INFLUENCE OF SCHOOL AGRICULTURAL FARMS ON ACADEMIC PERFORMANCE IN AGRICULTURE AS A SUBJECT IN SECONDARY SCHOOLS.

VITALIS MACHISU

A Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirement for Award of Master of Science Degree in Agricultural Extension of Jaramogi Oginga Odinga University of Science and Technology

DECLARATION AND APPROVAL

Declaration by the Candidate

I declare that this thesis submitted to Jaramogi Oginga Odinga University of Science and Technology for the award of Master of Science Degree in Agricultural Extension. This work is mine and has not been previously submitted by me or any other person for the award of a Diploma, Degree at this university or any other Institution of higher learning

Signature…… **Date….**

Vitalis Machisu

A352/4249/2015

Approval by Supervisors

This thesis has been submitted for examination with our approval as the University supervisors.

Signature…… **Date……**

Dr. Alice Nakhumicha Muriithi

Department of Plant, Animal and Food Sciences Jaramogi Oginga Odinga University of Science and Technology

Signature…… **Date……**

Prof. Reuben Oyoo Mosi

Department of Plant, Animal and Food Sciences, Jaramogi Oginga Odinga University of Science and Technology

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DEDICATION

I dedicate this work to my parents for my upbringing and to my family for financial, material support and encouragement throughout the study period.

ACKNOWLEDGEMENT

I thank the Almighty for the gift of life. Special gratitude goes to my supervisors Dr. Alice Nakhumicha and Prof. Reuben Oyoo Mosi for their encouragement, guidance and vital academic input that helped in developing this thesis. Finally, I acknowledge my study colleagues for their moral and material support during the study. I also grateful to my school principal Mrs. Jane Vulimu Kavuludi for her permission, encouragement and material support throughout the study period.

ABSTRACT

Agricultural education contributes significantly to political, social and economic aspects of development. The overall objective of the study was to understand the influence of school agricultural farms on academic performance in agriculture as a subject in secondary schools in Hamisi sub-county. The specific objectives were: to characterize school agricultural farms, to assess the influence of students' perceptions towards school agricultural farms on academic performance in agriculture as a subject and to evaluate the influence of school agricultural farms on academic performance in agriculture as a subject in secondary schools in the study area. This study used Research conceptual model that advances the opinion that teaching is a concept with an interplay that employs sets of variables to realize its objectives. Hamisi sub- County has 50 secondary schools offering agriculture as an examinable subject at KCSE, with 2800 students, 50 principals and 50 agriculture teachers purposive sampling was used to collect data from principals and teachers while simple random sampling was used to collect data from students. School agricultural farms in Hamisi sub-county have been in operation for an average of 23 years, with 91.7% having less than five acres 54% and are managed by teachers. 87.5% of the farms are within walking distance from classrooms. The linear regression model, shows that students' perception towards school agricultural farms had a significant effect on their academic performance (Wald=10.907, p=.001) presence of schools agricultural farms increased performance in agriculture by 0.21($\beta_2 = 0.21$; $p < 0.05$). It was concluded that perception of students and teachers influence learning and teaching of agriculture which has significant effects on their academic performance. The study recommended further studies on management of school agricultural farms to enhance student performance in the subject. Similarly, seminars for teachers should be intensified to encourage cultivation of positive perception toward teaching and learning agriculture in agricultural farms.

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LIST OF ABBREVIATIONS AND ACRONYMS

BOM	Board of Management.
KCSE	Kenya Certificate of Secondary Education
KICD	Kenya Institute of Curriculum Development
MOE	Ministry of Education
QFAT	Questionnaires for Agriculture Teachers
QFP	Questionnaires for Principals
QFS	Questionnaires for Students
SMC	School Management Committee
TLM	Teaching and Learning Materials
TSC	Teacher's Service Commission
USAID	United States Agency for International Development

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Agriculture is the main economic activity in many parts of Kenya, and is also the backbone of the country's economy. According to the Food and Agricultural Organisation of the United Nations, agriculture and related activities contribute 53% of Kenya's Gross Domestic Products (GDP) and 40% of the country's export earnings (FAO, 2021). In Western Kenya, like many other regions in the country, majority of the population resides in rural areas, agriculture being the main livelihood. Thus, as the country strives to eradicate poverty and raise the general welfare of the population, there is needed to enhance the productivity of the agricultural sector. In the same regard, the youth, who comprise the most active sector of the population, need to be empowered with agricultural concepts and skills from the school-going age, for the general economic prosperity of the nation (Williams and Dixon, 2013; Dillon et al., 2012).

1.1.1 School agricultural farms

It is stated in the curriculum that for effective teaching, learning should be practised through demonstrations in the classroom and in the field, field-trips, and hands-on experimentation (Dillon et al., 2012). School farms provide a learning laboratory in which these activities can be practised, thereby enhancing the quality of secondary education (Lekies and Sheavly, 2013).The concept of school agricultural farming began in earliest in the developed world, more so in Europe, in the 19thcentury. During the period, school farms were established across Europe, Australia and the United States, with a goal of improving the quality of education through involving children in the learning process, promoting engagement and changing the attitude towards practical experience (Dillon et al., 2012 ; Christie, 2016). The public-school farm then emphasized that natural sciences and agricultural should be learnt in agricultural farm (Desmond, et al., 2014).

As early as the 18th century, school farms were intended for teaching farming and also identified as experiential learning tools that would help children connect with real-life experiences (Dillon et al., 2012). In United States of America however school farms were

introduced in urban schools for aesthetic and educational purposes rather than for practical exposure for the students (Desmond, et al., (2014). In China, monetary change developments proposed agricultural education program and methodology that addressed the financial substance in agricultural institutions (Xiao-rong et al., 2014). School agricultural farm have now become regular features in African countries, and have been included in national education policies and wide-scale school garden classes (Dillon et al., 2012).

The Food and Agriculture Organization promotes the use of school farms for experiential learning through which education and nutrition can be improved. School farms are tools where pupils can attain life skills that are relevant to the everyday challenges of nutrition, food security, and poverty (Lambert et al., 2018). This form of experiential learning provides a form of non-formal education that prepares future farmers beyond the classroom (Snodgrass, 2012). A study by Wishek (2017) established that food-based systems are the cornerstones of sustainable development. These cornerstones are learning, nutrition and income. Five components have been identified as key elements for making the quality of secondary education sustainable and beneficial to the society. These are improving curriculum, increasing learning materials, increasing instructional time, improved teaching and enhancing pupil learning capacity (Sullivan, 2006).

The quality of education can also be improved through the use of experiential learning techniques (Muro and Burch, 2013). The school agricultural farm is a selected plot of land in the school environment where students carry out practical agriculture, both in crop production and animal husbandry. School agricultural farms are also a component of school activities and together they can form a genesis for a more productive agricultural sector. The farms help the students to acquire knowledge and practical skills in agriculture and agricultural-related opportunities. Some benefits of the farms to students include generating circumstances for students to market agricultural products, providing students with supervised occupational experience in agricultural productivity and encouraging the use of records and reports. Inadequate resources for vocational agriculture delivery and lack of interest on the part of students pose challenges to the development and growth of school farms (Onwumere et al., 2016; Hardré et al., 2015).

Experiential learning is an integration of practical exposure, perception, cognition and behaviour, which generates a learning process based on personal experience, which ultimately creates knowledge (Lambert etal., 2018; Williams and Dixon, 2013).Lambert et al.,(2018) defines learning as the process of creation of knowledge through transformation of experience. There is no order in which to complete the four learning features, but the highest quality of learning occurs when the student practises all four in the learning cycle, through personal experience. Experience alone, however, does not constitute learning because students must establish meaning of each experience through reflection (Boulton-lewis et al., 2012). The school farm has thus become an essential part of agricultural education and student experience (Rubenstein and Thoron, 2014). This is especially for students who do not come from an agricultural background.

Snodgrass (2012) promotes the use of school farm for experimental learning through which education can be improved. School farms improve quality of education by adding relevant contents. According to Snodgrass (2012), school agricultural farms create opportunities for hands-on learning when students interact with farm activities. This improves formal education beyond classroom. School agricultural farms act as a place for extracurricular of learning and offer a great educational potential , Kolb (2016).The current increasing importance of agricultural education traces back to tremendous structural changes in agriculture in Germany and USA. This was when schools began implementing agricultural education, specifically through the use of school agricultural farms. Students were able to have a unique experienced learning about agriculture. This allowed them to obtain instruction and experience" (Shimoguchi and Inaizumi, 2015). As times changed, many students utilized their own family farms to house their supervised agricultural experience (SAE).

The cost of the land caused school administrations to do away with the land that was used for agricultural education. Due to the growing numbers of urban-raised students, school agricultural farms have become an essential part of agricultural education and student experience (Rubenstein and Thoron, 2014). For students who do not come from agricultural backgrounds as explained by Njura et al., (2019) and Shimoguchi and Inaizumi (2015), school farms serve the important role to this group of students. For

those who do have agricultural backgrounds, the school farms are platforms for gaining in-depth knowledge about agricultural production. School farming is designed to increase active learning, because the principles taught in the classroom are applied on the school farms for practical experience.

Previous studies have found that students were motivated by the empowerment they experienced when practical learning directly aligned with their values, ideals, and deeper sense of purpose (Beni and Adu, 2017). In Kenya, the Ministry of Education has for years been facilitating induction training modules in partnership with different players in the education sector to equip agriculture teachers with necessary skills and knowledge, with the ultimate goal of improving academic performance in the subject. School agricultural farms play a vital role in agricultural education, through provision of demonstration site, hands on experience, project site (Njura et al., 2019). However, limited research has been carried out on characterization of school farms and influence of students' perception towards school agricultural farms on academic performance in agriculture.

1.1.2 Agricultural education in secondary schools in Kenya

The genesis of agricultural education in secondary schools in Kenya, and even other countries in the region and the continent, can be traced to the United States Agency for Internal Development (USAID), which provided funding for workshops, equipment and training of agricultural teachers at the then Egerton College, Njoro,(Njura et al., 2019). Currently, agricultural education in the Kenya education course runs from the second education stage- after primary school, and entails crop and livestock production, farm power and equipment, farm structures, and agricultural economics and agro-forestry (The Elimu Network, 2021). The course is tailored with the primary goal of inculcating a sound understanding of the subject among learners and appreciation of its importance to the society and the nation at large. It is also aimed at enlightening the learners on the vast opportunities existing in the sector and other arms of the economy related to it.

Additionally, it provides the skills necessary for carrying out agricultural activities, and opens path for higher learning. Schools offering the subject are encouraged to put in place efficient systems for harvesting rainwater and storing it in reservoirs for use in such practices as irrigation and watering livestock. A substantial emphasis in agricultural

education is placed on fulfilling the needs of people and communities and developing personally rewarding and socially responsible knowledge, skills, and professional principles. This method emphasizes experiences as the environment in which information and skills are acquired and rely heavily on these experiences as a resource. Agriculture education encompasses a broad spectrum of topics, including horticulture, forestry, conservation, natural resources, agricultural commodities and processing, food and fibre production, aquaculture and other agricultural products, mechanics, sales and service, economics, marketing, and leadership development. Participation in educational programs created with a broad variety of individuals in mind may provide opportunities for continuing education in agriculture and related areas. Agriculture education offers students the option to further their careers and retrain and learn agricultural sector-specific knowledge and skills.

According to Chemjor (2016), majority of agriculture teachers feel that students chose the subject at the later stage of second education stage- after primary school level mainly due to peer pressure. The study also established that parental pressure also had an influence on students' choice of the subject, with up to a quarter of the parents feeling that the subject was not suitable for girls. According to the study, about a third of the boys and a fifth of the girls taking the subject chose it because they felt it was easy to pass. The study also found that about a third of the boys and the same proportion of girls chose the subject due to positive attitude and a liking for agricultural activities. Another study by Njoroge and Orodho (2014) found that enrolment for the subject by students in public secondary schools in Nairobi County was declining, although attitude towards the subject remained largely positive. The study also established that the development of the subject in the schools was hampered by inadequate teaching resources, especially tools for farming, and shortage of land.

1.1.3 KCSE Performance in agriculture in secondary schools in Hamisi Sub-county

This study focuses on schools in Hamisi sub- county, Vihiga County. Agriculture performance in Hamisi sub-county has been poor for a long time. Despite the Government's efforts to enhance the teaching of agriculture in secondary schools around the country, performance in the subject remains generally below expectations, with most

schools recording a low average score (Andanje, 2020). Among the key reasons attributed to this trend are poor pedagogical skills among majority of teachers of the subject; existence of conflicting syllabi from the Kenya National Examinations Council (KNEC) and the Kenya Institute of Curriculum Development (KICD), a fact many teachers in the Sub- County.

The goal of pedagogical skills is to assist students in improving their grades and developing necessary skills. Learning and using various pedagogical tactics might be of considerable use to educators. It is essential for good teaching and enables teachers to use effective pedagogical tactics, which is why it is so important. The study of pedagogy lays the groundwork for efficient classroom learning and the interaction between students and teachers. There are many different ways in which instructors benefit from having pedagogical competence in the classroom. They have the most considerable impact on overall educational quality, a fact that many educators in the Sub-County are unaware of despite its significance.

The Kenya Certificate of Secondary Education agriculture examination comprises three papers, namely, Paper 1 (443/1), a theory paper with a maximum of 90 marks, Paper 2 (443/2) also a theory paper with up to 90 marks, and Paper 3 (443/3), which is a project examination, giving a maximum of 100 marks (Arap Too, 2021). Paper 1 features general agriculture, crop production, agricultural economics, and soil and water conservation. Paper 2 tests on Livestock production, farm machinery, farm structures, and farm tools and equipment. Over the years, the sub-county has, like the rest of the country, recorded generally unimpressive secondary school agriculture results over the years. Between 2013 and 2019, the highest mean score attained by an individual school in the subject was 10.67, by Kitagwa secondary school, in the year 2013.

The highest average mean over the period was 8.00, which was attained by Nyang'ori High School, with only five schools out of 50 managing a mean grade of C+. The average mean for the sub-county has seen a steady decline over the period, with the highest, 5.7, being attained in 2014.

1.2 Statement of the problem

The agricultural sector in Kenya remains a key player in the economy, providing food security for the growing population and employment for millions of individuals. Among the critical approaches to sustaining the paramount position of the sector is ensuring that the education system in the country continues producing quality graduates with the requisite skills to add value to the sector. It is against this background that the Government of Kenya places much emphasis on development and improvement of agricultural education in secondary schools and even institutions of higher learning.

According to the Kenya Institute of Curriculum Development (KICD), Secondary School agriculture syllabus, a key goal of secondary school agriculture is to enable students to nurture interest in the subject as an industrial entity, while creating awareness on the various opportunities available in the sector. It was noted in a teachers' workshop in Kakamega County that performance in agriculture as a subject in secondary schools countrywide has remained below average mean grade of C+ (plus) since 2013. School agriculture farm is one of the major factors to be considered in school academic performance. Hamisi sub-county has consistently registered an average mean grade that is lower than C+ in the agriculture subject over the said period (see appendix table 1).

School agriculture farm is one of the major factors to be considered in school academic performance. There is a knowledge gap of limited data on influence of school agricultural farms on academic performance in agriculture as a subject in secondary schools. This performance trend needs to be checked for more students to continue developing interest in the subject, and the agricultural sector to maintain its key position in the economy of the country. The study in this regard seeks to investigate the influence of presence of school agricultural farm on academic performance in KCSE agriculture as a subject in secondary schools in Hamisi Sub-County.

1.3 Objectives of the study

1.3.1 Overall objective of the study

The overall objective of the study was to understand the influence of school agricultural farms on academic performance in agriculture as a subject in secondary schools in Hamisi sub- county, Vihiga County, Kenya.

1.3.2 Specific objectives of the study

The specific objectives were:

i. To characterize school agricultural farms in secondary schools in Hamisi sub county.
ii. To assess the influence of students' perception towards school agricultural farms on academic performance in agriculture as a subject in secondary schools in Hamisi sub county
iii. To evaluate the influence of presence of school agricultural farms on academic performance in agriculture in secondary schools in Hamisi sub county.

1.4 Research questions

The research questions for the study were:

i. What are the characteristics of school agricultural farms in secondary schools in Hamisi Sub-county?
ii. What is the influence of students' perception towards school agricultural farms academic performance in agriculture as a subject in secondary schools in Hamisi sub-county?
iii. What is the influence of school agricultural farms on academic performance in Agriculture as a subject in secondary schools in Hamisi sub-county?

1.5 Justification of the study

A key feature for consideration in this aspect is availability of land specifically set aside for purposes of teaching the agriculture subject. This study sought to contribute knowledge with regard to the influence of school agricultural farms in the academic performance of students in agriculture as a subject in secondary school in Hamisi Sub County. Additionally, there is limited research available on the influence of school agricultural farms on academic performance in agriculture as a subject in secondary schools in the country at large. This study sought to address that gap and thus open up academic discourse on the matter and provoke increased research on it. For the agricultural sector to maintain its lead position in sustaining Kenya's economy, it is important that factors surrounding the delivery of agriculture as a subject in secondary schools be fully appreciated by all stakeholders – for the sake of decision-making and policy generation.

The findings of the study will be important to Ministry of Education in the setting up of policies and guidelines surrounding the teaching of the subject, and also for school administrators and managers on the question of offering the subject in their institutions. This study will contribute to knowledge to education administrators on the influence of school agricultural farms on academic performance of agriculture as a subject in secondary schools. The findings will provide data for education administrators on influence of school agricultural farm on academic performance of agriculture. The findings may help to put in place strategies to have effective school agricultural farms by providing in-service trainings to secondary Agriculture teachers.

1.6 Scope of the study

The study was limited to the use of school agricultural farms in cultivating and raising livestock for purposes of demonstrating agricultural techniques, including its economic gains and its influence on academic performance of agriculture among students. The study was limited to Hamisi sub-county in Vihiga County in western Kenya. The study was carried out over a three-month period between August and October 2019.

1.7 Limitations of the study

While there are thousands of secondary schools offering agriculture as an examinable subject at KCSE level, the findings of this study may not necessarily apply to them all, but only those with similar farm, climate and teaching/administrative settings as those in Hamisi sub-county. Further, even for the schools with farms offering the subject, there are wide variations in crop and livestock rearing, the extent of farming, and farm machinery and infrastructure.

The study focused on the school farming activities in the sub county, which were limited in the scope and scale, and as such, the findings cannot be generalized for the entire agriculture industry.

1.8 Assumptions of the study

The study was guided by the following assumptions:

i. That the responses given were forthright and honest, and thus the analysis provided an accurate representation of the situation on the ground.
ii. That the attitudes of the study sample were representative of the general population.

1.9 Operational Definition of terms

The following terms have been used in the research study bear the following meanings;

Academic performance: - This refers to pupil education achievement in a learning setup.

Agriculture----- This is the study of a science and an art, or occupation concerned with growing crops, tilling of land, and rearing of livestock.

Learning: ----- Term used to connote the change that is relatively permanent in relation to the knowledge of a person and behavior that comes because of experience.

Material Resources: ---- This refers to all materials and equipment used to enhance effective learning, that included laboratories, classroom and school garden.

Perception -- This is a tendency to reply absolutely or negatively towards an exact plan, object, person, or scenario.

Performance: - Referred to the level of student's achievements or attainments of knowledge and skills compared to others.

Principal--- The highest rank in the school setup who takes the leading role In the daily running of the institution.

Physical resource ---- Include reallocation of physical space in the school for setting up learning laboratories, Libraries, Classroom.

Student---- A person who undergoes learning process in a school towards Behavior modification and change.

Sub-county----- This is a devolved unit in county by law, which is responsible for all education matters within the sub-county

Teacher---- A qualified trained expert who instills knowledge, competence, to learners.

Demonstration plot-- A piece of land used to show how agricultural farm activities are carried out.

KNEC project Plot- A piece of land where agricultural KNEC projects are carried out.

CHAPTER TWO

LITERATURE REVIEW

2.2 Characterisation of school agricultural farms

According to the Food and Agricultural Organisation (FAO), farms are broadly divided into four categories, namely, small subsistence-oriented family farms (having one or two crop or animal types, with rudimentary management); small specialized family farms (focusing on some crop or livestock, with management a bit more organised in terms of bookkeeping, etc.); large commercial family farms, and commercial estates (which many times also include on-farm processing or value addition within the same premises (FAO, 2021). School agricultural farms may fall within a range similar to specialised family farms and commercial estates.

In general, school administrations take into account variety of factors when making decision on location of school agricultural farms. Key considerations in this regard include proximity to main school buildings, especially classes (the farms should preferably be close for easy accessibility); size of land (school farms generally need a lot of land for variety of activities); topography or nature of the landscape (extremely sloppy areas or shallow soils are in general avoided); waste management (the farm should be located where it will be easy to handle/dispose the various wastes resulting from activities within), and the average direction of the wind (if the wind generally blows to the south, the farm should be positioned on the southern end of the school to avert the possibility of bad odours being directed towards the main school blocks) (Business Compiler, 2020).According to the research conducted by Lambert et al., (2018) and Lachowski (2015), school agricultural farms are categorized under land size in acreage, distance from agriculture class, purpose for utilization and enterprises on the farm.

Most use of the farms are for production agriculture to achieve farm sustainability, learning and practical experience (Mazurkewicz et al., 2012). Agriculture teachers have access to farms with nursery beds, green house, fields' crops and animals. They utilize them basing on their perception (Lachowski, 2015).

2.3 Influence of students perception towards school agricultural farms on academic performance in agriculture

According to Lambert et al.,(2018), and Roots et al., (2002) human thoughts and concepts are continually formed and modified over time. Thus, the background knowledge, learning attitude and prior learning experience that a student carries to class can greatly influence the development of new knowledge. Most studies on perception of secondary school students' towards school agricultural farms focus on motivational outcomes resulting from positive results attained from farms and farming education (Krogh et al., 2014).

In a study conducted within a school garden in New York City, USA, Lekies and Sheavly (2013)looked into factors of school garden projects that influence children's interest in farming. They established that learned farming skills triggered interest in farming, and recommended the creation and development of hands-on garden activities to foster interest in gardening. According to the study, accomplishment of farm activities acts as an incentive to engage in and solve further related tasks. Thus, through their engagement in farm tasks, students can establish positive relationships to plants and animals that may be a motivational basis for wanting to learn more about and become active in matters environment. This is in tandem with the findings by Levin and Wadmany (2012), that positive motivation in teaching/learning content affects students' perception by encouraging them to have self-confidence. In a separate study by Ekezie (2020) on the influence of environment on performance of secondary school students in Rivers State, Nigeria, it was found that bad parental guidance; unfavourable teaching environment, lack of well-trained teachers and school farms all negatively affected the performance of students. In the same regard, according to Njura et al., (2019), working together to attain a common goal builds uniform identity among the conference players and emboldens a sense of social unity. Many tasks cannot be solved individually, thus participants can realize their own qualities and skills as well as those of others in order to reach the common goal.

Availability of teaching and learning resources also plays a major role in inculcating a positive attitude among learners taking agriculture as a subject. A study by Juznic et al.

(2015) found that availability and utilization of agriculture teaching and learning resources influences students' perception towards the subject. Another research by Otekunrin, Otekunrin and Oni (2019) in Ibadan, Nigeria, established that availability of school farms and instructional materials alone were not sufficient for ensuring good performance in Agriculture in secondary schools, but there was great need for well-trained teachers and good infrastructure.

Also critically important as regards enrolment and performance of students in agriculture is the teachers' perception. A study in Baringo County, Kenya, by Cheplogoi (2016) on influence of teachers' characteristics on attitude towards agriculture in secondary schools, established that while there was no significant relationship between the gender or experience of a teacher and his/her attitude towards agriculture, a teacher's qualifications greatly influenced attitude towards the subject, with the highly qualified tending to favour the subject more than the less academically endowed

Kidane (2013) similarly observed that absence of motivation- which can also be triggered by lack of resources -leads to learners putting less effort in a subject, leading to poor academic performance in that subject. According to Roesch-mcnally and Arbuckle (2018), academic performance of a student depends on instructional materials available in the school and socio-economic environment he/she grows up in. The study also established that situational interest during a partly farm-based educational program on agriculture, nutrition and consumerism correlates with the intention to practice environmentally friendly consumer behaviour after the treatment. Other study findings emphasize the important role situational motivational variables play in agriculture and farm education (Hardré et al., 2015).

The youth, who make up the future of every society are encouraged into farming through Young Farmers Club (YFC) and sometimes have their farms or gardens. Through this initiative, they receive useful information that assists them in analysing innovations tailored for agricultural development.

Empirical data regarding the great contributions made by youth in agriculture is however lacking, most probably because of their inadequate exposure to practical agriculture during their secondary school days, and lack of practical skills. Thus, the scope of their

involvement has not been statistically ascertained. In Kenyan universities, for student to study agriculture, the student must have studied agriculture subject in secondary school. The attendant knowledge gap has not permitted the formulation of articulate policies for the improvement. Several youth programs in agriculture have operated and failed due to unreliable data, information and inadequate skills on what determines the youth's participation in rural agriculture for the design of appropriate intervention strategies. As a consequence of this, the Nigerian government made agricultural science a subject compulsory in all secondary schools to develop and improve effective learning of the subject. In Kenya, the 8-4-4 system of education was also introduced with the same logic as a means of embracing the practical approach to learning. Under the learning regime, students were to acquire knowledge and practical skills in agriculture and get prepared for agricultural occupations (Njura et al., 2019; Beni and Adu, 2017). With this approach to learning, the teacher's professional duties extend beyond formal teaching. Outside of the classroom, the teacher accompanies students on field trips, supervises study halls, helps with the organization of the school functions and serves as a supervisor for extracurricular activities. Essentially, the general principles of teaching are that teachers with adequate readiness teach more effectively, efficiently and better as a motivated teacher teaches better than the one who is not motivated (Kigenyi, 2017).

2.4 Influence of School agricultural farms on academic Performance in agriculture

Among other positive features, farm education allows for nature experience in several ways, namely, scientific (exploring plants and animals, e.g., different grains), social (establishing a partnership with domesticated animals), ecological (examining ecosystems such as soil), and aesthetic (the beauty of nature, e.g., the smell of herbs and flowers). Studies have shown that the extent and scope of farm education strongly correlate with the appreciation of nature that influences environmental action (Beni and Adu, 2017; Williams and Dixon, 2013).

According to Ratcliff et al., (2015), students engaged in farm education gain exposure to direct learning experience that equips them with farming practices pertaining to crops and livestock. School farm activities improve retention of learner content by providing hands on learning environment. It also improves retention of concepts learnt by providing

hands on learning empowerment. This bridges the gap between classroom content and life application.

In a study that reviewed the theoretical/conceptual background of garden-based learning and its role and effectiveness in education globally, Desmond et al., (2013) established that while utilizing school farm, it impacts skills like teamwork, communication, and cooperation among learners and in turn enhances their academic achievements. They found in their study that experimental learning can improve learners' quality of education through involvement in the learning process, in the process generating positive attitude towards that subject. According to Ezeugbor (2014), a school agricultural farm is an experimental learning facility that enables the learner to get connected with real-life experience.

While effective teaching and learning is practised through demonstration in class, field trips and hands-on experience is undertaken in the school farm. The school agricultural farm is thus a learning laboratory where practical lessons on agriculture are taken. In a related study, Kidane (2013) established that the teaching of agricultural science was influenced by availability of fields for practical experience. In addition, practical farm education allows for several types of nature experiences. In addition, Joshi et al., (2008)argued that learners participating in farm projects had their knowledge and skills in nutrition, agricultural and garden produce vastly improved. Radcliffe et al., (2015) similarly argued that students participating in garden group projects gained enhanced ability to correctly identify vegetables.

Studies indicate that teacher evaluations and students' self-assessments agree with the notion that gardening and farming experiences have a positive impact on science achievement in school (Abdullah et al., 2015; Lekies and Sheavly, 2016).This result can be explained by qualitative findings indicating that farm experiences promote social learning and strengthen the sense of self-efficacy (Woody et al., 2013; Lachowski, 2015) that in turn can have a positive effect on learning and achievement in school. A study by Onwumere et al., (2017) on the influence of school farms on the teaching of agricultural sciences in senior secondary schools in Abia State, Nigeria, established that the farms

have positive influence on teaching of the subject, since agriculture teachers have high regard for the farms in the first place.

Njura et al., (2019), investigated the importance of hands-on activities in farms education of adolescents aged 13-16. Students' self-reports indicated an increased level of cognitive and affective components of learning through the inclusion of instructional hands-on activities on farms in comparison to control group participants without hands-on experience Eigbeonan (2015) reported that students' engagement in school garden activities predicted learning about gardening but also school grades in core subjects. According to (Krogh et al., 2014) presents work on the benefits of learning on farms. Learning in school agricultural farms has core idea that students who regularly and actively participate in local farming have long-term connections to the farm activities.
According to (Krogh et al., 2014), active participation in meaningful tasks is the key element to learning on farms.. Educational farms have the primary aim to provide opportunities to learn about agriculture.

Thus, a range of favourable results can be achieved, such as ability to act. The farm jobs demand the ability to make decisions and perseverance. The results of the tasks are self-explanatory and contribute to feelings of self-efficacy, empowerment, and competence in the sense of self- determination theory (Williams and Dixon, 2013).

2.5 Theoretical framework

This study is anchored on two theories, the Experiential Learning Theory by Kolb (2016), and Meaningful LearningTheory by David Ausubel.

2.5.1 Experiential Learning Theory (2016)

The Experiential Learning Theory was posited as a result of Kolb's work on styles of learning, in the year 2016. In the theory, Kolb argues that effective learning occurs in four key stages, namely, concrete learning, reflective observation, abstract conceptualisation and active experimentation (Western Governors University, 2020). According to Kolb, concrete learning results from the learner being exposed to some experience and interprets it accordingly, while reflective observation occurs when the learner reflects on some personal experience gone through. He held that learning is a process in which information is formed by converting experiences learners go through.

The theory is founded on the idea that people learn best via hands-on experience (Conlan, et al., 2012). As a result, experience is important in the learning process (Sternberg and Hang, 2000), and it is learner-centred. According to Baker and Robinson (2012), group projects, among other things, provide the drive for the experiential learning process. School agricultural work, research initiatives, and guest speakers are among the other activities. Instead of teacher - directed experience, it allows students to learn through student-centred perceptions such as doing, finding, reflecting, and implementing. Coping with real-world problems helps pupils improve communication abilities, self-confidence, and decision-making competencies.

In secondary school, students learn by doing. Because agriculture is a practical subject, Longshal and Usman (2015) have placed a strong emphasis on it. In agriculture, learning by doing allows students to put what they've learned in class to use in real-world circumstances (Cheek et al., 2012)

Benjamin Franklin's maxim from 1750, "Tell me and I forget, Teach me and I remember, Involve me and I learn," (Northern Illinois University, 2013) further supports the thesis. Because agriculture is a practical subject, practical exercises are essential in its education, and a lack of them cause’s learners to be unfamiliar with knowledge and technical competencies.

2.5.2 Meaningful Learning Theory

The research used David Ausubel's theory of knowledge acquisition, where the learner actively produces knowledge through internal cognitive judgments (Ausubel’, 1963). The teacher serves as a guide rather than a tutor, and therefore only encourages and supports opportunities that promote students to think. Meaningful learning causes the phenomena of activating, in which the recall of one fact triggers the memory of the other, which leads to the recall of still another fact. If the information were memorized, this would not be an issue. According to David Ausubel (1963), meaningful learning happens when the learner completely comprehends the knowledge acquired and how it links to other facts retained in his or her memory.

According to Ausubel (1963), in order to learn meaningfully, the learner must tie new knowledge (ideas and assertions) to what they currently know (Asian e University). This

necessitates the student's construction of knowledge rather than its transmission to him, and so learning become relevant whenever the learner does the work himself. The secondary curriculum strives to improve agriculture skills, build self-reliance, creativity, and problem-solving skills, and promote agricultural activities that support environmental protection, among other things (KLB, 2012). All of this is addressed in various sections in the secondary school agriculture curriculum from form 1 to form 4.

In order to achieve the following goals, the student must be able to connect the knowledge learned from many disciplines to form a cohesive whole. During the nine months of the project's implementation, the learner has the opportunity to bundle all of that knowledge. This can be illustrated and explained as follows: Garden equipment, land preparation, sowing, field techniques, and farm records are all covered as independent topics in the course, which runs from form one to form four. However, throughout the implemented project, the learner must retain and communicate all of this in order for the project to be completed successfully. As shown in Fig 1 below, this aids the learner in internalizing the concepts:

Rote Learning **Meaningful Learning**

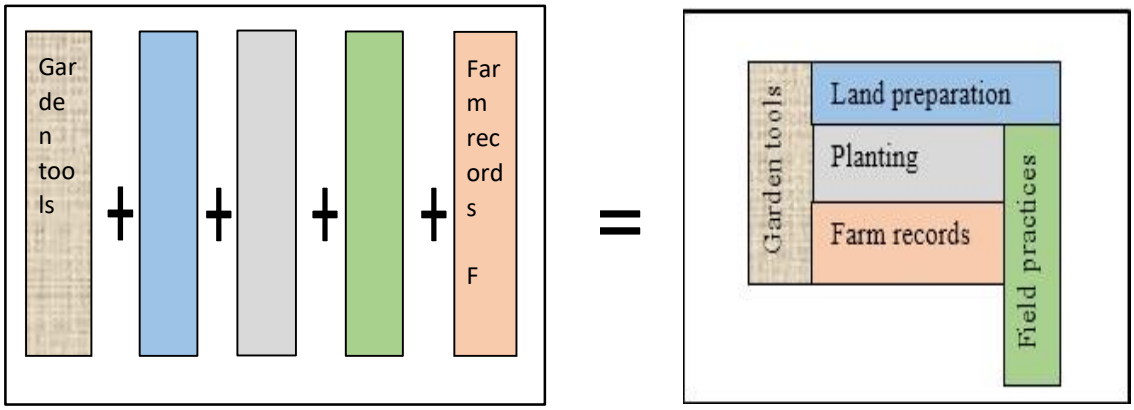

Figure 1: *Rote learning versus meaningful learning*

2.5 Conceptual Framework

The conceptual framework for the study is as outlined in Figure 2.1. The independent variables are school agricultural farm characteristics and learners' perception towards school agricultural farms, while the dependent variable is academic performance in agriculture. The intervening variables are teaching/learning on the farm, learning strategies on the farm, and agricultural learning/interaction at the farm.

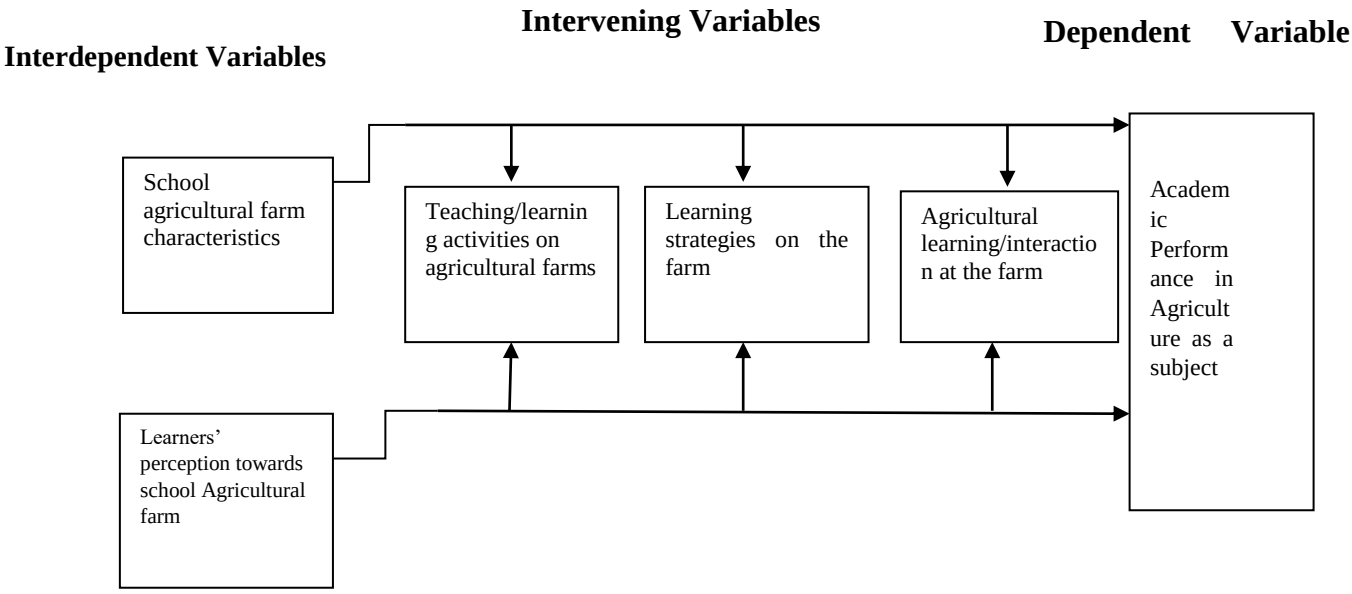

Figure 2: *The Research Conceptual Model*

CHAPTER THREE
MATERIALS AND METHODS

3.1 Location of the study

The study was carried out in Hamisi sub-county, one of the four sub-counties of Vihiga County, in Western Kenya. Hamisi sub-county is situated on the eastern part of Vihiga County, whose other counties are Emuhaya, Luanda, Sabatia and Vihiga. The sub-county borders Nandi County to the East, Sabatia and Vihiga sub-counties to the West, Kisumu County to the South, and Kakamega County to the North, as depicted in Figure 1.1. The sub-county straddles the equator and has an equatorial climate with annual rainfall of 1000-2700mm.Hamisi sub-county has peasants who mainly earn income from farming. The region receives 1000mm – 2700mm of rainfall annually and most of the land is made up of fertile soil which supports vegetation. The altitude of the location is about 2200m above sea level, and long rains occur between March and August while short rains are experienced between October and November. The choice of location was premised on the fact that the area had experienced changes in agricultural land use due to high population growth and socio-economic characteristics. Vihiga, like other counties in the region, has a large number of institutions and schools with agricultural and government demonstration farms.

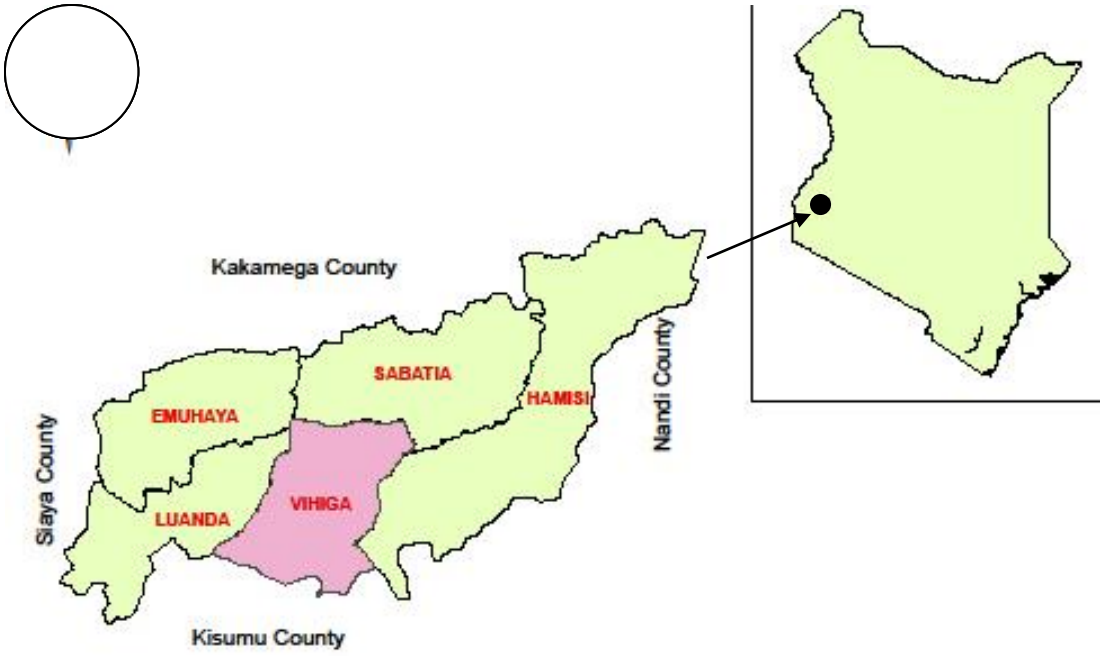

Figure 3. *Location of Hamisi sub-county*

Source: Researchgate.net, 2021

3.2 Research design

This study employed descriptive survey approach to understand the influence of school agricultural farms on the academic performance in agriculture as discipline in the secondary curriculum. Both qualitative and quantitative data were used to interpret the phenomenon of livestock production, crop production, agricultural economics and agricultural engineering. The study focused on the main interest and objectives of school farming in the 21st century and also considered the most used approaches in teaching agriculture in secondary schools.

The study also sought to ascertain if there was any relationship between the agricultural skills disseminated by teachers using school farms, and the ultimate academic performance in agriculture by students. The independent variable was farming activities undertaken in school farms, while the dependent variables were the level of competence of learners as revealed in KCSE examinations and practical work. The intervening variables were quality of teaching materials and effectiveness of teaching methods employed for agriculture in secondary schools. The design was preferred since it largely

sought information regarding self-recorded facts about respondents' feelings, opinions, attitudes and beliefs on current situation on school farming activities. According to Ezeugbor (2014) and Bhatia (2018), descriptive research design is used when data is collected to describe persons, organizations, settings or phenomena. The approach is useful in establishing existing data trends, using such common statistics as mean, median, mode and percentage. The design was ideal in this study as it was carried out within a limited geographical scope. The approach was also appropriate since the study sought was focused on a situational analysis of influence of school agricultural farms on academic performance of agriculture in secondary schools in Hamisi sub-county. The study involved use of questionnaires, with sections on characterization of school farms, how students' attitudes towards school farms affects academic performance in agriculture, and how school agricultural farms influence on academic performance in agriculture in secondary schools. The questionnaires were distributed among target agriculture teachers and sampled form four students.

3.3 Population and sample size of the study

Hamisi sub-county has 50 secondary schools offering agriculture as a subject, three of them being boys' boarding schools, three girls' boarding schools, two day/boarding school, and 42 mixed day secondary schools (MoE, 2019). The sub-county has 2800 form four students taking Agriculture together with their agriculture teachers.

The target population of study was 2800 agriculture students in the 50 secondary schools, 50 school principals and 50 agriculture teachers. The entire sub-county was studied because the size of the population that has the particular set of characteristics of interest was small. Taro Yamane formula was used for determining the sample size for agriculture students. The formula was chosen for the study since it is useful when working with a definite population whose size is known (as is the case with agriculture students in Hamisi sub-county), and it is based on the assumption that the confidence level (the confidence or certainty that the data collected is representative of the population) stands at 95% .Yamane's formula is expressed as below;

$$n = \frac{N}{(1 + N(e)^2)}$$

Where, n represents the sample size, N the population under study and e the margin error. Since the sub-county had 2800 form four agriculture students together with their teachers, the sample size was determined as under:

$$n = \frac{2800}{(1 + 2800(0.05)^2)}$$

$$n = \frac{2800}{(1 + 2800(0.0025)^2)}$$

$$n = \frac{2800}{(1 + 7)}$$

$$n = \frac{2800}{8}$$

$$n = 350$$

Stratified sampling technique was used to select 7 students 'respondents from the 50 schools. This yielded a total of 350 respondents from the student's population and one agriculture teacher in each school was selected to avoid variations in the responses. Stratified sampling involves splitting the sample into subgroups (strata), then taking a random sample from each (Taherdoost, 2016). The sampling approach was chosen because it ensures that each sub-group within a given population receives good representation within the sample (Trost et al., 2016).all the principals were purposely selected to participate.

3.4 Data collection by objectives.

In order to address the three study objectives, a survey was conducted using a structured questionnaire, focused group discussion and interview guides was conducted to gather information on school farm characteristics, students perception towards school agricultural farms and influence of school agricultural farm on academic performance in agriculture as subject. (Appendix 1and 2) data on school performance was obtained from school records in the 50 secondary schools studied (appendix 3).

3.5.1Characterisation of school agricultural farms in secondary schools in Hamisi Sub-county

On characterisation of school agricultural farms, questionnaire and focus group discussion made up of seven members from each school was used for collecting data from the agriculture teachers and students, while the interview approach was used for the principals. Focus group discussion method was additionally employed for the students. The questionnaire used is featured in Appendix II, with Part I Section B carrying questions for the teachers and Part II Section I showing the ones for the students. The interview schedule is shown in Appendix III.

Three hundred and fifty (350) structured questionnaires were administered to the students over a two-week period. Each questionnaire consisted of 8 questions classified according to the main themes of the study, agriculture education and training syllabus; activities that build capacity within the agriculture sector; vocational and in-service training and informal knowledge; skills acquisition by students and the education system on the ground such as farmer field schools. The questionnaire was preferred because it enabled contacting large number of participants quickly, easily and efficiently, in effect attracting high response rate, and it provides room for presenting a wide range of subject-specific wide range of open and closed ended questions (Colorado State University, 2019). The questionnaire is also useful as it allows large populations under study to be assessed easily (Jones and Khanduja, 2013).

The study is additionally in a position to observe and record verbal and non-verbal cues such as body language and emotions, and the tool also enables more detailed information to be obtained from respondents, given that more questions can be asked, and the respondents is not influenced as in group discussions. Focus group discussion is useful where deep understanding of social issues is needed, and is popular due to its participative nature (Nyumba, Wilson, Derrick and Mukherjee,2018). It has the advantage of being fast, inexpensive, giving participants a chance of reflecting on others' opinions as they present their own. Additionally, for the study, there is a chance of seeking clarity by probing further when vague responses are provided.

Participants in focus group discussion also respond more freely than when interviewed as individuals. Both the interview and focus group discussion involved oral administration of direct and non-direct semi-structured questions to principals and the agriculture students.

3.5.2 Influence of Perception of Students on the Contribution of agricultural farms on academic Performance in the subject in secondary schools

The questionnaire was also used for collecting data from the teachers and students (Appendix II Part 1 Section C and Part II Section II, respectively) on the influence of agriculture students' perception towards agricultural farms on academic performance in agriculture. The interview approach was used for the principals (Appendix III), while focus group discussion was used on the students alone.

3.5.3 Influence of school agricultural farms on academic performance in agriculture as a subject in secondary schools.

Data on influence of school agricultural farms on academic performance in the schools under study was collected from teachers and students using the questionnaire (Appendix II Part I Section D and Appendix II Part II Section III). As in the cases above, data from principals was collected using interview (Appendix III), and a focus s alone.

3.6 Validity and reliability of study tools

3.6.1 Validity

Validity of the instrument is the extent to which it measures what it purports to measure, or, in research, how well the collected data provides a true measure of the subject under study (Taherdoost, 2016). The questionnaires were validated by two experts from the department of Agricultural Education and Extension of Jaramogi Oginga Odinga University of Science and Technology.

3.6.2 Reliability

According to Golafshani (2012), reliability is the degree to which a research instrument yields consistent results after repeated trials. Golafshaniargues that if a study administers a tool of data collection and gets the same result on second administration then there is reliability. Reliability of the instrument was estimated through a pilot test using Test re-test method. Questionnaire and interview methods were administered twice within an interval of two weeks and modified to determine reliability.

The results obtained from pilot study assisted the study in revising the questionnaire to ensure it covered objectives of the study, for any instrument to be reliable it had to provide required results regardless to change in environment and location. The test-retest approach was carried out using different resources to see if the results were similar. Results obtained after test re-test were reserved for comparison with final study.

3.6.3 Reliability Test

The study sought to ensure that the research scales under study were reliable. The following section discusses the results of tests of reliability and validity

3.6.4 Test of Internal Consistency Reliability

The scales of research were evaluated to establish their reliability. To test the internal consistency of the scale items, Cronbach's alpha coefficient was utilized. Cronbach's alpha coefficient gives values ranging from 0 to 1 whereby the value of 1 indicates perfect reliability. The cut-off points of 0.70 is considered to be the lowest level of acceptability (Hair, Black, Barry and Anderson, 2014).The reliability statistic for each of the identified factors is presented in Table 4.1.Consequently, all the other items for each objective were accepted since they were above the cut-off point of 0.70. Table 4.2 revealed an overall reliability coefficient of 0.904. Statistically, a study will get a high Cronbach's alpha coefficient when the data is normally distributed compared to when it is positively or negatively skewed.

Table 1 : *Test of internal consistency reliability.*

Variables	Number of items	Cronbach's Alpha(α)	Comments
Students' perception	10	0.784	Accepted
School agricultural Farms	6	0.813	Accepted
Performance of agriculture in Secondary Schools	4	0.809	Accepted
Overall reliability	20	0.904	Accepted

3.6.5 Descriptive statistics

This section presented and discussed the results of the descriptive statistics of demographic information of the respondents and Agricultural farms in secondary schools. It also presented descriptive analyses results of the study variables.

3.7Ethical Considerations

Before administering the questionnaire, consent was sought from local authorities of Hamisi sub-county, and also sought from the respondents. Information obtained was only handled by the study and not shared publicly. The raw data was handled with confidentiality, and remains in safe custody even after the study.

3.8 Pilot study

Pre-testing of the research instruments was conducted through administering them to selected sample similar to actual sample that the research planned to use in the study. Pilot study was carried out on members identical to the sample, but not on those who would form part of the final sample. This was to prevent later influence on behaviour of the subject, which could affect reliability and validity of the research instrument. This provided valuable insights for research. The pilot study was helped in developing and testing adequacy of the research instrument; assessing feasibility of the study; designing a study protocol; assessing whether the research protocol was realistic and workable; establishing whether sampling frame and techniques were effective; identifying possible problems that may occur using the study methods; collecting preliminary data,

determining financial and human resources needed in the study for data analysis techniques to uncover potential problems, and developing research questions and research plan. The pilot study was carried out in three secondary schools in Emuhaya sub-county, and involved a total of 21 agriculture students and 3 agriculture teachers responding to questionnaires and three school principals responding to interview guides. In view of the findings of the study, necessary adjustments were made on the research tools.

3.9. Descriptive statistics

Characteristics of school agricultural farms was carried out using survey data which was analysed to generate descriptive statistics which was subjected to statistical analysis using SPSS to generate descriptive statistics on various school farm characteristics.

3.9.1 Inferential statistics

Influence of school farm on academic performance and students' perception towards school agricultural farm were analysed using multiple regression model which was fitted.The multiple regression analysis was used to test whether the independent variables had a statistically significant relationship on the dependent variables. (Lucey, 2016).

$Y = esp. (\beta_{0 + \beta 1}x_{1 + \beta 2}x_2 + \beta_3 x_3 + \varepsilon)$ Where:

Y= academic performance

β_0= Constant which is the value of dependent variable when all the independent variables are zero.

Bi= coefficient for X_i (i=1, 2, 3)

X_1= School farm characteristics.

X_2= Students' perception towards agricultural farms

X_3 = Level of school farms' influence on academic performance.

Ɛ: Error term

3.9.2 Data processing

Collected data was cleaned for analysis. The data was cleaned and coded inconformity with requirements of various analytical software.

3.9.3 Data analysis

The study sought to determine the degree of association and cause-effect influence between the variables. Descriptive and inferential statistics were used in analyzing the data. Collected data were coded and verified for any errors and omissions. Data was run through the Statistical Package for Social Sciences (SPSS) version 20. A Likert scale was adopted to provide a measure for descriptive data.

The scale helped to minimize the subjectivity and made it possible to use inferential analysis. The numbers in the scale were ordered such that they indicated the presence or absence of the characteristic to be measured (Mugenda and Mugenda, 2003). This mix of tools was necessary because whereas some aspects of the study where qualitative others were of quantitative nature.

CHAPTER FOUR

RESULTS

4.2 Demographic Profile of the teacher's respondents.

The demographic profile of the teachers covered in the study are set out in Table 2 majority (80.0%) had a first University degree, 12.0% had second university degree.

Table 2: *Level of education of the teacher's respondents.*

	Frequency in numbers	Percentage
First degree	40	88.0
second degree	10	12.0
Total	50	100.0

4.2.2 Years of service of the teachers in the current schools.

In terms of the years of service of the teachers in their current schools, 66.2% had worked for less than 5years, 28.6% between 4-10 years, 3.9% for 11-15 years and 1.3% had worked for over 16 years.

Table 3: *Years in Service of the teacher respondents.*

Years of service in the current school

Years	**Frequency(number)**	**Percentage**
Less than 5 years in service	51	66.2
6-10 years	22	28.6
11-15 years	3	3.9
Over 16 years	1	1.3
Total	**77**	**100.0**

4.2.3 Gender of teachers

The study observed that 87.5% of the teachers who participated in the study survey were males and 12.5% were females (Figure 1).

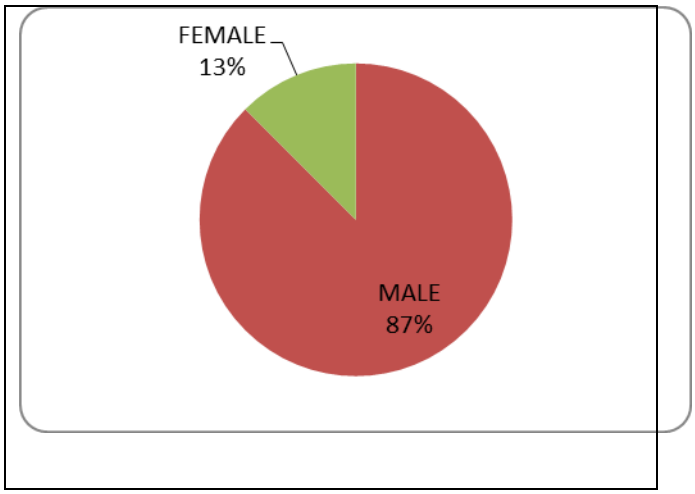

Figure 4: *Gender of the Teachers Respondents*

4.2.4 Teaching subjects of the teacher respondents

In terms of the teaching subjects (Figure 2), 79.2% of the taught Biology/Agriculture, 8.3% Agriculture/Biology, while 12.6% was shared equally by those teachers who taught Math/Agriculture (4.2%), Chemistry/Agriculture (4.2%) and Agriculture/CRE (4.2%).

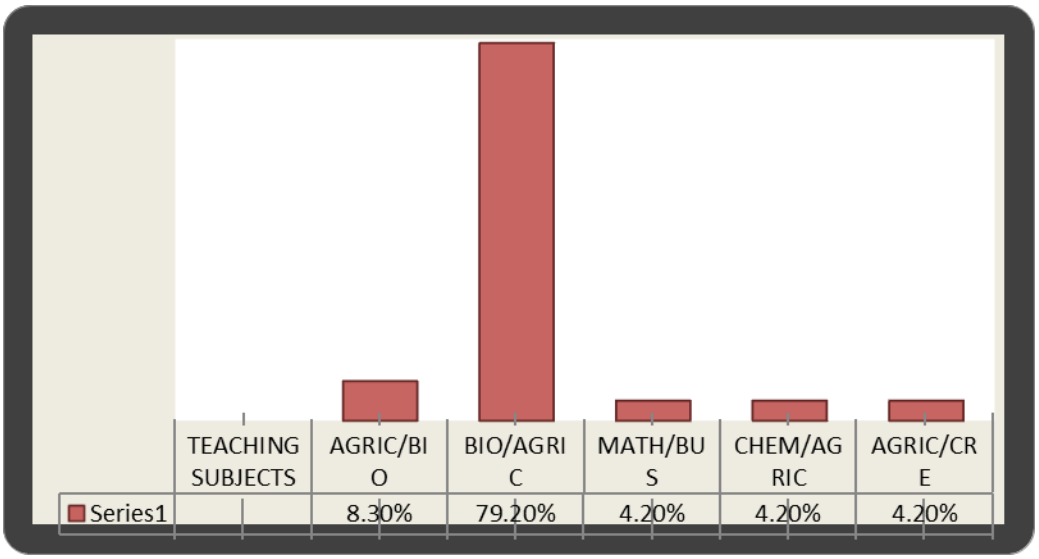

Figure 5: *Teaching Subjects of the Teachers' Respondents.*

4.2.5 Profiles of the schools covered in the study

The profiles of the schools covered by the study are presented in this section. The respondents were required to provide information on the type of school, types of plots the schools have and the beneficiaries of the school agriculture farms produce.

4.2.6 Types of school attended by students

The types of schools attended by the students are shown if Fig. 6.

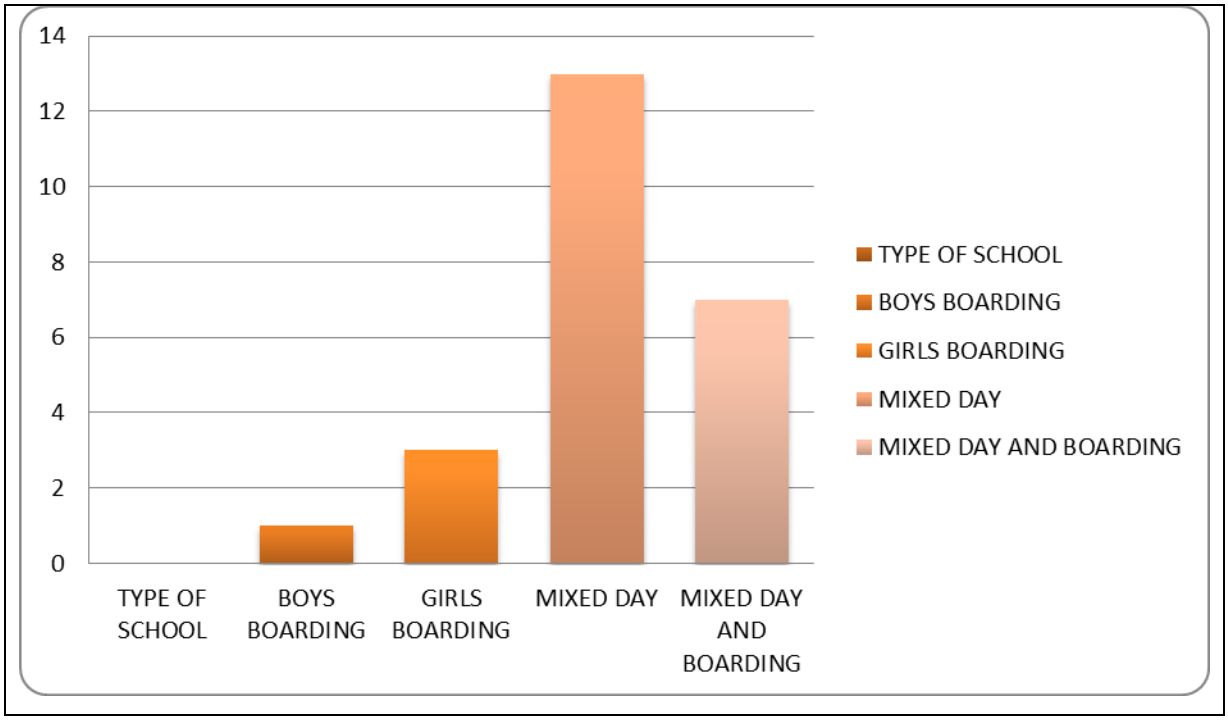

Figure 6: *Type of the school attended by the students*

The schools included in the study were mixed day schools, boarding boys' schools boarding girls' schools and boarding /day schools. Mixed day schools recorded the highest attendance at 54.2 %, followed by mixed day and boarding with 29.2%, girls boarding at 12.5%, and boys boarding had the lowest frequency at 4.2%.

4.2.7 Categories of school agricultural farms

The study determined the types of plots owned by the schools are shown in Fig. 7.

The school agricultural farms were classified as YFC Plots, Demonstration Plots, KNEC Plots and Commercial agriculture Farms. KNEC Plots accounted for the highest

percentage of the plots with 79.2%, followed by Commercial agriculture Farms with 12.5%, while YFC and Demonstration Plots accounted for 4.2% each.

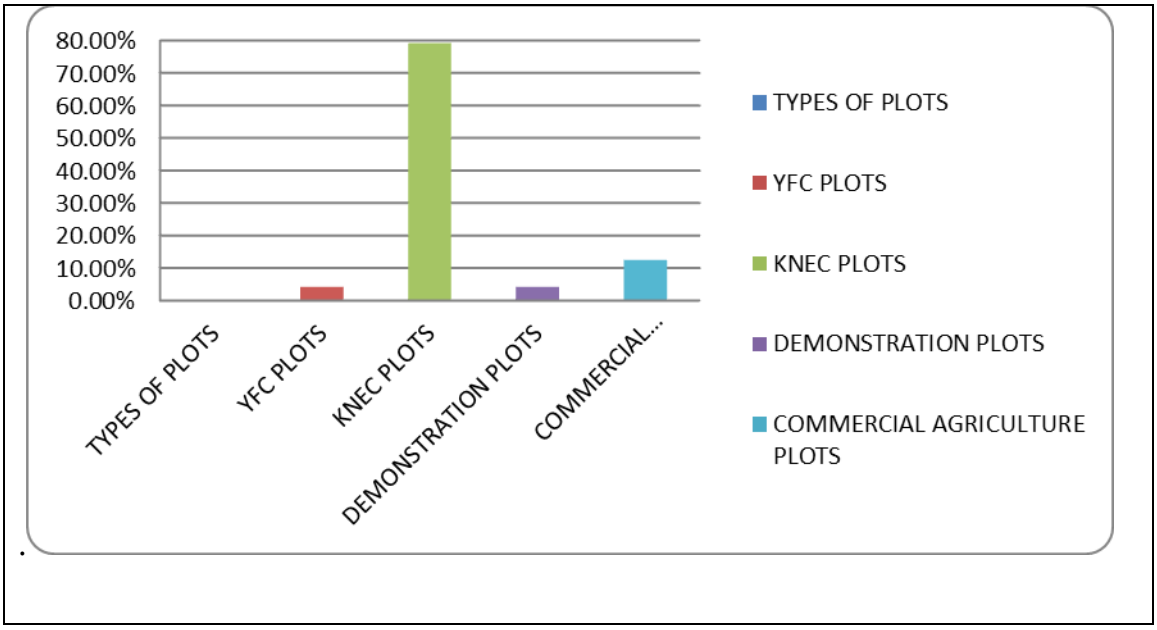

Figure 7: *Categories of school agricultural farms.*

4.2.8 Beneficiaries of school agriculture farms

The established beneficiaries of school agricultural farms are presented in Figure5. The beneficiaries of the school agricultural farms included all students, agriculture candidates, agriculture club members and hired personnel by the school. Approximately 66.7% of beneficiaries of the school agricultural farms were agriculture candidates, followed by all students at 20.8%, agriculture club members and hired personnel utilization accounted for 8.3% and 4.2% respectively.

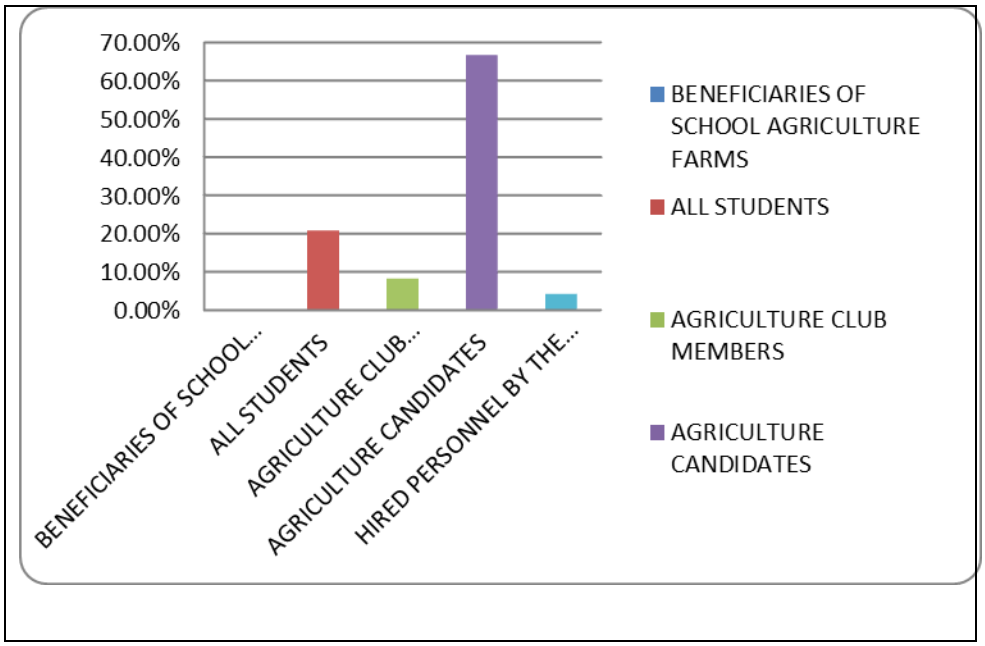

Figure 8: *Beneficiaries of school agricultural farms.*

4.2.9 Characteristics of school agricultural farms

This section analyzed objective one of the studies which aimed at characterizing school agricultural farms in secondary schools in Hamisi sub-county.

4.2.10 Utilization Period of school agricultural farms in years

The reported utilization periods of the school agricultural farms in the study area are presented in Figure 9.

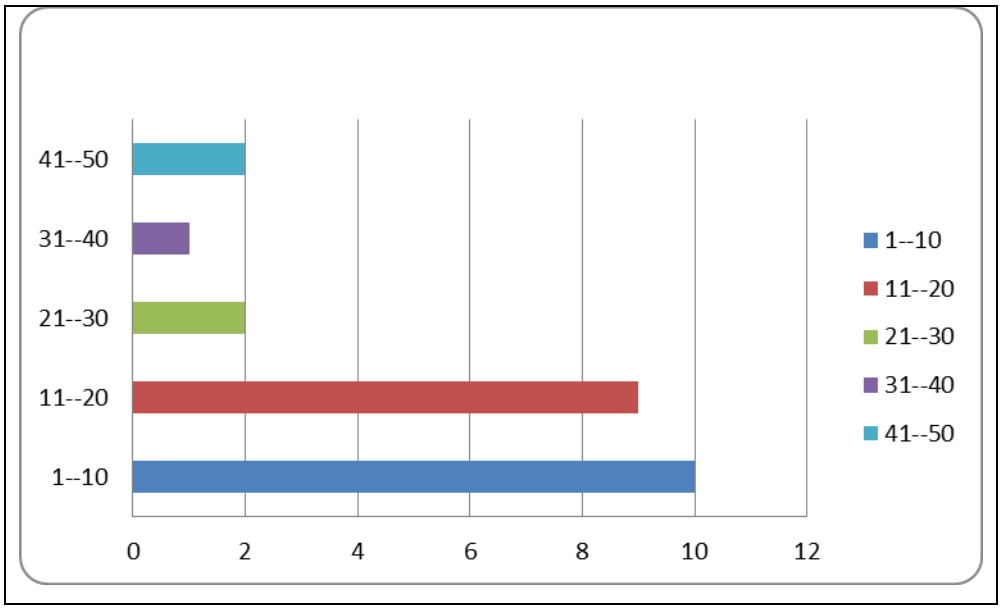

Figure 9: *Utilization period of school agricultural farms in years.*

The majority (41.7%) of school agricultural farms in had reportedly been utilized for a period of 1-10 years, while 37.5% had operated for 11-20 years, the school farms that operated for a period of 21-30 years and 41-50 years both accounted 8.3% each, while 4.2% of the farms had been used for 31-40 years.

4.2.11 Management of the school agricultural farms

The types of management personnel of the school agricultural farms covered by are presented in Figure 10. The majorities (54.2%) of school farms were managed by school agriculture teachers, 20.8% were managed by hired personnel, 12.5% by board of management, and 8.3% were managed by the school principals and 4.2% by the school farm manager.

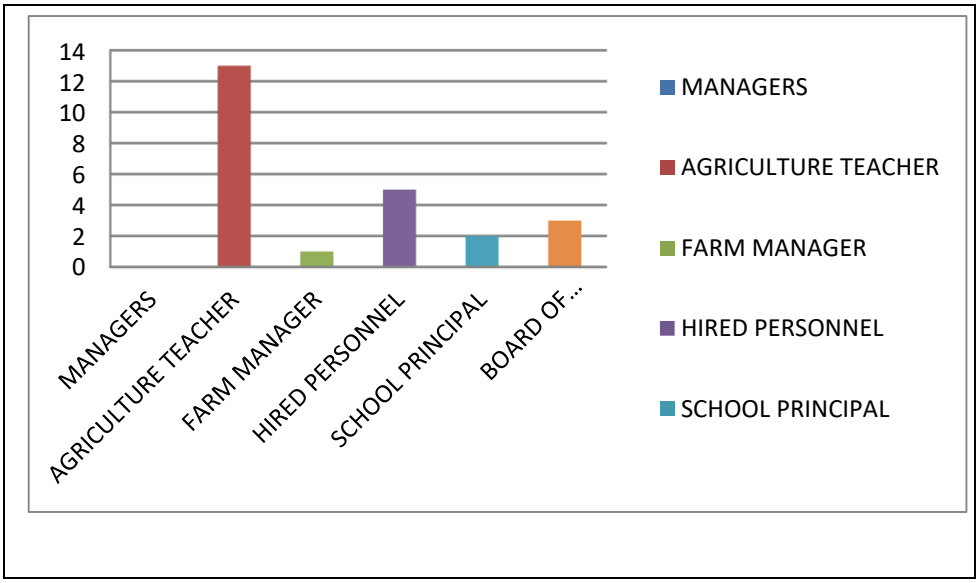

Figure 10: *Management of the school agricultural farms.*

4.2.12 Size (acres) of the school agricultural farms

The size of school agricultural farm in acres covered by the study are shown in Figure 11. . Of the 50 secondary schools surveyed, 91.7% had less than five acres of land, 8.4% each had 5-15 acres and 25-35 acres.

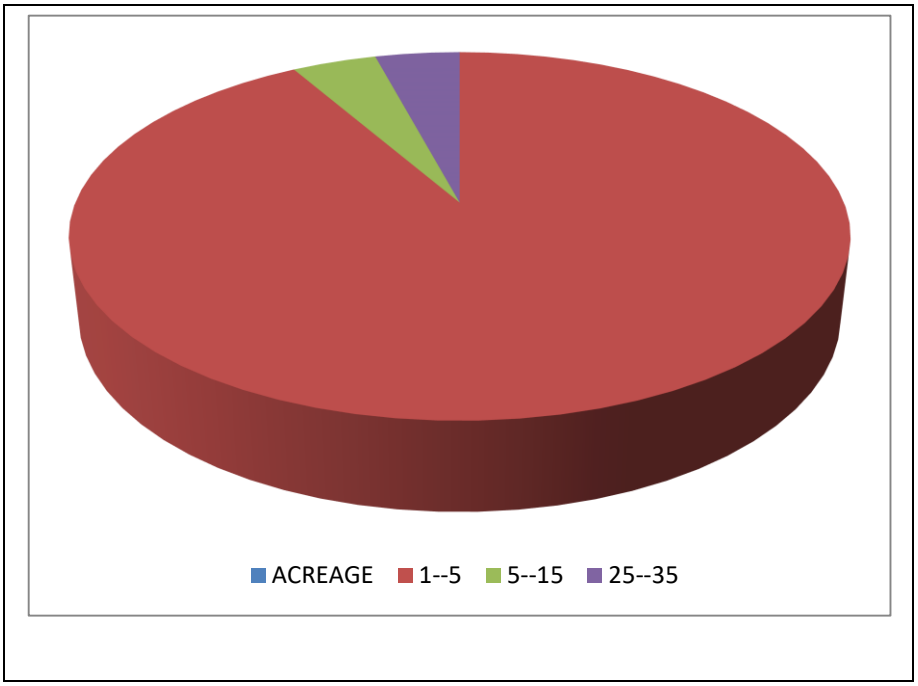

Figure 11: *Size of the school agricultural farms*

4.2.13 Proximity of school agricultural farms to agriculture classrooms

The distances of school agricultural farms from agriculture classrooms are given in Figure 12.

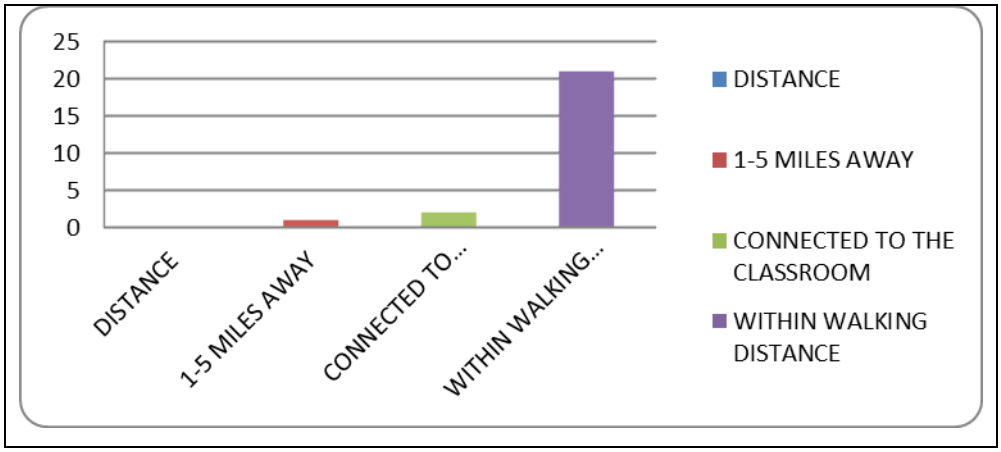

Figure 12: *Proximity of school agricultural farms to classrooms.*

Most of the schools 48 (87.5%), had their school agricultural farms- within a distance of 50 metres from the classrooms, two (12.5%) of the schools had their farms adjacent to classrooms, while one of the schools, had its farm within a distance of 1 to 5miles away.

4.2.14 Functions of school agricultural farms.

The functions of the various the School Agricultural farms are presented in Figure 13. Majority of the farms (66.7%) were classified as educational farms and 33.3% were classified as food production farms

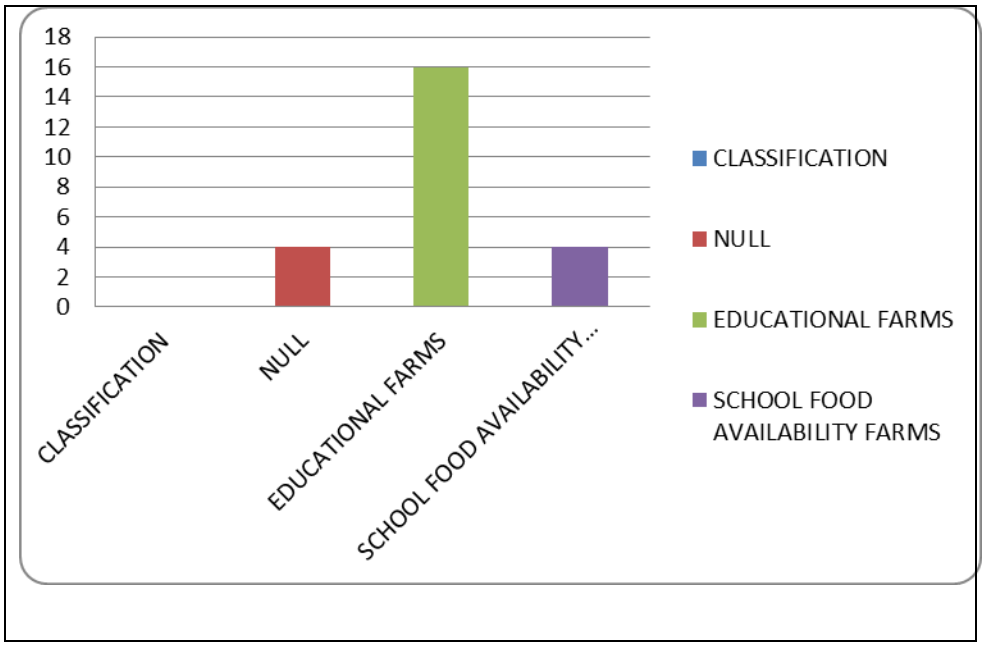

Figure **13:** *Classification of school agricultural farms by utilization.*

4.2.15 Record keeping in School Farms are presented in Figure 14. Fig. 14 presents the level of record keeping in the schools covered by the study. On average, 50% of the schools kept basic farm records, while the other 50% did not keep any records at all.

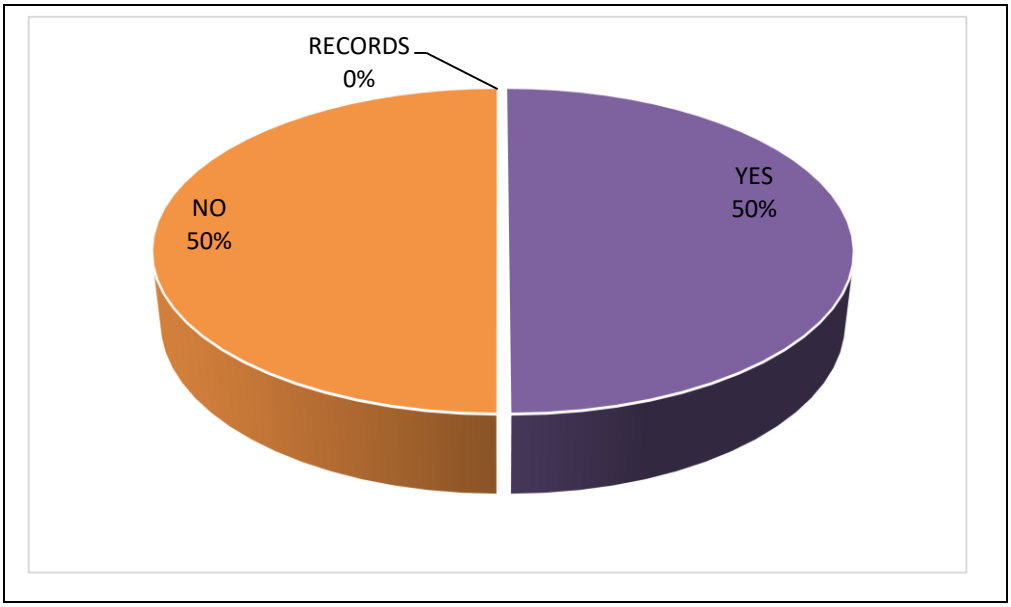

Figure 14: *Schools that keep farm records*

Table 4: *Correlation Matrix of students' perception, school agricultural farm characteristics and performance of agriculture.*

		Students' perception	Agricultural Farms	Performance of Agriculture
Students' perception	Pearson Correlation	1	.622**	.281**
	Sig. (2-tailed)		.000	.000
	N	338	338	338
Agricultural Farms	Pearson Correlation	.622**	1	.287**
	Sig. (2-tailed)	.000		.000
	N	338	338	338
Performance of Agriculture	Pearson Correlation	.281**	.287**	1
	Sig. (2-tailed)	.000	.000	
	N	338	338	338

Correlations among students' perception, school agricultural farms and academic performance of agriculture.

The correlation coefficients between students' perception and academic performance in agriculture as a subject; and school agricultural farms and academic performance in agriculture as a subject were 0.281 and 0.287 respectively, while that between students' perception and agricultural farms was 0.622. All coefficients were significantly different from zero ($p \leq 0.001$)(Table 4).

Table 5: *Multiple regression academic performance on students' perception and presence of school agricultural farms on academic performance.*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.898	.107		8.373	.000
Students' perception	.006	.087	.008	.074	.041
Presence of School Agricultural Farms	.645	.096	.721	6.708	.000

a. Dependent variable: academic performance of agriculture in secondary schools

The general model can therefore be written as:

Y = 0.898 + 0.006*Students' perception +0.645* Presence of schools of agricultural farms

Where Y is the academic performance of secondary schools.

CHAPTER FIVE
DISCUSSION

5.1 Results of the study by objectives

This section highlights and presents the analysed results by objective with their intensive explanation as follows;

5.2. Characteristics of School Agricultural Farms

Characterization of school agricultural farms. From the study findings school agricultural farms were characterized under; **land use, use of the school farm, proximity of the school, agricultural farms to agricultural classrooms, management of school agricultural farms , resources of the school agricultural farms, categories of school agricultural farms, beneficiaries of school agricultural farm products. operational period of school agricultural farms**

5.2.1 Operational period of School Agricultural Farms

From the results of the study, majority of the farms (54%) have been operational for average period of 23 years while the youngest farms have an operational period of 2 years. this finding agrees with the study of (Shoulder's and Myers ,2012)

From the above consistent in results, it is concluded that majority of the farms are old enough hence expected to have been effectively established to offer quality resources for instructions of agriculture.

5.2.2 Management of school agricultural farms

In terms of management of the above farms, the results suggest that most farms (54%) were managed by teachers of agriculture in schools, while 20.8% of the farm were managed by hired personnel, while 12.5% were managed by board of management while 8.3% and 4.2% of the farm were managed by school principals and farm managers respectively This finding agrees with the study findings of (shoulders and Myers ,2012). Therefore, a conclusion is drawn that most schools' farms are under good management and should be having adequate resources for teaching and learning of agriculture.

5.2.3 Type of school agricultural farms

The study findings indicate that schools in the area are into categories; **YFC plots (4.2%); Demonstration plot (4.2%); KNEC plots (79.2%); Agricultural club members plots (12.5%)**

This finding is consistent with the finding of (Binky and Tulloch,2007). From the above findings, types of school agricultural farms are designed to increase active learning and experience of principles taught in classrooms, as they are applied in the farm activities.

5.2.4 Beneficiaries of school agricultural farm products

The study established that all students in the school benefits directly or indirectly from the farm produce. Majority (54%) of the beneficiaries are agriculture candidate and club members, this are in agreement with the findings of (Trexler, 2011, Sayre and Clark, 2011)Therefore, a conclusion is drawn that since school farm products benefits all students, proper structure should be put in place for maximum utilization of school farm in teaching of agriculture and for commercial purposes.

5.2.5 Proximity of school agricultural farms to agricultural classrooms

The study established that a majority of farms 87.5% were within a distance of 50 meters from classes, while the rest were adjacent to agricultural classes.

These findings are in agreement with the study findings of (Parr and Trexler, 2011). This leads to a conclusion that most school farms in the study are accessible and should be effectively utilized for instructions of agriculture

5.2.6. Functions of school agricultural farms

The study established that majority of the farms 66.7% were used for educational purposes while 16.7% were used for food production purposes, while 7.45 were not utilized.

These are in consistent of the findings of (Parr and Trexler, 2011), a conclusion therefore drawn that most farms are used for educational purposes and should have required structure and resources for effective utilization in teaching of agriculture.

5.2.7 Resources of the school agricultural farms

Resources of the farms were classrooms, general shop, livestock housing, school farm livestock, and green houses, cereals, vegetables and cash crops.

This finding agrees with (Dunlop's 1966) findings in Texas. it was therefore concluded that most schools in the study have resources. Their farm which should be utilized in teaching of agriculture is secondary schools.

5.2.8 Land size and school agricultural farms

From the study, land size is varied from one school to another. 91.7% of the schools had less than five acres of land while 8.4% had between 5-15 acres of land and 1% had between 25-35 acres of land, this agrees with the study of (shoulders and Myers, 2012).It is therefore concluded that all schools have a piece of land that can be put in agricultural use for demonstration and teaching of agricultural concepts in schools.

5.3 Influence of students' perception towards agricultural farms on academic performance in agriculture

The study established that utilization of the school farm was based upon the teachers perception of the school farm facilities. This will intern influence students perception towards the school agricultural farm. These findings are in agreement with the findings of Shoulders and Myers (2012)

From the findings, it was found that variation in academic performance in agriculture in secondary schools is significantly explained by the variation in the independent variable student's variation. The students' perception was positively correlated with academic performance in agriculture in secondary schools and it implied that every unit increase in students' perception increased performance.

The perception and attitude of the students towards the subject of agriculture and farms has been considered as great and impressive. Most of them admitted enjoying the agricultural practical lessons and the possible impacts in their life (Borasi, 2010; Shoenfeld, 2015). Normally, the concept and the students' attitude towards agriculture plays a significant role in determining how the students feel about the agricultural subject and determines the approaches that they take towards the subject. Attitude towards the subject is therefore the most important thing in the course of studying the subject.

These results are in line with Lambert et al., (2018), and Roots et al. ; (2002) human thoughts who opined that, the background knowledge, learning attitude and prior learning

experience that a student carries to class can greatly influence the development of new knowledge. Other studies that concur with this study include Krogh et al., (2014) and Joshi et al., (2008). Lekies and Sheavly (2013) looked into factors of school garden projects that influence children's interest in farming. They established that learned farming skills triggered interest in farming, and recommended the creation and development of hands-on garden activities to foster interest in gardening. The availability of teaching and learning tools is also important in establishing a good attitude among students studying agriculture. According to Juznic et al. (2006), students' perceptions about agriculture are influenced by the availability and use of agricultural teaching and learning materials.

Another study by Otekunrin, Otekunrin, and Oni (2019) found that having school farms and instructional materials was not enough to ensure high agricultural performance in secondary schools, and that there was a significant requirement for well-trained instructors and appropriate infrastructure. Similarly, Kidane (2013) found that a lack of motivation - which may be driven by a lack of resources - causes students to put less effort into a topic, resulting in low academic achievement in that subject. According to Roesch-mcnally and Arbuckle (2018), a student's academic performance is influenced by the instructional resources accessible in his or her school as well as the socioeconomic milieu in which he or she grows up. The study also found that situational interest in agriculture, nutrition, and consumerism during a partially farm-based training program corresponds with the desire to conduct environmentally responsible consumer behaviour following treatment.

A study in Pakistan found out that the performance in agricultural subject is solely depended on the attitude of the students. However, similar studies have found out that girls have lower success rate compared to boys in terms of the agricultural subjects. The studies that have been done to determine the impacts of the students in relation to performance in the agricultural subject found out that the performance is pegged on the attitude. Therefore, the element, mostly the social environment should work to ensure that all students regardless of the gender have the right attitude to improve the performance of the students mostly concerning the subject. Without the right attitude mostly among students, Girls are made to think that they cannot do better than boys in

Agriculture subject in National exams. Therefore, positive attitude should always be enhanced in the school environment to ensure all students are given equal chances towards Agriculture to help reduce the negative attitude that seems to institutionalize the thinking that it is only boys who can do better than girls in agriculture subject should not be encouraged.

5.4 Influence of presence of school agricultural farms on academic performance in agriculture.

The study established that school agricultural farm offered hands in learning venues which are vital for learners to increase students' engagements, curriculum can offer abstract and no real life experience and application. Therefore the school farm was found to make a connection between abstract contents in classroom and real life experience. These findings were in consistent with the findings of Kellog et-al (2010) who suggested that hand on learning increases learner active learning and real life simulation.

It was established that school agricultural farm activities was a balance and integratia between learning from classroom lecture and peer directed project based hand on learning in the farms. This finding agrees with finding of Parr and Trexler (2011) who concluded that hand on learning is a way of learners to connect with real life learning.

The school agricultural farm was found to play a vital role for learners who didn't come from a agricultural background. Such learners were said to gain more indepth knowledge about agricultural production as the school agricultural farm produced a wide variety of experiences. These findings were in consistent with the findings of William and Mc Carty (1985) who emphasized that school agricultural farm has ability to serve diverse groups of learners.

From the study finding, it was established that through learner engagement in school agricultural farm activities, they were motivated with empowerement they experience when practical learning were directly alighted with their values, ideas and deeper sense the purpose when learners utilize school agricultural farm for instructing agricultural activities. These findings were in agreement with findings of Parr and Trexler (2011, page 178).

School agricultural farm activities and classroom instruction were essential for students engagements and success in agricultural academic performance. These findings were in agreement with the finding of Talbers et-al (2007).

The study find that the purpose of school agricultural farm was to provide real-life application for students who were unable to have these experience elsewhere.

These findings agrees with the finding of William and Mc Carthy (1985) who emphasized that school agricultural farm has ability to serve diverse groups of learners.

These results agree with studies that show teacher evaluations and students' self-assessments have a positive impact on science achievement in school (Abdullah et al., 2015; Lekies and Sheavly, 2013). This is explained by qualitative findings indicating that farm experiences promote social learning and strengthen the sense of self-efficacy (Woody et al., 2015; Lachowski, 2015) that in turn can have a positive effect on learning and achievement in school. A study by Njura et al. ; (2019) investigated the importance of hands-on activities in farms education for adolescents aged 13-16 years old. The findings indicated an increased level of cognitive and affective components of learning through the inclusion of instructional hands-on activities on farms in comparison to control group participants without hands-on experience.

Another study by Krogh et al. ; (2014) showed that learning in school gardens and neighbouring farms whose core idea is that students who regularly and actively participate on local farms have long-term connections to the farm's activities.

From the responses of the principals, the influence of school farms on academic performance in agriculture was observed to be of great significance, as 66.1% of them were able to observe close supervision of students' performance through practical session interactions with their respective subject teachers. Of the sampled population, 22.0% viewed school agricultural practical as tools for positively shaping students' attitudes towards agriculture as a subject and hence generating better performance.

Saving on time to be focused on learning was also another factor of consideration, according to 6.8% of them, while the least suggested was the enhancement of students' creativity by exposing them to field problems and allowing them to come up with viable

solutions during practical sessions. This is an indicator that agricultural practical are highly valuable in determining the academic performance of students in agriculture.

From the study, it was evident that among the most effective ways of improving students' perception towards performance in agriculture as a subject is by engaging the students in field practical all through their four years in high school. This option was vouched for by 57.7% of the principals, also only encouraging and rewarding agricultural practical competitions in school was supported by 15.5%. Allowing the students to visit agricultural shows and exhibitions was brought was recommended by 14.1% and, lastly, % paying of commission to agriculture students from the farm proceeds was considered to help improve students' perception hence better performance in the subject. Studies Kidane (2013) indicate that teaching of agricultural science was influenced by availability of agricultural fields for practical experience in agricultural institutions.

Gegbe and Koroma (2014) reported that poor teaching methods without practical farms contribute to the poor performance of students, while Ojukwu (2015) and Moyo and Maseko (2016) stated that poor practical teaching methods and failure to use instructional material effectively also influence the performance of students. Lack of agriculture-related practical work came as an important cause for the poor performance of students. This finding supports the one by Lee and Sulaiman (2018) who report that students who are involved in practical agricultural work performed better than those who were not. Further, Ojukwu (2015) and, Moyo and Maseko (2016) determined that the inadequacy of practical experience influenced the performance of students negatively. With agricultural education being a practical subject, it is expected that each student should have a small plot on which to learn about gardening and practical farming (Talathi et al., 2014).

The findings were in agreement with Tapiwa (2021), Darko et al. (2016a) and Waithira (2013) who explained that practical teaching of agriculture in high schools was greatly hampered by lack of school gardens, demonstration plots and well-equipped laboratories. All of these inadequacies hinder practical training and force theoretical teaching which restricts hands-on skills development. Practical training in agriculture is rooted in the constructivist perspective that children learn by doing rather than by being told. Thus, the lack of out-of-school activities and practical work in agriculture pose a serious challenge

to the learning situations ought to be reality based to enable students to develop and practice the skills on their own.

These findings agree with studies that show positive results of farm and gardening education (Krogh et al., 2014; Joshi et al., 2008; Lekies and Sheavly, 2013). This also agrees with studies by Lachowski (2015) that reviewed on possible benefits of school gardening, concluding that students' general attitudes toward school improved with the amount of gardening activities. Ratcliffe et al. (2015) established that school gardening improved participants' preference for vegetables compared to a control group. These attitudinal changes may also affect actual behaviour.

Another study suggested that field demonstrations and experiments are some important out-of-class activities for students as they prompt students to be active seekers of knowledge and as such, influencing their performance. (Fleming et al.,2013).

This chapter has discussed the results of the study according to the objectives. The results indicate that majority of the agricultural farms are small and unstructured, with no formal management. The study found that a learner's perception has a positive and significant influence on his/her performance in agriculture. The study also established that school agricultural farms have an influence on academic performance in agriculture as a subject to a large extent since it was positively and significantly correlated with the academic performance in agriculture.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Based on the study results and limitation the following conclusions were made on each study objectives.

6.1.1 Characterization of school agricultural farms in secondary schools.

The study concluded that most school agricultural farms have been in existence for an average of 23 years, majority of the farms were managed by teachers of agriculture, the farms had low acreage and within walking distance from agricultural classrooms. Diversity of crops and livestock were major farming enterprises on those farms.

6.1.2 Assessment of the influence of students' perception towards school agricultural farms on academic performance in agriculture as a subject in secondary schools.

The perception and attitude of the students towards the subject of Agriculture and farms has been considered as great and impressive. Based on the study results, learner's perception towards school agricultural farms has great influence on his/her academic performance in agriculture as a subject. A large percentage (77.8%) of the sampled students agreed that perception towards school farm affects academic performance in it. From the simple linear regression model, students'perception towards the agricultural farms was found to have significant effect on their academic performance (Wald=10.907, p=.001).

6.1.3 Evaluation of the influence of presence of school agricultural farms on academic performance in agriculture in secondary schools.

Availability of functional school agricultural farm with high quality farm infrastructure influence academic performance in agriculture as a subject to large extent as agreed upon by a cumulative of 97.2% of the sampled students, 95.6% of the teachers and 100.0% of the principals. In view of the study findings, schools with large farm had good KCSE performance in agriculture as compared to those with small farm size.

6.2 Recommendations of the Study

Pursuant to the study results it is recommended that;

6.2.1 Characterization of the school agricultural farms in secondary schools.

The study recommends that another research should be conducted in Hamisi sub-county to assess level of school agricultural farms preparedness in teaching of agriculture. Enhancement of agricultural practical and adequate school agricultural farm infrastructure is highly recommended in schools offering agriculture as subject to enable students performs better in agriculture as a subject in high schools.

6.2.2 Assessment the influence of students' perception towards school agricultural farms on academic performance in agriculture as a subject in secondary schools.

Seminars for teachers should be intensified to encourage cultivation of positive perception toward teaching and learning agriculture in school agricultural farms.

Secondly, the study recommends a further study to be done analysing the specific aspects of students' perception towards agricultural farms in order to identity the most appropriate factors and effective ones influencing academic performance in agriculture as subject.

6.2.3 Evaluate the influence of presence of school agricultural farms on academic performance in agriculture in secondary schools.

The study recommends further research on management of school agricultural farms that greatly influence agricultural academic performance in agriculture secondary schools.

The study further recommends school agricultural farm structure and facilities be improved and well organized to improve academic performance in agriculture as subject in secondary schools

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APPENDICES

Appendix 1: Survey questionnaire

Survey questionnaire was broken as:

1a) Profile of the school

1 Name of School_____

2. What type of school is your school?

Boys Boarding [ ] Mixed Day [ ]

Girls Boarding [ ] Mixed Day and Boarding [ ]

3. Does the school have an agriculture farm[s]?

YES [ ] NO [ ]

4. What type of plots does the school have? (Tick from the list given)

YFC Plots [ ] Demonstration Plots [ ]

KNEC Plots [ ] Commercial Agriculture Farm [ ]

5. Who utilizes school Agricultural farms in your school? (Tick from the list)

All students [ ] Agriculture candidates [ ]

Agriculture club members [ ] Hired personnel by the school [ ]

b) Characteristics of school agricultural farms.

1. For how long has the school farm been in operation? (Approximate years) _____

2. Indicate from the following list, who manages school farms in your school?

Agriculture teacher [ ] Hired personnel [ ]

Elected students [ ] School principal [ ]

Farm manager [ ] Board of Management [ ]

3. How many acres is your school agriculture farm? (Approximate acres from the list below)

1-5 [ ] 5-15 [ ] 15-25 [ ]

25-35 [ ] 35-50 [ ] above 50 [ ]

3. How far is the school agriculture farm from agriculture classes? (Response from the list below)

Connected to classroom [ ] within walking distances [ ]

1-5 miles away [ ] 10 or more miles away [ ]

4. Approximate land size in acres under;

a) Food crops _____

Which crops are grown 1_____ 2_____

3_____ 4_____ 5_____ 6 _____

b) Cash crops _____

Which crops are grown 1 _____ 2_____ 3

_____ 4 _____ 5_____

6_____

(c) Livestock

Which livestock are reared? 1_____ 2_____3_____

4_____ 5 _____6_____ 7 _____

5. Classify your school farms into any of the utilization categories below

Income generation farms [ ] school food availability farms[ ]

Educational farms [ ]

Reasons

_____

_____

6. Do you keep farm records? Yes [ ] No [ ]

If yes, which records?

1c) Profile of agriculture teachers in Hamisi sub county.

1. Name of interviewee_____

2. Number of years of experience as agriculture teacher_____

3. Gender Male [ ] Female [ ]

4. Education level (highest) Certificate [ ] Diploma [ ] Degree [ ] Masters [ ]

5. Length of stay in current school (years) 0-5 [ ] 6- 10yrs [ ] 11-15 [ ] above 16yrs [ ]

6. A) Teaching subjects _____

B) preferred teaching subject_____

1d) Students perception towards school agricultural farms

1. Based on the Likert scale of 1 – 5 where (1 = Very low extent, 2 = Low extent, 3 = Moderate extent, 4 = Large extent and 5 = Very large extent), indicate what extent do you agree with the following statements.

Statement	1	2	3	4	5
Student's attitudes towards school farms depend on agriculture teacher?					
Active involvement of students in school farm activities consumes much of lesson time allocated to Agriculture?					
School farm is an extension of classroom instructions?					
Students are motivated towards school farms without influence of the agriculture teacher?					
School farm is a facility for supervised Agricultural experience?					
Active participation of students in school farm activity delay syllabus coverage?					
All agriculture teachers influence student's attitudes towards school farm?					
Performance of most school farms depends on attitudes of agriculture students?					
Active participation in farm activities make them t have negative perceptions towards agriculture as a subject					

1e) How school agricultural farms influence academic performance of agriculture in secondary schools

1. Based on the Likert scale of 1 – 5 where (1 = Very low extent, 2 = Low extent, 3 = Moderate extent, 4 = Large extent and 5 = Very large extent), indicate to what extent do you agree with the following statements.

Statement	1	2	3	4	5
Practical on school farm improve understanding of agriculture concepts in secondary school?					
Schools with active agricultural farms perform better in agriculture KCSE examination?					
Teaching and Learning agriculture in school farms make learning interesting and real?					
Lack of functional school farms makes it difficult to understand some agriculture concepts?					
Participation of school farm activities encourages sharing of knowledge among agriculture students?					
A farming activity in school farm encourages collaboration and discussion among learners?					

Part II: Questionnaire to students

Ia) Characteristics of school agricultural farms

1. Based on the Likert scale of 1-5 where (1 = Very low extent, 2 = Low extent, 3 = Moderate extent, 4 = Large extent and 5 = Very large extent), indicate to what extent you agree with the following statements;

Statement	1	2	3	4	5
The type of crops grown on the farm influences academic performance by students in agriculture					
Selection of crops to grow determines students' a performance.					
Management of the school farm is important in improving					

academic performance by the students					
Size of the school farm improves academic performance in agriculture					
Purpose of farming on the school farm influences performance by agriculture students					
Recording of all activities carried out on the farm influences performance by agriculture students					

1b) Students perception towards school agricultural farms

1 Does your attitude towards the agricultural farm influence your academic performance?

YES [ ] NO [ ]

2. Based on the Likert scale of 1 – 5 where (1 = Very low extent, 2 = Low extent, 3 = Moderate extent, 4 = Large extent and 5 = Very large extent), indicate the extent to which you agree with the following statements.

Statement	**1**	**2**	**3**	**4**	**5**
Involvement of students in agricultural farm activities improves academic performance					
Students' attitude towards agriculture as a discipline depends on the teacher of the subject					
The mode of delivery by the teacher strongly influences a student's attitude towards academic performance					
Reviewing and solving students' complaints by agriculture teachers influences students' attitude towards academic performance					
Students attitude towards agricultural farm is determined by activities engaged in					

1c): School agricultural farms and academic performance

1 Does School agricultural farm influence your academic performance YES [ ] NO [ ]

2. Do you engage in practical lessons in your school? YES [ ] NO [ ]

3. If yes, what time interval do you engage in the practical lessons?

[ ] Daily [ ] Weekly [ ] Monthly [ ] Others

4. Based on the Likert scale of 1 – 5 where (1 = Very low extent, 2 = Low extent, 3 = Moderate extent, 4 = Large extent and 5 = Very large extent), indicate the extent to which you agree with the following statements.

Statement	1	2	3	4	5
Engaging in practical lessons helps as improve our academic performance					
Having an agricultural farm has helped our school perform better in KCSE exam					
The school farm has helped us develop better understanding of agricultural concepts					
Practical lessons on the school farm has enabled us develop cohesion and integration					

APPENDIX 2: Interview schedule for school principals

1. Does your school utilize agricultural farm in teaching?

2 What is the source of capital used by agriculture teacher on school agricultural farm?

3. Who manages your school farm?

4, how is your agriculture teacher motivated towards school farm when teaching?

5. In your own view, how can agriculture teacher influence students' attitudes towards school farm?

6. How does school farm influence academic performance of agriculture?

7. Are Agricultural practical done on school farms valuable in teaching of agriculture? Explain.

8. What should be done to improve student's attitudes towards school agricultural farms?

9. What are some of the strategies to be put in place to ensure maximum utilization of school agricultural farms for instructions?

Appendix 3. 1Performance of agriculture as a subject in KCSE in Hamisi sub-county

s/n	School name	farm (Acres)	Agricultural KSCE mean score from 2013-2019						
		3	2013	2014	2015	2016	2017	2018	2019
1	Nyang'ori	1	10.22	9.74	9.34	6.73	5.89	7.28	6.79
2	Kitagwa	2	10.66	8.87	6.578	5.66	7.30	7.31	5.22
3	Tigoi girls	1	6.91	8.33	6.83	4.92	3.83	4.12	4.86
4	Makuchi	3	3.02	4.00	3.94	2.11	2.75	3.96	4.80
5	Kaimosi girls	3	7.15	10.02	9.35	4.14	3.22	4.44	4.82
6	Senende boys	2	6.96	10.06	10.06	4.73	3.67	4.02	4.80
7	Goibei girls	1	6.24	8.57	5.65	3.28	2.29	3.11	4.63
8	Gimose	2	.....	.....	.....	.....	2.66	2.66	4.56
9	Gamalenga	2	5.34	4.95	3.63	2.67	2.5	3.70	4.45
10	Simbi	1	3.88	4.36	3.57	2.37	2.31	3.11	4.80
11	Musiri	2	4.143	6.00	3.14	3.35	1.76	2.52	4.08
12	Kaimosi boys	25	5.75	7.73	5.51	3.67	3.15	3.35	4.04
13	Ivola	2	4.48	4.57	4.22	3.14	3.35	2.48	3.8
14	Malinda	1	.....	.....	3.65	2.97	2.86	4.17	3.71
15	Munzatsi	3	4.89	4.94	3.66	2.53	2.33	3.47	3.68
16	Dr.Dangana	3	4.97	6.16	5.17	4.28	2.70	3.14	3.64
17	Erusui girls	2	8.40	8.72	5.76	5.63	3.47	3.32	3.53
18	Givole	2	4.59	4.62	2.77	2.82	2.16	3.02	3.46
19	Kaptik	4	6.09	6.69	4.64	4.31	2.92	3.47	3.41
20	Gimarani	1	4.00	5.67	2.65	2.83	2.57	3.33	3.32
21	Gamoi	1	3.92	5.11	3.01	2.27	2.35	2.65	3.29
22	Kamulukuywa	2	.....	.....	.....	.....	.....	1.83	3.29
23	Kapchemugung	2	3.71	4.70	3.03	2.20	2.60	1.86	3.14

24	Buyangu	1	3.23	6.04	4.90	3.22	1.78	2.87	3.08
25	Jepkoyai	2	3.55	6.00	5.00	2.00	2.50	2.24	3.09
26	Imusutsu	1	4.64	6.29	3.24	2.73	2.23	2.77	3.02
27	Lwombei	2	4.20	4.56	3.10	2.95	2.17	3.22	3.00
28	Muhudu	2	6.41	8.79	5.01	2.98	2.66	3.22	2.98
29	Kinu	1	.....	3.90	2.72	2.30	1.93	2.03	2.87
30	Shamakhokho	1	5.00	5.26	4.66	2.18	2.39	2.32	2.82
31	Samson Mmaitsi	1	.....	.....	.....	3.14	2.88	2.93	2.73
32	Stanley Godia	2	5.23	6.52	3.80	3.500	3.05	2.72	2.65
33	Museywa	1	6.00	4.25	2.71	3.00	2.72	2.59	2.63
34	George khanirikap	2	4.17	4.88	2.79	2.59	3.50	3.00	2.54
35	Gimengwa	1	.....	3.28	3.12	2.43	2.08	2.26	2.53
36	Kapsotik	3	3.46	4.61	3.83	1.94	2.00	2.55	2.51
37	Ishiru	2	3.86	3.63	2.51	2.64	2.08	1.58	2.48
38	Muhaya	2	4.35	4.16	3.64	1.73	1.65	2.38	2.35
39	Bumuyange	1	.....	.....	.....	2.84	1.13	2.00	2.33
40	Kisasi	1	.....	.....	.....	2.40	1.77	2.22	2.33
41	Chebunaywa	1	3.00	3.38	2.70	1.62	2.00	2.67	2.33
42	St peters Erusui	2	.....	.....	.....	2.15	1.94	2.63	2.19
43	Bumira	1	.....	3.73	2.65	2.11	2.29	2.56	2.17
44	Gisambai	2	3.77	4.81	4.69	2.17	1.76	2.22	2.14
45	Gavudunyi	1	5.21	6.74	3.74	2.16	2.00	2.27	2.11
46	Muyere	1	.....	.....	.....	1.94	1.58	2.26	2.11
47	Cheptech	1	2.00	2.47	3.04	2.14	2.11	2.07	2.11
48	Chepsaga	1	.....	.....	.....	1.87	1.50	2.60	2.00
49	Kaimosi Demon.	6	3.30	3.70	2.86	1.84	1.75	1.91	2.00
50	Gidagadi	1	.....	.....	.....	.....	.....	2.57	1.80
	AVERAGE		**4.81**	**5.73**	**2.89**	**2.89**	**2.49**	**2.98**	**3.22**

MEAN SCORE