Activity-Based method of teaching is applicable in subjects such as Agriculture, Home Economics, and Basic Science among others. In doing the activity, students should know the purpose before

they become interested in it. According to Enekwe (2002), Activity method of teaching enables students learn with the same vigour that marks their natural activity.

2.6.1.1 Advantages of Activity-Based Teaching Method.

The benefits of an Activity-Based method of teaching cannot be overemphasized. It is as a successful teaching model in the field of the sciences like Agricultural Science.

Learning activities if based on real life experience help learners to transform knowledge or information into their personal knowledge which they can apply in different situations (Edward, 2001). Activity method introduces some elements of joy, team spirit, respects for each other opinions and reduces abstractness in science concepts (David, 2007). With activity method of teaching agriculture, an uninteresting topic become interesting. In teaching students, the strategy that should be used should attempt to accommodate the diverse needs of the students in a class and allow for optimum learning by directly involving students in the teaching learning process. Activity-Based method addresses this concern.

Intelligence is a continuing process of adaptation and organization as the learner interacts with the physical and social environment (Piaget, 1967). He asserted that when learners are provided with adequate rich experience and activities, it enhances cognitive development and movement from one level of the domain to another.

Meaningful learning only takes place through personal involvement by the students, when it's self-initiated and the learners evaluate to see whether it leads to what they want to know or meet their needs (Bjerknes, 2002). David (2007) said the advantages of Activity-Based teaching strategy are that, it connects with real life as lived outside

school, make lesson learnt real, practical, interesting and meaningful. He opined that it frees teacher from being termed as a "talking teacher" and develops self-discipline among learners.

Activity-Based teaching also helps students to construct mental models that allow for 'higher-order' performance such as applied problem solving and transfer of information and skills (Churchill, 2003). Activity-Based teaching, if carried out in an effective manner, develop skills like Team-working, Communication, Design, Leadership, Project management, Research, Problem-solving, Reflection and Life-long learning in the learners (Khan et al., 2012). These activities, they said, if based on the real life experiences, can help students to apply the same in their practical life and hence prepare students for future life.

2.6.1.2 Enhancing Students Retention of Agricultural Science Knowledge through Activity-Based teaching.

Agriculture is an applied science. The teaching and learning of this course involves facts and figures, rules, laws, formulae, problem solving, understanding of scientific principles and concepts as well as practical demonstration of how an activity is done. Agricultural activities can be done both in the laboratory and in the field. The laboratory is an ideal environment for both active and cooperative learning (Hass 2000). Active engagement in laboratory exercises promotes a thorough understanding of the concepts described in lectures (Offei-Koranteng, 2013). According to him, further enhancement of the laboratory experience can be gained by encouraging students to interact with each other during the practical activity process. Engaging

students in activities are very important for students not only for understanding soil science but also for increasing the students' ability to solve problems.

Many agricultural science teachers use the traditional lecture method of teaching especially the soil science components which makes the students always acting as passive learners. When senior high school students are taught using activity teaching strategy, they are able to retain most of the concepts they learn because they actually get involved in the practical activity. Bichi (2002) said understanding and retention of learned items are products of meaningful learning when teaching is effective and meaningful to students. He further reported that anything that aids learning should improve retention whiles things that lead to confusion or interference of learned materials decrease the speed and efficiency of learning and accelerates forgetting.

Researcher Lagowski, (1990) on his study of student knowledge retention showed that students usually retain 10% of what they read; 26% of what they hear; 30% of what they see; 50% of what they see and hear; 70% of what they say; 90% of something they say while they are doing a task. Aneke (2012) also reported that 90% of what we use our hands to do is retained.

Dale (1969) developed learning experience cone of activity teaching on students' retention rate. It is illustrated below:

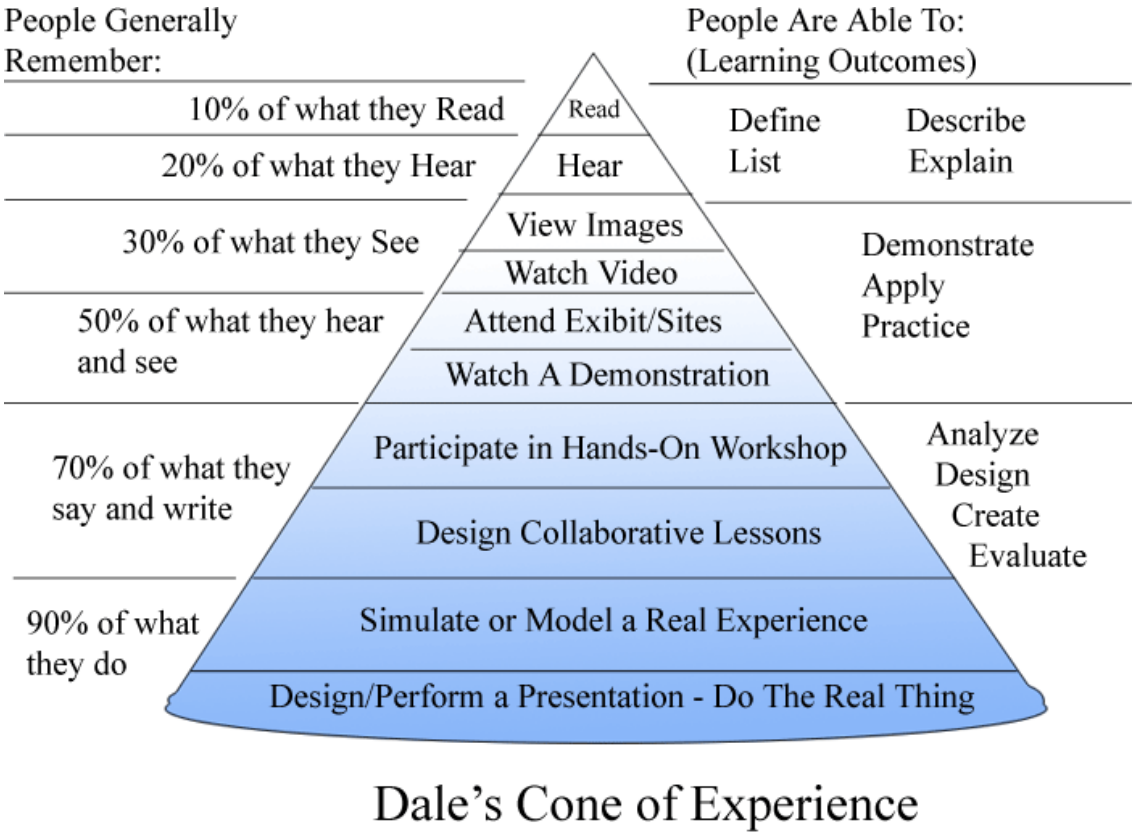


Figure 1: Source: Principles of Teaching <**http://teacherworld.com/potdale.html**>

2.6.2 Laboratory Method

The use of laboratory experience is an important tool in the overall problem-solving procedure (Phipps, 1963). Laboratory experience varies class procedure and is an effective teaching tool (Agbulu, 2004). It utilizes many senses and provides for physical activity. Laboratory experiences may be used to point out problem or find out solutions to problems. In the laboratory method, concepts and theories are carried through to their application. Students are taught hands-on skills that ensure that the skills learned are practical and usable. This hands on approach to teaching has traditionally been an agriculture teacher's preferred method of teaching (Phipps&

Osborne, 1988). Agricultural laboratories activities are learning experiences in which students interact with the materials and /or models to observe and understand the nature of agriculture and its underlying biological, physical, and social science components (Myers, 2004). These activities allow students to construct scientific knowledge, skills, and values from direct experience and the instruction is applicable to any agricultural programme, allows for practical, guided experience for students to learn and test science concepts (Wendy, 2006). Laboratory teaching approach is an experiential learning approach. Literature has proved that hands-on learning or laboratory activity is a preferred and successful method of instruction, and many agricultural teachers are teaching scientific concepts in their courses (Wendy, 2006), but how agricultural science teachers use the laboratory activities in their classroom to enhance students' performance in agricultural science especially in the soil science aspect is the question. This study seeks to use Activity-Based Teaching Strategy to enhance students' performance in soil science in agricultural science.

2.6.2.1 Benefits of using Laboratory Method in Teaching Agriculture

Laboratory settings have long been an integral component of agricultural education, and remain a crucial aspect today (Phipps, 1988). Trends in agriculture industry signal a need for agricultural education to teach scientific problem solving. Agricultural laboratories are currently understood as a means for providing students practice applications for theories taught in classroom (McCormick, 1994). Laboratory instruction is the essential link between classroom instruction and skill development (Phipps and Osborne, 1988). The emergence of scientific agricultural education may provide opportunity for the laboratories to become a keystone in the teaching of

scientific skills and problem solving. By designing laboratory instruction to focus on scientific problem solving, teachers can enhance students' experiences to prepare them more effectively for scientifically-based careers in agriculture (Parr & Edward, 2004). Agricultural laboratory activity teaching method provides students with the opportunity to develop problem-learning skills through experiential learning. According to Wendy J. Warner, Shannon Arnold, David W.W. Jones and Brain E. Myers (2006), the study they conducted revealed that agricultural laboratory activities provide multiple benefits to students including students becoming active in all the activities, an increase in cooperation and motivation among students and improved subject matter retention.

Appropriate laboratory activities can be effective in helping students construct their knowledge (Tobin, 1990; Gunstone, 1991), develop logical and inquiry-type skills, as well as problem-solving abilities. They can also assist in the development of psychomotor skills (manipulative and observational skills). In addition, they have a great potential in promoting positive attitudes and in providing students with opportunities to develop skills regarding cooperation and communication. (Offei-Koranteng, 2013).

The value of laboratory led education is not only recognized by the academic and private sector but is also highly valued by students themselves, who appreciate the opportunities, contextualization and challenges that laboratory practice offer. (Hofstein & Lunetta, 2004). Laboratory activities and experiences are crucial for science learners to comprehend concepts, acquire scientific and problem solving skills, scientific 'habits of mind' as Hofstein and Naaman (2007) stated. According to Blosser (1980) science laboratory works are the factors that contribute to student achievement. When students

are able to practice what they have learned in the laboratory, they have completed the teaching –learning cycle. Through their application students are better able to see the real meaning of theory. They have a concrete idea of relationships and better understand concepts which are interrelated (Newcomb et al., 2004). Furthermore, Farounbi (1998) also indicated that the effective use of the science laboratory may have a significant effect on students' performance.

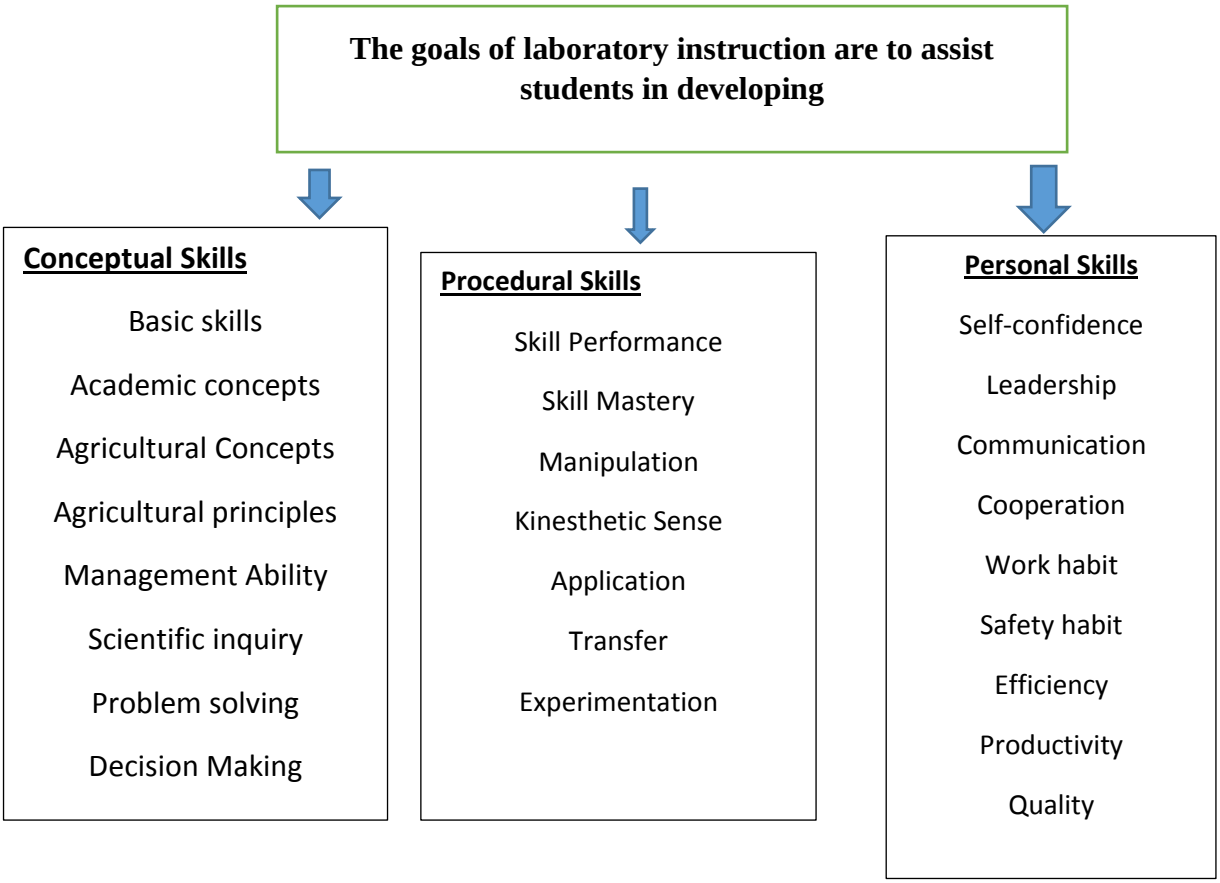
2.6.2.2 The Goals of Laboratory Instructions in Agriculture Education

Laboratory activities appear as a way to learn with understanding and, at the same time, engage in a process of constructing knowledge by doing science. (Offei-Koranteng, 2013). He went on to suggest that laboratory practical and experiences are central to science education goals; that science cannot be meaningful to students and the achievement of scientific proficiency cannot be obtained without practical experiences.

Agricultural laboratory instructions tends to develop skills that would equip students to undertake various responsibilities in the field of agriculture. The skills developed through the appropriate use of experiential learning in agricultural laboratories are diverse, yet related to theories and concepts focused on in the classroom (Shoulders & Brain E. Myers, 2012). Phipps (1963) postulated the goals of agricultural laboratory instruction as assisting students to develop conceptual skills, Procedural skills and personal skills. In the area of conceptual skills, agricultural laboratory instruction assists students to further develop the academic concepts, agricultural concepts, agricultural principles, management ability, and scientific inquiry among others. The

procedural skills according to Phipps are meant to assist students enhance their general skill performance, skill mastery, Manipulation, kinesthetic sense, application, transfer and experimentation. In the personal skills, students develop self-confidence, leadership, communication, cooperation, work habits among others. The summary of Phipps goal of laboratory instruction in agriculture is as follows:

Figure 2. Goals of Laboratory Instruction (Phipps, 1963)



While these theoretical goals are far reaching and include scientific inquiry and problem solving, instructional strategies characterized of traditional agricultural education utilize laboratories primarily to focus students' psychomotor skills necessary

for the traditional occupations in agricultural production (Broyeles, 2004, Johnson, 1989).

2.6.3 Lecture Method

This method is sometimes referred to as the 'talk and chalk method' (Ngozi, 2012). Some teachers use this method to enable them cover school syllables on time. It is characterized by the one-way-flow of information; from the teacher who is always active to the student who always remain passive throughout the teaching learning process. It is mainly teacher –centered and the learners' activity is listening and taking notes. In its true nature, the lecture method is not effective for science teaching, Abdullahi (2005) and Usman (2000). According to Abdulahi (2005), it promotes rote learning and regurgitation of information. Lecture method of teaching agriculture make students restless and disruptive since their attention span is very limited. It does not promote much meaningful learning of science as it appeals to hearing only (Ngozi, 2012).

2.6.4 Project Method

Project-Based learning has emerge to be an instructional strategy that is gaining growing interest within the engineering education community (Hadim &Esche, 2002). Duch (2002) describe project-Based learning as instructional methods that challenges students to learn how to learn, working cooperatively in groups to seek solutions to real world problems. This method is used by teachers to individualize instructions, usually it is giving to individuals or groups. Students are often required to look for topics of special interest to them and investigate solutions using projects. Sometimes students

obtain topics for the project work from available source and the teacher is supposed to guide them where necessary. Binnie (2002) noted that the use of project was very helpful in assisting the learning of students. He said their active involvement in the task forced them to think and enhanced their learning. The use of raw data of their choice motivated them because they wanted to know what conclusions they might come to. Without the project, he noted, their understanding of the process of problem solving using statistical thinking strategy outlined would have been very theoretical.

Project work approach seem to have the components to motivate teachers and students to develop cooperative work mainly aimed at the students to perceived and understand all the necessary stages needed to arrive at logical conclusion (Biajone, 2006). Project-Based learning is a systematic teaching method that engages students in learning knowledge and skills through an extended enquiry process structured around complex, authentic questions and carefully designed products and task. (Olatoya &Y. M Adekoya, 2010). According to him, research shows that learners do not only respond by giving useful information but also use actively what they know to explore, negotiate, interpreted and create. He went on to further say that education has benefitted from this teaching approach as teachers have learn to effectively select content and activities to amplify and extend the skills and capabilities of students. Project method of teaching could take students a week, month or even years. (Abdullahi, 2005).

2.4.5 Demonstration Method

In as much as many countries want their citizens to be educated, educational professionals are also seeking research supported practices that are applicable in classrooms and can facilitate student's access to the mastering of concepts in

agricultural science. Demonstration is a practical way of explaining or describing a process or an activity. Demonstration method of teaching do not only create cooperative pleasant atmosphere among students but enhance peer relations and also increase academic achievements of students. Demonstration method has been shown to be effective for both small group and large groups. The greater the degree of participation and sensory involvement by the learner the more effective learning will be. Newby, Stepich, Lehman and Russel (1996) suggested that to improve the use of demonstration method in the classroom, teacher should allow students to use several senses by allowing them to see, hear and possible experience. Also they said ideas should be presented to stimulate interest. If these precautionally methods are not taken, the use of demonstration method can limit students' participation. It is used to motivate students, teach certain skills, techniques, theory or practice. It can however be time consuming and demand a lot of materials and can also be harmful to students if carried out by them (Stanley, 2007).

2.6.6. Discovery Method

Brunner, in 1961 postulated the Discovery method of teaching science. The approach enables students to get first-hand experience in getting facts, concepts, and principles by using mental processes and manipulating scientific equipment and materials. Brunner postulated that a student who is exposed to discovery approach to learning would get the following benefits:

- There will be increase in intellectual attainment.
- Students' investigative processes become valuable.
- Discovery learning aids memory of a child.

Discovery method of learning is one of the best method of teaching that involves mental skills for learning by student to observing, measuring, classifying, and so on (James, 2001).

2.6.7. Discussion Method

An important ingredient of many teaching-learning situations is group discussion (Phipps, 1963). Discussion is a student -centered approach to teaching of agriculture in which students mute ideas or knowledge over a proposed topic. Here a group of students or a class exchange ideas about an issue or topic in agriculture. The teacher normally act as the moderator by listening to each individual student or groups. The teacher initiates the discussion by announcing the topic for the discussion. In the course of the discussion, the teacher asks challenging questions and ensures that students do not deviate from the main topic. Important points are written or recorded during the learning process. Advantages of discussion method of teaching are that students improve on their vocabulary skills and deeper understanding of method and techniques involved in discussing an issue. Also students get the opportunity to learn from each other as they exchange ideas, facts and opinions. Again, discussion instills creativity, critical and evaluative thinking among student.

2.6.8. Field Trip

This is trip or excursion taking outside the classroom for observation and obtainance of specific information (Ngozi, 2012). It is a planned visit to a place of academic interest. This is done to broaden students understanding about a topic. Thorough preparation is made before the trip, during and after the field trip. Field trip provides students the

opportunity to observe agricultural practices that cannot be demonstrated in the classroom. It also stimulates students' interest and motivates them to learn. Again, it provides students with the chance to meet and share experiences or learn from agricultural experts. Among the demerits of field trip are that, it involves a lot of risk as students are carried from their classroom to another destination on a vehicle or when students are learning around a factory where heavy machines and chemicals are likely to be around. It is also time consuming and expensive to conduct.

2.7 Agricultural Facilities and Equipment in the Classroom and Laboratories

Facilities are educational space, including the classroom and laboratories, which allows for the teaching and application of theory (Broyles, 2004). Broyles reiterated that Facilities are crucial to psychomotor teaching methods and enable students the opportunity to apply skills. Laboratory instructions are done through the use of experiments, exercises or applied projects. Agricultural facility such as laboratory provide an environment to stimulate real world applications. As agricultural education curriculum changes, the nature of facilities needed for instructions must also change. Agriscience laboratories must resemble a science laboratory (Newman & John, Vernon & Briers 1991). Although agricultural science laboratories should resemble science lab, there must be an effort to resist the temptation to integrate too much science and make sure that the courses are agricultural science rather than basic science (Vaughn, 1993). Vaughn further explained that the only means to be certain the course is agricultural science is by always using laboratory instruction and supervised experience to make instruction in agricultural science applied. Facilities are used to implement the

important hands-on element of teaching agricultural science. Lack of equipment and supplies are problems to successful agricultural education.

Most agricultural science teachers do not use laboratories due to lack of equipment and supplies. There are also lack of funds to purchase and update agricultural facilities. The quality of agricultural course is dependent to a large extent on how well the school provides the facilities to make effective learning possible. (Kunsela and Noakes, 1957). The purpose of facilities, classrooms and other learning laboratories is to provide a sound educational programme in agricultural / agribusiness (Sledge 1980). Sledge again said that modern buildings and support facilities should exist to help create a learning environment in which instructors function best. Having an adequate facility available is an important and necessary component if a quality teaching environments is provided (Bruce, 1980). Lee (1980) reported that traditional agricultural facilities have included classrooms and shops and that agricultural education must move away from the so-called traditional facility and start moving toward educational laboratories and classroom.

The availability of teaching and learning support materials is among the important determinants of the effectiveness of post-primary agricultural education and training (Vandenbosch, 2006). To achieve and sustained quality education, resources and facilities should be available in sufficient quantities. When schools are provided with adequate physical facilities, teaching-learning resources and equipment, it enhance quality learning thereby improving students' performance in various fields. Even when teachers are competent and well trained, they will often find it difficult to teach

effectively because of lack of adequate teaching and learning resources that are relevant to the local agricultural situation (Kabuigi, 2013).

2.8 Techniques and Forms of Assessment Used in Agricultural Science Education

Instruction and assessment are based on the profile dimension of the agriculture subject. Profile dimension describe the underlying behaviours for teaching, learning and assessment. The profile dimensions specified in the agricultural science subject of which teaching, learning and testing are based are Knowledge and Understanding (40%), Application of Skills (30%) and Practical Skills (30%) (Ghana Education Service, 2010). The ratio of theory to practice in agriculture is 70:40. Thus the students' cognitive, psychomotor and affective domains are assessed. The syllabus is considered a criterion to be achieved by students. The assessment procedures used in agriculture are class tests, exercises, homework, projects among others which are spelt out in the School-Based Assessment system (SBA). According to Ghana Education Service (2010), the SBA system is designed to provide an internal assessment system that would help to achieve the following purposes such as standardizing the practice of internal school- based assessment in all senior high schools in the country and providing reduced assessment tasks for subjects studied at SHS among others.

At the WASSCE level, the examination consists of three papers; paper 1 and paper 2 and paper 3. Paper 1 include the objective test and the essay test component. The objective normally consists of 50 multiple choice test items of which candidates answer all for 50 marks. The paper 2 could consists of some structured questions and essay questions. Candidates answer five essay questions from a list of 7-10 questions with each question having a sub-questions a, b, c and d for 80 marks. The paper three

consists of 4 questions and candidates are required to answer all the questions for 60 marks. The paper 2 is more intellectually demanding paper and is therefore weighted more than papers 1 and 3. To improve assessment and grading and also introduce uniformity in schools, it is recommended that schools adopt the WASSCE grading structure for assigning grades on students' test results. The structure of the WASSCE grading system for agriculture subjects are as follows:

Table 2.: WASSCE Grading System for SHS

GRADE	MARKS (%)	REMARKS
A1	80-100	Excellent
B2	70-79	Very Good
B3	60-69	Good
C4	55-59	Credit
C5	50-54	Credit
C6	45-49	Credit
D7	40-44	Pass
E8	35-39	Pass
F9	34 and below	Fail

Source: Ghana Education Service, 2010.

In the Activity-Based teaching method, the assessment technique frequently used includes written reports by students, students' performance and participation grades (Wendy, 2006).

2.9 Implications of the Reviewed Literature to the Present Study

Agriculture science teaching has been dominated by emphasis on factual knowledge although many researchers have suggested better method of teaching that would enhance students understanding. This factual knowledge teaching can be testify by examination questions by school Based Assessment system and External Exams by WAEC which depends almost exclusively on factual recall, recollection of formulae and precise definition of terms as well as description of routine experiments. Teachers continue to bombard factual information to the students which they commit to memory in order to pass their examinations. The memorization of scientific facts in agriculture result in forgetfulness and any examination which require application and synthesis of knowledge becomes difficult for students. The practical activities aspect of agricultural science are also neglected and the consequence of this is the poor performance of students in agricultural science subjects that is always contained in the WAEC Chief Examiners report every year.

Poor academic achievement and unhealthy attitudes towards agriculture has been reported by Azwifarwi, 2004. This is the result of ineffective teaching as stated earlier in the literature review. Other causes of poor academic achievement by students are inadequate practical activities, lack of teaching aids and facilities and students unawareness of their poor performance in agricultural science. As a result of these, this

study is carried out to investigate the activity-based teaching approach to enhance students understanding and performance to keep away from the predominant use of lecture method in teaching agricultural science. It is to encourage active participation of students to construct their own knowledge as to be in line with the experiential theory of teaching. In this research, Activity –Based teaching approach seem to be the method that would enable students achieve and retain material concepts so as to perform well in agricultural science, particularly the soil science component.

CHAPTER THREE

METHODOLOGY

INTRODUCTION

This chapter examines the methodology used in conducting the study. The methodology that were employed in this research include:

- Profile of the study Area
- Research design
- Population of the study
- Sample and sampling procedure
- Data type and source
- Research instruments
- Data collection procedure
- Situational Analysis (Pre-intervention, Intervention and Post-intervention)
- Analysis of the data collected
- Data quality and Ethical Issues

3.1 Profile of the Study Area

The study was carried out in the Bosomtwe District in the Ashanti Region of Ghana and lies within Latitude 6^{o} 24' South and 6^{o} 43' North and Longitudes 1^{o} 15' East and 1^{o} 46' West. It is bounded in the North by the Kumasi Metropolitan Assembly, in the East

by Ejisu-Juaben Municipal, the South by Bekwai Municipal and Bosome-Freho District and in the West by Atwima-Kwanwoma District. The District has a land size of 422.5 sq. km with a population density of 222.3 persons per sq. km. The District has 66 communities, which have been zoned into three area councils namely, Jachie, Kuntanase and Boneso (Ghana Statistical Service, 2014). The area where the study is being carried out falls within the equatorial zone with rainfall regime typical of the moist semi-deciduous forest zone of the country. There are two main rainfall seasons; the major rainfall between March and July and the Minor rainfall between September and October. The dry season spines from December to March. The district has a uniform high temperature with a mean temperature around 24^{0C} with the highest mean temperature occurring just before the major wet season in February whilst the mean minimum temperature occurring during the minor wet season. Beposo where the Senior High School is found is one of the 66 communities and within the Kuntanase zone. There are many educational institutions in the zone ranging from primary to tertiary. All the Senior high schools in the district study agriculture.

3.2 Research Design

The research design that was adopted for the study was an action research. According to Cohen and Manion (2007), action research is a small- scale intervention in functioning of the real world and a close examination of the effects of such an intervention. Ortrun, (2009) also define Action Research as a critical collaborative enquiry by reflective practitioners, being accountable and making the results of their enquiry public, self-evaluating their practice through engagement in participative problem solving and continuing with professional development. This is a type of

research which focuses on a specific problem and resulting in an action plan to solve or address the problem. Action research was chosen because of its flexibility. The cyclical nature of Action Research makes it possible to introduce change, refine the next cycle of the research based on experience and reflection (Norton, 2009). The problem that was identified by the researcher was the poor performance of students in agricultural science particularly soil physical and chemical properties. The research was based on two main research questions which were about the effects of Activity-Based teaching approach on students' academic performance in Agriculture and students interest in agricultural science when they are taught with Activity-Based method in agricultural science.

In carrying out this procedure, letter was sent to the school selected for the study to ask for permission to carry out the research work. Lesson notes and activity procedures were developed for the students. The subjects of the study were assessed using pre-test and post-tests results after a number of lessons in the class, field and laboratory activities had been done. The pre-test administered by the researcher was used to measure the performance of the students with regards to their initial knowledge in soil physical and chemical properties. After the pre-test, the students were taught using activity-based method for six weeks. After the six weeks, Post-test 1 was conducted to ascertain their achievement levels based on the learning outcomes and one month later, Post-test 11 was administered to determine their retention level.

The topics that were taught under the study were: Determination of the soil texture by Mechanical Analysis Particle Size Distribution (Soil Sedimentation) and Field methods, Determining Soil pH using Colorimetric method, Determining Water pH., Chemical

movement in Soils, Experiment to determine that Soil has a Charge, Soil Permeability and Capillarity of different types of Soils and determining the Moisture content of soils. Questionnaire consisting of four items were developed for both teachers and students after the activities. After these, there was data collection, collation and analysis.

3.3 Population of the Study

The study targeted the Agricultural Science Students and teachers in the Beposo Senior High School in the Bosomtwe District in the Ashanti Region of Ghana. This school was selected because that is where the researcher teaches. The particular class that was used for the study was form two Agricultural class. The average age of the students was 17 years.

3.4 Samples and Sampling Techniques

The sampling technique that was used for the study was purposive sampling. The target sample in the study consisted of six (6) Agricultural Science teachers and ninety four (94) form two (Form 2A and 2B) Senior High School Agricultural science students of 2015/2016 academic year from Beposo Senior High School-Beposo. There were 68 males and 26 females. All the teachers were males. The choice of form two students was based on the fact that they had been introduced to the study of Soil Uses and Management which is to be taught in the first year and second years according to the Ministry of Education (GES) Teaching Syllabus for General Agriculture (Senior High School 1-3). The students were taught through the normal classroom teaching method by the researcher. They were then taught using Activity-Based method by allowing them to perform many open ended and structured practical activities in the soil aspect.

The achievement scores of the sample were then obtained from a post-test. Throughout the studies, the topics studied were selected in conformity with the Senior High School Agricultural Science syllabus. The students did nine (9) practical activities.

3.5 Data type and Source

Data was gathered from primary sources through interviews to elicit information about the problems they encounter in the teaching and learning of General Agriculture that resulted in their poor performances during examinations. Questionnaires were also administered to students after the post-intervention strategy to find out their interest in the laboratory activities. Desktop study also enabled the researcher to get information and other necessary data from libraries and the internet for the literature review in line with the scope of the study.

Secondary data about the district was obtained from the Bosomtwe District Assembly. Data about student's performances in General Agriculture in 2011 WASSCE (Chief Examiners Report) was obtained from WAEC through the Assistant Headmaster of the school who is also Chief examiner in Agricultural Science.

3.6.0 Data Collection Instrument

The research instruments that were used were observations, interviews, questionnaires, an achievement test based on the course content, and practical activities. The questions of the achievement test was set from the course content and structured in order to achieve the stated objectives at the end of the lesson. Student academic achievements was then evaluated using the researcher-created Agriculture Achievement Assessment

Test in Soil science. The test consisted of twenty (20) multiple-choice items, three (3) compulsory essay type questions and one practical question. The practical activities were designed to measure the performance of the students.

3.6.1 Validation of Research Instrument

The content of the Agricultural Achievement Test was validated by one WAEC Examiner who has about twenty years teaching in agriculture at the Senior High School Level and Six Teachers from the school Examination Committee who were also Teachers for Science and Agriculture Department. The teachers were chosen because they help in the translation of the Agricultural Science Curriculum at the classroom level. They examined the teaching materials and the measuring instrument for the following purposes:

- Face validity.
- Appropriateness of the items in terms of reading.
- Clarity of expression in the instrument and learning materials.
- Check possibility of errors in the instrument.

The constructive criticisms and the feedback they made were used to improve upon the quality of the Agriculture Achievement Test.

3.7 Data Collection Procedure

Data were collected using the Agricultural Science Achievement Test (ASAT). ASAT were used to generate tree types of data:

i. Pre-Test Data during pre-intervention stage

ii. Post-Test I Data during Intervention stage

iii. Post -Test II Data

3.7.1 Pre-intervention Stage

The students were administered with the Agricultural Science Achievement Test (ASAT) pre-test before they were engaged in the practical activities. The test lasted for 45 minutes and was supervised by the researcher and the other six Agricultural Science tutors. This Pre-intervention strategy was used to ascertain the level of their understanding after they have been taught with the normal lecture method. Their scores were then recorded for analysis.

3.7.2 Intervention stage

This was where the activities designed to address the student's problem took place. The students were taught soil science using Field and Laboratory Activity-Based method for six weeks. Out of the six periods allocated for the teaching of the subject per week, four of the periods were used for practical activities at the Field and laboratory and two periods were used for discussion of the activities that were done. Thus the students were engaged in nine (9) activities making a total of thirty six (36) periods within the six weeks. In all the activities, the researcher ensured that students followed the necessary precautions that were expected of them to avert accidents as the activities were carried out. Three examples of the activities that were done are:

3.7.2.1 Intervention Activity 1 (Soil Sedimentation Test)

This activity was done with students in the laboratory to determine how the soil separates into individual layers. The students followed the procedure below:

1. Students took sample soil from the school garden
2. Students placed the garden soil into 1.5 glass jar
3. Students poured a measured amount of water into the jar filled with the garden soil
4. Students added Barium Sulphate into the mixture
5. Students closed the mouth of the mixture and shook it vigorously
6. The mixture was allowed to stand for about an hour without disturbing the stand
7. Students observed and wrote their observations for discussion

3.7.2.2 Intervention Activity II: Determining the Charge of a Soil.

This activity was also done to make student understand that soil has a charge and therefore absorb nutrients in their charge form.

Materials:

A 6 volt battery, copper wire, clay water-slurry, beaker.

Procedure Followed:

1. Teacher guided students to cut lengths of copper wire about 8 inches long
2. Students attached one copper wire to the positive pole of the battery and attached the second copper wire to the negative pole

3. Placed the ends of the wires in a flask to the top with clay which had been mixed with water to the consistency of glue.
4. Students allowed the set up to stand for about 10 minutes and observed whether the clay particles had moved to the wire attached to the positive or negative pole

3.7.2.3 Intervention Activity III : Determining the Percentage Moisture content of soil

This activity was done in the laboratory with the students to determine the percentage moisture content of soils.

Apparatus Used: Readable and Accurate balance, desiccator**,** numbered aluminum weighing tins with close fitting of 7.5 mm diameter and 25 mm deep and scoop.

Procedure:

1. Students Cleaned and dried the container and weigh to 1 g (W1).
2. Students placed a sample of about 3 kg of soil in the container and weighed to 1 g (W2).
3. Students placed the container in the desiccator and dried to a constant weight.
4. After drying, students removed the container from the oven and allowed to cool.
5. Students weighed the container with contents to 1 g (W3).

The researcher then assisted the students to calculate the percentage moisture contents of the soil by using the formula below:

$$MC\% = \frac{W_2 - W_3}{W_3 - W_1} \times 100$$

Where:

W1 = Weight of tin (g)

W2 = Weight of moist soil + tin (g)

W3 = Weight of dried soil + tin (g)

These three and other six (6) activities were carried out in the field and laboratory to helped students overcome the difficulties they encountered during soil lessons in General Agricultural science**.**

3.7.3 Post-intervention Stage I

Class exercises were given at the end of every week and the main test was administered to the group at the end of the six weeks period. The main test contained the same test items that were used for the pre- test but their numbering and positions were changed. These examinations were done to ascertain their achievement level after they had been taught with practical activity-based method. The scores obtained by the students were recorded and analyzed.

3.7.4 Post -intervention Stage II

One month after the Post-test I, a Post-test II was administered to find out the retention levels of the students. The 3 types of data that were generated were then analyzed in relation to the research questions investigated.

3.8 Data Analysis and Presentation

SPSS was used to analyse the scores of the nine different practical activities that were performed by the students. Responses from the questionnaire about students' interest

towards the study of agricultural science using Activity-Based method were collected and analyzed using simple percentages.

3.9 Data Quality and Ethical Issues

The data obtained from the Pre-test, Post-test I, post-test II and questionnaires were analyzed with the help of the teachers of the schools in which the research took place. The data was also submitted to the research supervisor for thorough scrutiny before it was finally used for discussion in the next chapter.

The researcher secured letter from the Faculty of Education of the University for Development Studies which were used to access research permit from the Ministry of Education in order to inform the respondents of the authority to carry out the research. Also the researcher arranged dates with the Headmaster of the school concerned to confirm dates for data collection and got the consent of the school administration to carry out the research. Again there was strict confidentiality by the researcher about the information that were given by the respondents. The information were used without mentioning the specific names of the respondents.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter presents the demographic characteristics of respondents, the pre-intervention, intervention and the post-intervention strategy and discussion of the results.

4.1. The demographic Characteristics of Respondents are represented on the table below:

Table 4.1 Distribution of the Respondents by Gender

	Students		**Teachers**	
Gender	Frequency	Percentage	Frequency	Percentage
Male	68	72.30	6	100
Female	26	27.70	0	0
Total	**94**	**100**	**6**	**100**

Source: Field work, 2017.

The target sample in the study consisted of ninety four (94) form two Senior High School Agricultural science students of 2015/2016 academic year and six (6) Agricultural Science teachers from Beposo Senior High School-Beposo. Sixty eight (68) of the student respondents were males representing 72.30% and Twenty six (26) females representing 27.70%. All the six (6) teachers were male representing 100%.

4.2 Distribution of Teachers by Teaching Experience in Agricultural Science.

Table 4.2 Distribution of teachers by teaching experience

Teacher Experience	Frequency	Percentage
1-5 years	2	33.30
6-10 years	3	50.00
11-15 years	1	16.70
Above 15 years	0	0.00
Total	**6**	**100**

Source: Field work, 2017

From Table 4.2, it turned out that 2 (33.30%) of the teachers had served for a period between 1-5 years, 3 (50%) had served for a period between 6-10 years, 1 (16.70%) had served for a period between 11-15 years and no teacher (0 %) had served above 15 years. From the results of the study, it could be seen that most of the teachers had taught for a long period of time and therefore were able to assist in handling the practical activities with the students.

4.3. Results of the Pre-intervention

This is the test administered to the students before they were engaged in the activity-based method of teaching. It was done to find out the performance of the students in

soil science before the intervention strategy; that is the use of the Activity-Based method. The table below represents the pre-test scores. It depicts the scores obtained by the students before engaging them in the activities. The total score was thirty (30) marks.

Table 4.3. Pre-test scores of students

Scores	Number of Students	Percentage
0-5	46	48.94
6-10	37	39.36
11-15	8	8.50
16-20	2	2.10
21-25	1	1.10
26-30	0	0.00
TOTAL	94	100

Source: Fieldwork, 2017

From table 4.3, Forty six (46) students scored marks between zero (0) and five (5) representing 48.94%, Thirty seven (37) students scored marks between six (6) and ten (10) representing 39.36.%, Eight (8) students scored marks between eleven (11) and fifteen (15) representing 8.50%, Two (2) students scored between sixteen (16) and twenty (20) marks representing 2.10 %. One (1) student scored between twenty one (21) and twenty five (25) marks representing 1.10% and no student scored between twenty six (26) and thirty (30) marks representing 0.00%. It can be deduced that students' performance in the subject was poor as few students were able to score higher

marks. The performance was due to the fact that they were not exposed to activities that could help them understand the topic better.

4.4. Intervention

Looking at the performance of the students at the pre-intervention stage, there was the need to engage the students in practical activities in the field and at the laboratory to enhance their performance. The students were engaged in activities for six weeks. In all, there were six periods for a week with each period lasting eighty minutes (80). The main activities that the students were engaged in the laboratory were soil sedimentation to test for the rate at which different soil particles settle, soil pH test using electrometric and calorimetric method, determination of water pH, soil permeability, soil charges movements, Capillary action of soils, calculating for the percentage soil moisture content of soils, and comparing the water holding capacities of sand, silt and clay soils.

4.5. Post-intervention results

The research question one was addressed here: What is the effects of Activity-Based teaching approach on Students' academic performance in Agriculture? After six weeks of engaging students in the activity based method of teaching soil science, a post test was conducted and the following results were obtained:

Table 4.4 Post-test 1 Scores of students

Score	Number of students	Percentage
0-5	0	0.00
6-10	2	2.10
11-15	2	2.10
16-20	12	12.80
21-25	36	38.30
26-30	42	44.70
TOTAL	94	100

Source: Field Work, 2017

4.5.1. Post Intervention Result Analysis

From table 4.4, the post intervention results indicated that no student scored between zero (0) and five (5). Two (2) student scored between six (6) and Ten (10) marks representing 2.10 %. Two (2) students also scored between eleven (11) and Fifteen (15) representing 2.10%. Twelve (12) students scored between sixteen (16) and Twenty (20) representing 12.80%. Thirty six (36) students scored between Twenty one (21) and Twenty five (25) representing 38.30% and Forty two (42) students scored between Twenty six (26) and Thirty (30) marks representing 44.70%.

The above illustrations of the post –test scores show that students performed better when compared with the pre-test scores. As many as ninety (90) students scored above the average pass mark of fifteen (15) as compared to the pre-test score where Twenty one (21) students got an average pass mark of fifteen (15) . The better performance was

attributed to the practical activities that the students were engaged in during the teaching learning process in the soil science aspect in the Agricultural science subject. The results of this finding is in line with the assertion made by Enekwe (2002), that activity method of teaching enables students learn with the same vigour that marks their natural activity and hence better performance in the subject they are taught. The high performance of the students also confirms what Farounbi (1998) said, that the effective use of the science laboratory may have a significant effect on students' performance.

4.5.2. Enhancing Students' Retention of Agricultural Science Knowledge through Practical Activities

The second research question designed for the study was to help enhance the rate of students' retention when they are taught soil science (Agricultural science) using activities. This was asked to address research objective two; that is to examine the extent to which Activity-Based teaching method would enhance students' retention of Agricultural Science knowledge. To address this question, another post –test was done one month after the first post- test. The results of the post-test two is shown in table three below:

Table 4 .5 Post-Test II Results of Students.

Scores	Number of Students	Percentage
0-5	0	0.00
6-10	0	0.00
11-15	8	8.50
16-20	13	13.80
21-25	34	36.20
26-30	39	41.50
TOTAL	46	100

Source: field work, 2017.

4.5.3 Analysis of the Post-Test II Results

From the table above, no student scored marks below the mark of ten (10). Eight (8) students scored between eleven (11) and fifteen (15) marks representing 8.50%. Thirteen (13) students scored between sixteen and twenty (20) representing 13.80%. Thirty four (34) students scored marks between twenty one (21) and twenty five (25) representing 36.20%. Thirty nine (39) Students scored marks between twenty six (26) and thirty (30) representing 41.50%.

From the above analysis, it is seen that all the ninety four (94) Students were able to get the average pass mark of fifteen (15) and above. This means that the students found the teaching approach meaningful and were able to retain the concepts learnt. They were able to remember what they have been taught the previous month. This is in conformity with an assertion made by Bichi (2002) that understanding and retention of learned

items are products of meaningful learning when teaching is effective and meaningful to students. It also further agrees with Lagowski, (1990) who said in his study of student knowledge retention that students usually retain 10% of what they read; 26% of what they hear; 30% of what they see; 50% of what they see and hear; 70% of what they say and 90% of something they say while they are doing a task. Aneke (2012) also reported that 90% of what we use our hands to do is retained and is in tandem with the results of this study. Again the results of the study is in accordance with Wendy J. Warner, Shannon David W.W. Jones and Brain E. Myers (2006), whose study revealed that agricultural laboratory activities provide multiple benefits to students including students becoming active in all the activities, an increase in cooperation and motivation among students and improved subject matter retention.

4.6. Students Interest in Activity Teaching Method of Agricultural Science

Agriculture is an applied science as stated earlier in the literature review. The teaching and learning of the course involves facts and figures, rules, laws, formulae, problem solving, understanding of scientific principles and concepts as well as practical demonstration of how an activity is done. Therefore after the students were introduced to activity teaching method, they were asked whether they found the activity teaching of the course in the field and laboratory interesting. Their responses were as follows:

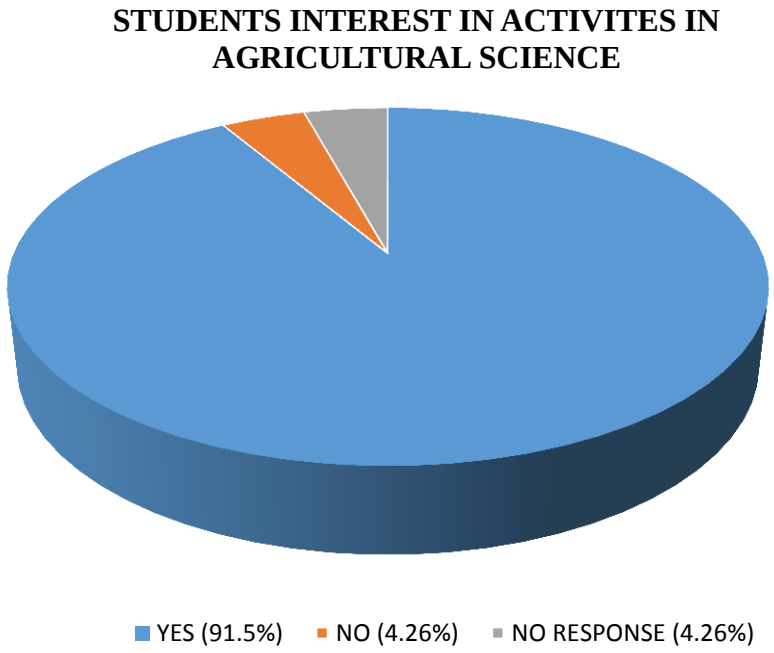


FIG. 3. A pie chart showing student's interest in Activity-Based teaching method in Agricultural Science

Eighty (86) students representing 91.5 responded 'YES'. They gave the reason that they found it interesting because they were actively involved in the activities and interacted with the materials used for the various activities and also had the opportunity to practice what they learnt in the classroom. Their responses agree with McCormick, (1994) who said that agricultural laboratories are currently understood as a means for providing students practical applications for theories taught in classroom. Laboratory instruction is the essential link between classroom instruction and skill development (Phipps and Osborne, 1988).

Only four (4) students representing 4.25.% responded 'NO' and gave a reason that laboratory activity in soil science is time consuming and that its frequent use may not

help to complete the syllabus used for WASSCE Exams on time. Four (4) students - 4.25% did not give any response to the questions.

4.7. **Teachers response about the Performances of the Students**

The teachers involved in carrying out the nine activities done with the students were asked to give the views on whether the Activity-Based teaching strategy contributed to the students outstanding performances or not and they gave their response as follows:

Table 4.6. Teachers view about the Teaching strategy on students' performance

	Frequency	**Percentage**
Strongly Agree	5	83.30
Agree	1	16.70
Disagree	0	0.00
Strongly disagree	0	0.00
Total	6	100

Source: Field work, 2017.

From the table, five (5) teachers (83.30%) strongly agreed that the Activity-Based teaching strategy resulted in the good performances of the students. One teacher agreed that the teaching method used accounted for the impressive performance of the students. No teacher disagreed that Activity-Based teaching strategy used by the researcher did not reflect on the performances of the students.

From the table it can be concluded that the teachers saw the Activity-Based teaching strategy as good and therefore would use it in their teaching learning process in the school.

CHAPTER FIVE

SUMMARY, CONCLUSION, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 Introduction

This chapter presents the summary of the findings and conclusion of the study. Also the chapter looks at recommendations for stakeholders and suggestions for further research for agricultural science educators.

8.2 Summary of Findings

This section presents the summary of the findings of the study per the objectives and research questions of the study.

5.2.1 The effects of Activity-Based teaching on Students' academic performance

The study revealed that using Activity-Based teaching strategy enhanced the academic performance of the students in Agricultural Science greatly. The major reason was that the students were involved in all the activities that were done and were able to put theory into practice. The results of the post-test showed this outstanding improvements in the student's performances in the subject. The improvement in the students' performances was also due to the fact that the activities done with the students introduced some elements of joy, team spirit, and reduced abstractness in concepts that were taught in Agricultural science. The Activity-Based teaching strategy was therefore effective in enhancing the academic performance of students in Agricultural Science.

5.2.2 Rate of Retention in Agricultural science when students are taught using Activity-Based teaching method.

The students were able to retain the learned concepts in Agricultural Science when they were engaged in Activity-Based teaching Strategy .The Post-test II organized after one month of the Post-test I also showed good performances in the test as all the ninety four (94) students got the pass mark of fifteen (15) and above. The high retention rate was due to the fact that the students were able to relate and solve problems outside the reams of textbooks. The Activity-Based teaching strategy was therefore meaningful to the students.

5.3 Conclusion

Teaching method adopted by a teacher has a significant effect on students' achievement, retention and interest of a subject. The study revealed that the activity method of teaching enhanced the performance of students remarkably. Every member of the study population was able to improve his or her performance in Agricultural science subject. The improvement in their performances in the subject was not due to chance but is because of the effectiveness of the Activity-Based teaching strategy used. Activity-Based method facilitates effective learning of basic scientific concepts in Agricultural science particularly soil science aspect, raises students' interest and also enhanced their skill of holding field and laboratory equipment. Their ability to interact with learning materials was also enhanced as they actively got involved in all the activities during the teaching learning process.

5.4 Recommendations

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

1. Agricultural Science teachers should use Activity-Based strategy of teaching to help enhance students' academic performance and raise their level of retention in the subject.
2. Agricultural learning activities should be introduced to Agricultural Science students early so that students' interest in the course would be aroused and sustained throughout their period of study in schools.
3. Heads of schools and departments in agriculture should assist in acquiring materials that could help teachers to engage students in activities both in classrooms and on the field.

5.5 Suggestions for Further research

1. The study should be conducted in all the schools in Ashanti Region and other parts of the country to find out how Activity-Based method of teaching in Agriculture affects students' performance.
2. A study should be conducted to investigate how Activity-Based method of teaching facilitates the development of students thinking.
3. For any further research, it is suggested that other aspects of agriculture such as animal science aspects that demands activities should also be done with students to know whether it would yield similar results.

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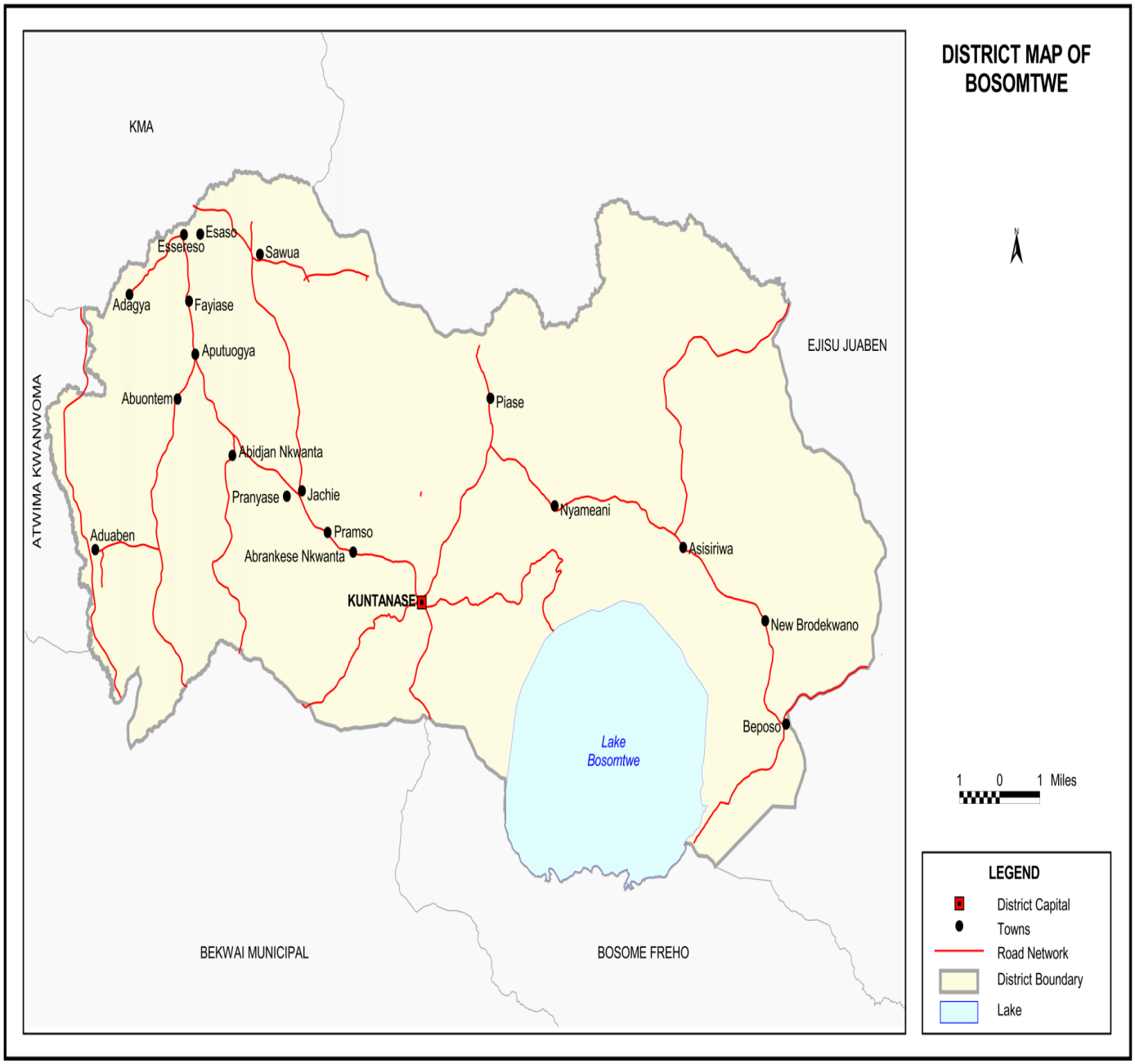
APPENDICES

APPENDIX I



APPENDIX II

INTERVENTION ACTIVITIES DONE WITH THE STUDENTS

Plate 1. Soil sedimentation experiment (Field and Laboratory Activity)

Plate 2. Activity to test for soil acidity

Plate 3. Activity to show movement of charges in soil

Plate 4. Activity to determine the percentage moisture content of soil

APPENDIX III

AGRICULTURAL SCIENCE ACHIEVEMENT TEST

Beposo Senior High School, Beposo, Bosomtwe.

Subject: General Agriculture

Class: Form Two Agric. (2C)

Section A (OBJECTIVE TEST)

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

1. Which of the following statement is true?

   A. Acid soils have higher OH^- than H^+

   B. Acid soils have higher H^+ than OH^-

   C. Neutral soils have OH^- than H^-

   D. Neutral soils have higher H^+ than OH^-

2. Which of the following soils have the particle size less than 0.002mm?

   A. Clay

   B. Sand

   C. Silt

   D. Boulder

3. All the following are composition of soil except

A. Mineral matter

B. Organic matter

C. Air

D. Oil

4. The feel of the soil or the relative proportion of the soil particles is termed as soil

A. Texture

B. Structure

C. consistency

D. acidity

5. Examples of liming materials are

I Calcium and Magnesium carbonate

II Calcium oxide and calcium hydroxide

III. Sodium chloride and Hydrochloric acid

A. 1 and II
B. I and III
C. I only
D. I,II and III

6. Which of these is not a physical property of the soil

A. Texture
B. Structure
C. Consistency
D. PH

7. Which of the following soils is least permeable

A. Sand

B. Clay

C. Silt

D. Loam

8. A soil of PH 1.5 is

A. highly acidic

B. highly neutral

C. slightly alkaline

D. slightly acidic

9. Sandy soil is made up of all of the following except

A. Coarse particles

B. fine particles

C. granular particles

D. Tilts particles

10. Sodium Carbonate is added to soil solution during sedimentation test to aid….of soil particles

A. dispersion

B. Cohesion

C. Breaking

D. Sticking

11. Unfavourable soil conditions associated with acidity may be corrected by the addition of

A. Nitrogen fertilizers

B. Sodium Carbonate

C. sulphide

D. Lime

12. Which of the following methods involves the use of dye to determine PH of soil in the laboratory?

A. Electrometric method

B. Colorimetric method

C. Endometria method

D. Field method

13. Which of the following instrument is used to cool heated soil in the laboratory when determining soil moisture content

A. measuring cylinder

B. Desiccator

C. refrigerator

D. elastrator

14. If a soil is able to make a full length cylinder but breaks upon bending, then the soil is likely to be

A. clay

B. loam

C. sand

D. clay sand

15. What reagent is used when determining the pH of soil using colorimetric method?

A. Barium Sulphate

B. Sodium Carbonate

C. Sulphuric Acid

D Ethanol

16. The resistance of the soil at various moisture content when the soil is subjected to mechanical stresses or manipulations is termed as

A. aeration

B. Consistency

C. elasticity

D. plasticity

17. Nitrogen is absorbed by plant in the form of

A. NH_4^+

B. $NH4^-$

C. NH_3^-

D. NO_3^-

18. Why do re-weigh heated soil when the moisture content of the soil is been determined?

A. To now the water that have been lost

B. to know the water that have been added

C. to know the now of dead micro organisms

D. to know the number of dead organisms

19. All the following factors influence soil erosion except

A. rainfall

B. Topography

C. soil susceptibility

D. soil temperature

20. Which of the following is a micro-nutrient?

A. Nitrogen

B. Potassium

C. Iron
D. Sulphur

SECTION B (ESSAY)

ANSWER ALL THE QUESTIONS

Experimental set up "A"

1. The experimental set-up labelled **A** is used to determine a physical property of soil. Study the set-up carefully and answer the questions that follow.

   a. State two observations that could be made from the experimental set-up.

   (2marks)

b. Mention four ways in which the floating materials on the surface of the water is important in crop production **(4marks)**

c. State one precaution that should be taken when setting up the experiment **(1 marks)**

d. State the aim of the experiment **(1mark)**

2. A sample soil collected from school garden weighed 120gm. It was placed in an oven at a temperature of 100^{o}C. After allowing the soil to cool, the sample was re-weighed. The new weight of the soil was 90mg. Calculate the percentage moisture content of the soil. (**3marks)**

3. Describe an experiment in the laboratory to compare the water holding capacity of sand, clay and loam. (**5marks)**

4. Copy and complete the following table in a colorimetric method of testing for soil acidity **(4marks)**

Relative soil acidity	**pH**	**Colour of soil acidity**
Very strongly acidic	4.0	-
Moderately acidic	-	Light green
-	4.5	-
Very slightly acidic	-	Greenish blue
--	5.0	Yellowish green
Slightly acidic	-	-

APPENDIX IV

SAMPLE LESSON NOTES FOR INTERVENTION ACTIVITY

BEPOSO SENIOR HIGH SCHOOL, BEPOSO, BOSOMTWE DISTRICT.

*WEEK ENDING…**23RD June, 2017***
*SUBJECT……**General Agriculture***

DAY/ DURATION	TOPIC/ SUB-TOPIC	OBJECTIVE/ RPK	TLM/TLA	CORE POINTS	EVALUATION/ REMARKS
Tuesday, 20/06/2017 7: 40-8-9: 40 (80 Minutes)	Soil, their uses and Management. Sub-topic 1.soil physical and chemical properties	By the end of the lesson the student will be able to 1.use electrometric and colorimetric method to determine soil acidity in the	**TLM**: Measuring cylinder, samples of clay, sand and loam, water, sodium carbonate, pH meter, litmus papers, beakers, funnel, filter paper, universal indicator, tin, scoop		1. Describe an activity to show how different soil particles separate at different rates. 2. State two precautions that should be taken when undertaken

	2.Soil Water 3. Soil Fertility And Productivity	laboratory 2. Perform an experiment to determine the composition of the soil using sedimentation method. 3. Perform an activity in the laboratory to determine the water holding capacity of. Clay, sand and	**TLA:** **1**.Teacher lets students mention the types of soils used for crop production **2**.Teacher guides students to : **i** Weigh 100gm of garden soil **ii**.pour the weighed soil into measuring cylinder **iii.** Pour adequate distilled water into the cylinder and add Na2CO3. **iv.shake** the mixture vigorously and allow it to settle for 10mins. **3**.Students observe the set-up	Mechanical Analysis of determining particle sizes of soil using Sedimentation Method.	the activity.

		loam. RPK: Students have seen clay, sand and loam soils before.	and write their conclusions	Soil particles separates into individual components at different rates. **OBSERVATION** Sand settles at the bottom first followed by silt and the clay. The floating water with suspended materials indicates the presence of organic matter.	

APPENDIX V

UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE.

FACULTY OF EDUCATION

SCHOOL OF GRADUATE STUDIES

SAMPLE QUESTIONNAIRES FOR STUDENTS TEACHERS

1. **QUESTIONNAIRE FOR STUDENTS**

Dear Student, this anonymous questionnaire seeks for your opinions about the teaching and learning of General Agricultural Science at Beposo Senior High School. Do not write your name, or any other comments that could identify you on this questionnaire. There is no right or wrong answer to any of the questions. This is not a test and your answers will not affect your scores and grades in the subject. By completing the questionnaire you are agreeing to take part in this research. Please read the information below which explains the purpose of this research. The information you provide will be useful to improve the ways of teaching and learning General Agricultural Science. Your answers will remain confidential and any reports about this research will not name any student. Thank you for participating in this study.

SECTION A

Name of School: ……

Class: .....

Form…….

Sex: Male ……Female…….

SECTION B

1. How many years have you study General Agriculture in this School?

   ……

2. Which aspect in General Agriculture do you find it difficult and why.....

3. Do you have an interest in studying Soil Science in General Agriculture using Activity-Based Method of teaching 1. YES 2. NO.

4. If YES why? And if NO why? .....

   .....

   .....

   .....

2 QUESTIONAIRE FOR TEACHERS

Dear Sir, this anonymous questionnaire seeks for your opinions about the teaching and learning of General Agricultural Science at Beposo Senior High School. Do not write your name, or any other comments that could identify you on this questionnaire. There is no right or wrong answer to any of the questions. By completing the questionnaire you are agreeing to take part in this research. Please read the information below which explains the purpose of this research. The information you provide will be useful to improve the ways of teaching and learning General Agricultural Science. Your answers will remain confidential and any reports about this research will not name you. Thank you for participating in this study.

SECTION A

Name of School: ……

Class taught.....

Form…….

Sex: Male ……Female…….

SECTION B

1. How many years have you teach General Agriculture in this School?

   ……

2. Which aspect in General Agriculture do students find it difficult and why.....

3. Do you think the method used by the researcher helped improved the academic performance of the students in the General Agriculture subject? Please tick one.

   1 Strongly agree [ ]

   2. Agree [ ]

   3. Strongly disagree [ ]

   4. Disagree [ ]

   Give reasons for your answer……