

**DOCUMENTING THE TEACHER-GUIDED 4-K CLUB ACTIVITIES
UNDERTAKEN FOR LEARNERS' ACQUISITION OF THE CORE
COMPETENCIES IN THE AGRICULTURE SUBJECT AT UPPER PRIMARY
SCHOOL IN MAKINDU SUB-COUNTY, KENYA**

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**A Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirements
for the Master of Science Degree in Agricultural Education of Egerton University**

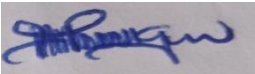
EGERTON UNIVERSITY

JULY, 2025

DECLARATION AND RECOMMENDATION

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I declare that this thesis is my original work and has not been presented for the award of any diploma or conferment of a degree in this or any other university.

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DEDICATION

To my wife Sharon and my son Mark Robert, to my dear parents Benjamin and Catherine Ndambuki and to all who believe that no human is limited.

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First, I would like to thank Almighty God for granting me good health, provision and wisdom throughout the study period. I am grateful to Egerton University for giving me opportunity to pursue my master's degree in the institution. I also thank NACOSTI for granting me permission to conduct this study. To my colleagues, Stephen Mulei and Magdalene Mwende, I am truly grateful for your financial and moral support especially during moments when I felt like giving up. I would also like also to thank my family for their patience, encouragement and understanding during the demanding period of conducting this research. I owe sincere gratitude and appreciation to my able supervisors Dr. Miriam Kyule and Dr. Jacob J.J.O. Konyango for their tireless guidance and support from formulation of the research title to completion of this study. Thank you for nurturing me academically. To the Makueni County Commissioner and County Directors of MoE and MoALF, thank you for authorizing me to conduct this study. Finally, I deeply appreciate all my respondents both agriculture teachers at upper primary school and Agricultural extension officers at Makindu Sub-County for going out their way to ensure that I obtained the required data.

ABSTRACT

The agriculture curriculum at the upper primary school requires learners to engage in hands-on activities to acquire various core competencies in the subject. Among the ways that teachers of agriculture would promote the acquisition of competencies in the agriculture subject is through the use of the 4-K Club activities conducted within the school farm, community and through the incorporation of ICT. However, there is a paucity of research on the use of teacher-guided 4-K Club activities for learners' acquisition of core competencies in the agriculture subject. Therefore, this study sought to document the teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school. A descriptive survey research design was employed in the study. The accessible population for this study consisted of five agricultural extension officers and 150 agriculture teachers from the 54 primary schools with either active or inactive 4-K Clubs in Makindu Sub-County. The census sampling method was used to include all five agricultural extension officers in the study. The table for determining sample size by Krejcie and Morgan was used to sample 108 agriculture teachers. Therefore, the total sample size for the study comprised of 113 respondents. Questionnaires and observation checklists were used as methods of data collection in the study. Both face and content validity of the questionnaires and the checklist were determined qualitatively through discussion with supervisors and other experts from the Department of Agricultural Education and Extension of Egerton University. A Pilot study comprising of 30 agriculture teachers and three extension officers was conducted at Kibwezi East Sub-County to determine the reliability of the questionnaires. Split-half and Cronbach's alpha methods were used to determine the reliability of teachers' and agricultural extension officers' questionnaires respectively, where coefficients of 0.74 and 0.89 were obtained. All data was analysed using descriptive statistics with help of the Statistical Package for Social Sciences (SPSS) version 28 software. The study found that currently, agriculture teachers have inadequately guided learners to carry out various 4-K Club activities when teaching to acquire core competencies in the agriculture subject. However, futuristic teacher-guided 4-K Club activities conducted within the school farm, community and through the incorporation of ICT were found to strongly enhance the acquisition of different core competencies by learners. Therefore, this study recommended that agriculture teachers at upper primary school should guide learners to carryout various 4-K club activities within the school farm, community and through incorporation of ICT to enable them acquire various core competencies.

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LIST OF ABBREVIATIONS AND ACRONYMS

4-H	Head, Heart, Hands, Health
4-K	Kuungana, Kufanya, Kusaidia, Kenya
ASK	Agricultural Society of Kenya
CBE	Competence Based Education
FFA	Future Farmers of America
GoK	Government of Kenya
ICT	Information Communication Technology
KICD	Kenya Institute of Curriculum Development
MoALF	Ministry of Agriculture Livestock and Fisheries
NACOSTI	National Commission for Science, Technology and Innovation
NFYFC	National Federation of Young Farmers Club
SOFDI	Sustainable Organic Farming and Development Initiatives
YFCK	Young Farmers Club of Kenya

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Globally, many nations that have been highly productive in the field of agriculture have vibrant youth clubs in their learning institutions (Elias et al., 2018). Clubs such as the Future Farmers of America (FFA) and 4-H (Head, Heart, Hands, Health) clubs have been actively involved in teaching and learning agricultural subjects at various levels of education in the United States of America (Bournesmothers, 2020). The agricultural activities undertaken by these youth clubs have been found to reinforce the achievement of agricultural education objectives and equip learners with relevant competencies in agriculture. Other youth clubs used in teaching agriculture globally include the 4-H Club in Canada, Young Farmers' Club (YFC) in England, Wales and Nigeria (Ndambuki et al., 2024b). The use of agricultural youth clubs in education across different countries has equipped learners with practical agricultural skills. Previous studies have also shown that the use of agricultural youth clubs in teaching influences learners' attitudes towards agricultural subjects (Samoei, 2020).

In the USA, for example, young people in high schools are not only taught agriculture through classroom instruction, but also reinforced by the use of Supervised Agricultural Experience (SAE) and active involvement of National Future Farmers of America organisation (FFA) activities (Thomas, 2018). According to Tummons et al. (2017), the FFA organisation was established in 1928 to develop its members' leadership, character, scholarship, cooperation and citizenship through agricultural education. It offered a variety of programs that were made to reinforce schoolwork by encouraging the practical application of classroom instruction in agriculture. In addition, it provides information and incentives for students wishing to further their studies in Agriculture, as well as having programs such as the New Century Farmer Program, which helps young people realize the opportunities in agriculture in the 21st century (Ballaro & Moriarty, 2019). In Canada, 4-H Clubs have been successful in mobilizing young people and the community at large to engage in agricultural production, thereby improving the country's economic growth (Sansom, 2018).

In the United Kingdom, the National Federation of Young Farmers' Clubs of England and Wales have been used to instil agricultural skills in young people. The organisation also organises competitions, education tours among the members and holds an annual convention for all clubs in all states (National Federation of Young Farmers Club, 2016). In Africa, youth clubs are also used to promote the learning of agriculture in schools as well. For example, in

Nigeria, YFCs have been found to play a significant role in encouraging young people to learn and develop a passion for farming, since the clubs have been used in the teaching of practical agriculture curricula (Salawu et al., 2021). The 4-H clubs have been used to instil youth community development skills and promote self-reliance among the youth (Morgan & Cannon, 2018). The Children in Agriculture Program (CIAP) has been used to integrate agriculture training and promote children's interest in agriculture as they grow (Magagula & Tsvakirai, 2020). According to Jumpah et al. (2022), Ghana's Youth in Agriculture Program(YIAP) has significantly influenced young people to embrace farming and pursue it as a commercial venture. This active integration of youth organisations and programs in teaching agriculture has been found to contribute much to making young people love agriculture (Njura et al., 2020). In addition, the organisations have helped youth take agriculture as a dignified profession and achieve most of the agricultural education objectives, hence preparing future farmers of their countries.

In Kenya, the leading agricultural youth organisations are the Young Farmers Club of Kenya (YFCK), which draws its membership from secondary schools and the 4-K Club, meaning (*Kuungana, Kufanya, Kusaidia, Kenya*), which is based in primary schools (Ndambuki et al., 2024a). These two clubs provide opportunities that promote learners' acquisition of agriculture competencies, foster positive attitudes towards agriculture and improve performance, among other benefits (Adam et al., 2017). The two clubs are therefore crucial in the successful implementation of the agriculture curriculum at their respective levels of learning. The 4-K Club in primary schools was established by the Government of Kenya as a local version of the 4-H agriculture club in the United States of America, to be based in primary schools and is also extended to youth groups outside schools (Karanu & Oniang'o, 2017). The 4-K Clubs are managed by the Ministry of Agriculture, Livestock and Fisheries (MoALF), which oversees all its operations and performance countrywide (Kenya News Agency, 2021). The MoALF has set up well-defined activities, principles, motto and objectives to guide the 4-K Clubs in helping learners acquire relevant competencies in agriculture.

According to Karanu and Oniang'o (2017), the 4-K Clubs' guiding principle is empowering young people aged between 6 and 14 years, both in upper primary schools and within the wider community, with agricultural and life skills to lead to good nutrition, health and better living standards. The objectives of 4-K Clubs, as stated by MoALF, include teaching young people improved agricultural methods, promoting an appreciation of agriculture as a dignified profession and promoting food production by youths for both selling and home consumption, hence becoming self-reliant (Atela et al., 2018). In addition, the 4-K Clubs aim

to influence the attitudes and practices of the community toward profitable farming. The motto of the 4-K Club is "learning by doing", where learners get involved in various agricultural practices and learn through practising, hence getting relevant experiences and competencies through hands-on engagement (Shiundu, 2021). The club majors on crop and livestock production, as well as areas of education like nutrition, population and family life (Atela et al., 2018). The MoALF states that learning through 4-K Clubs is to be achieved by taking learners to courses, in-school or on-farm demonstrations, field visits, use of technical teaching materials, participation in agricultural shows and field days, national 4-K Club competitions, exposure to agricultural content via mass media and carrying out of projects in the farm practically (Muldoon, 2010).

In the current structure of the 4-K Club, learners are also required to employ modern technology when carrying out the 4-K Club activities. For example, using modern farming methods in their projects, such as innovative gardens (Shiundu, 2021). Learners are also required to make good use of Information Communication Technology (ICT) tools to access agricultural information of importance and engage in digital marketing of their project's produce (Antony et al., 2020). Learners are also required to use ICT tools to keep a portfolio of their produce, interact with 4-K Club members from other schools, as well as carry out record keeping through taking photos and videos of their projects (Ndambuki et al., 2024a). The use of ICT by the 4-K Club members is aimed at preparing them to become future farmers who can employ modern methods of farming for high productivity (Ikpea, 2022). Based on the nature of 4-K Clubs, they provide a variety of opportunities that enable learners to learn various agricultural skills practically and master relevant core competencies. Following the introduction of the Competency-Based Education (CBE) system in Kenya, the agriculture subject and other technical learning areas have been given more emphasis and reintroduced to primary schools (Karani et al., 2021). The curriculum is more practical, advocates for the implementation of agriculture in a practical manner and promotes the mastery of competencies across all levels of education.

According to the Kenya Institute of Curriculum Development (2017), the competencies that learners should acquire in this curriculum include critical thinking and problem-solving, learning to learn, creativity and imagination, communication and collaboration, citizenship, digital literacy, and self-efficacy. In addition, during learning, learners are required to gain knowledge, skills and attitudes, which are part of learners' competencies (Shkak & Hassan, 2020). In the agriculture subject, learning is learner-centred and learners are expected to construct their knowledge at their own pace; therefore, graduation is based on the

demonstration of competencies by individual learners (Ruth & Ramadas, 2019). In competency-based agriculture subject, learners are also required to demonstrate how they can apply skills, knowledge, attitudes and values gained during the learning process (Jane et al., 2020). Teachers act as facilitators who guide learners during the learning process to gain the required skills, knowledge and attitudes, and master the expected competencies. Teachers also have a critical role in coming up with platforms through which learners can be exposed to opportunities for acquiring the required competencies (Mwang'ombe, 2021). Furthermore, teachers are responsible for incorporating school resources and facilities, involving other stakeholders such as parents and the entire community in the learning process to help learners master various core competencies in agriculture subject (Ajuoga & Keta, 2021).

One of the ways in which agriculture teachers can promote the implementation of the agriculture curriculum would be through activities of the 4-K Club, conducted on the school farm, within the community and through the incorporation of ICT (Karanu & Oniang'o, 2017). These activities provide hands-on learning experiences, hence helping learners master various core competencies. They enable learners to engage in practical agricultural activities, thereby constructing knowledge on their own and mastering various competencies that learners should acquire in the agriculture subject (Ajuoga & Keta, 2021). Despite the good potential of 4-K Clubs in helping learners gain various skills in agriculture, the clubs have been struggling to survive in primary schools since the 1990s (Ndambuki et al., 2024b). In response, the Government of Kenya, through the MoALF, approved the revival of the 4-K Clubs in all primary schools on 25th February 2021, to help learners learn various agricultural practices, especially under CBE (Gekonge, 2021). The initiative was officially launched by the president on 4th June 2021. However, limited effort has been put into finding out how best 4-K Clubs can be used in teaching and learning agriculture at the upper primary level. This study, therefore, sought to document the current and futuristic teacher-guided 4-K Club activities undertaken to support learners' acquisition of the core competencies in the agriculture subject in upper primary schools in Makindu Sub-County, Kenya.

1.2 Statement of the Problem

The agriculture subject at the upper primary school level requires learners to learn by doing to acquire various competencies in the field of agriculture. One of the ways in which teachers of agriculture would ensure the implementation of a practical agriculture curriculum at the upper primary is through the use of the 4-K Club activities conducted on the school farm, in the community, and through the incorporation of ICT. Literature indicates that the MoALF

has put in place strategies to revive inactive 4-K Clubs in schools and ensure that the clubs remain vibrant in all primary schools. Among the reasons for reviving the clubs in schools is to provide a platform that teachers can use in the implementation of the practical, competency-based agriculture curriculum and help learners master competencies through hands-on club activities. However, there is a paucity of information regarding the 4-K Club activities that teachers of agriculture at upper primary school should conduct in the future to ensure learners' acquisition of the core competencies. It's upon this knowledge gap that this study sought to document the current and futuristic teacher-guided 4-K Club activities aimed at promoting learners' acquisition of core competencies in the agriculture subject at upper primary schools in Makindu Sub-County, Kenya.

1.3 Purpose of the Study

The purpose of this study was to document the teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.

1.4 Objectives of the Study

The objectives of the study were to document;

- i. The current teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.
- ii. The futuristic teacher-guided 4-K Club activities undertaken within the school farm for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.
- iii. The futuristic teacher-guided 4-K Club activities undertaken within the community for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.
- iv. The futuristic teacher-guided 4-K Club activities through incorporation of ICT for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.

1.5 Research Questions

The study sought to answer the following research questions;

- i. Which are the current teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school

in Makindu Sub-County, Kenya?

- ii. Which are the futuristic teacher-guided 4-K Club activities undertaken within the school farm for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya?
- iii. Which are the futuristic teacher-guided 4-K Club activities undertaken within the community for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya?
- iv. Which are the futuristic teacher-guided 4-K Club activities through incorporation of ICT for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya?

1.6 Significance of the Study

The information obtained in this study is likely to inform teachers, learners and the KICD about the relevant teacher-guided 4-K Club activities that can be used in teaching and learning of the agriculture subject at the upper primary level. The study may highlight to teachers the opportunities present in 4-K Clubs, which may make learners acquire various competencies in the agriculture subject. The findings of this study are likely to inform teachers and school heads on the strategies to keep 4-K Clubs active as a platform for implementing the agriculture curriculum in primary schools. Furthermore, the findings of this study are also likely to inform the GoK on the current teacher-guided 4-K Club activities undertaken by schools within the school farm, the community and through the incorporation of ICT for the acquisition of the core competencies in the agriculture subject in primary schools. The findings may also contribute to the development of strategies for linkage between the primary school agriculture learning activities conducted on the school farm and those in the community as required for the implementation of the competency-based agriculture curriculum.

1.7 Scope of the Study

The study focused on documenting the teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at the upper primary school level. The study was conducted at upper primary school level among primary schools with either active or inactive 4-K Clubs in Makindu Sub-County, Kenya. Makindu Sub-County was deemed appropriate since no similar study had ever been conducted in the area. The study was also conducted at the upper primary school level since it's the primary school level where the 4-K Clubs are made to operate. The study first determined the current teacher-guided 4-K

Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school. These current teacher-guided 4-K Club activities included those conducted within the school farm, in the community and through the incorporation of ICT. The study then determined the futuristic teacher-guided 4-K Club activities, which were categorised into activities undertaken within the school farm, within the community and through the incorporation of ICT. These current and the futuristic teacher-guided 4-K Club activities were measured based on respondents' frequency of agreement with the extent to which each activity contributed to the learners' acquisition of the core competencies in the agriculture subject.

1.8 Assumptions of the Study

This study assumed that:

- i. Teachers assigned to teach the agriculture subject at the upper primary school level were aware of 4-K Clubs and their activities.
- ii. All teachers assigned to teach the agriculture subject at the upper primary school level were conversant with the core competencies that learners are expected to acquire during the learning process.

1.9 Limitations of the Study

The study was limited by the fact that there were few schools with active 4-K Clubs. This was addressed by including those schools with inactive 4-K Clubs to participate in the study.

1.10 Definitions of Terms

4-K Club activities: According to Muldoon (2010), 4-K Club activities include; participating in Agricultural Society of Kenya (ASK) competitive shows and exhibitions, attending agricultural field trips, undertaking projects on crop and livestock production and participating in national 4-K Club competitions. This study adopted this as the ideal definition of 4-K Club activities.

4-K club: This is a community and primary school-based agricultural youth organisation that works under MoALF to help young boys and girls aged between 6 and 14 years acquire agricultural and life skills (Karanu & Oniang'o, 2017). This study defined the 4-K Club as an agricultural youth organisation based in primary schools whose activities can help learners acquire the core competencies in the agriculture subject.

Agriculture subject: This is an area of study that aims to equip learners with agricultural skills to gain competencies applicable to both their contemporary and future lives (Kenya Institute of Curriculum Development, 2017). In this study, it referred to a subject under CBE taught independently, starting from upper primary, aiming to equip learners with knowledge, skills and attitudes in agriculture to help them master various competencies that prepare them to become proficient in agriculture-related activities.

Competence: This refers to a collection of skills, attitudes and knowledge that enables one to perform a particular task effectively (Sifuna & Obonyo, 2019). In this study, the core competencies were; communication and collaboration, critical thinking and problem-solving and digital literacy, which learners are expected to acquire when carrying out 4-K Club activities.

Competency based curriculum: This refers to a study program that emphasises and aims at equipping learners with knowledge, skills and attitudes for real-life application (Wambua, 2019). This study defined Competency Based Curriculum as the newly introduced curriculum in Kenya (2-6-6-3), which aims to enrich learners with various competencies in different learning areas and subjects through a hands-on, learner-centered approach.

Current: According to the Cambridge Advanced Learners Dictionary (2010), the term current refers to something occurring at present. Agricultural activities keep changing with changes in societal needs, climatic conditions and environmental changes that affect the production of both crops and livestock in a given locality. In this study, the term current referred to the current or present teacher-guided 4-K Club activities

conducted within the school farm, the community and through the use of ICT facilities.

Curriculum implementation: Orstein and Hunkins (1998) define curriculum implementation as the process by which the planned or officially designed course of study is translated by the teacher into syllabi, schemes of work and lessons delivered to learners. This study adopted curriculum implementation as the level of acquisition of communication and collaboration, critical thinking and problem-solving and digital literacy competencies by learners at upper primary school level, as demonstrated when carrying out teacher-guided 4-K Club activities during learning of agriculture subject.

Documenting: According to the Cambridge Advanced Learners Dictionary (2010), documenting means recording the details about something. In this study, documentation referred to the recording the ideal teacher-guided 4-K Club activities that should be conducted within the school farm, within the community and through the use of ICT facilities to facilitate the acquisition of the core competencies in the agriculture subject.

Futuristic: According to Mampane (2020) futurism is an aspect of education that focuses on the learner's attainment of 21st-century skills, such as critical and creative thinking and the promotion of modern and advanced approaches to teaching and learning. In this study, futuristic referred to the realignment of the teacher-guided 4-K Club activities conducted within the school farm, within the community and through the incorporation of ICT into the implementation of the competency-based agriculture curriculum at the upper primary level.

ICT incorporation: According to Ministry of Education (2021), ICT incorporation is the integration of ICT-based activities in the teaching and learning process. In this study, ICT incorporation referred to the inclusion of ICT-based 4-K Club activities by agriculture teachers when teaching to help learners acquire relevant core competencies. These activities included; helping the learners to market their project produce on social media, guiding learners to create e-portfolios, take and store 4-K Club photos and videos, using the internet to search for information and guiding learners to interact with the other 4-K Club members on social media platforms.

School type: According to the Ministry of Education (2021), school type refers to the categorization of schools in terms of factors such as gender, level and mode of schooling. In this study, school type referred to the categorisation of schools into

pure day and day/boarding schools, a factor which may have an effect on the use of the teacher-guided 4-K Club activities to help learners acquire core competencies in the agriculture subject.

Teacher of agriculture: According to Waiganjo (2021) an agriculture teacher refers to a person who has been assigned to teach the agriculture subject to learners. In this study, an agriculture teacher referred to an individual assigned to teach agriculture subject at the upper primary level. He/she is an agriculture curriculum implementer who employs various strategies to facilitate the achievement of learning outcomes.

Teacher-guided 4-K club activities: Karanu and Oniang'o (2017) describe these as teacher-based 4-K Club activities that mainly involve guiding learners when carrying out the club's activities. In this study, teacher-guided 4-K Club activities referred to the strategies employed by teachers assigned to teach agriculture in upper primary to effectively facilitate the use of 4-K Club activities conducted in the school farm, community and through the use of ICT facilities for the acquisition of the core competencies in the agriculture subject.

Upper primary: According to the Kenya Institute of Curriculum Development (2017), this is the level of study under the Competency Based Education system, consisting of Grades 4,5 and 6. This study adopted this as the operational definition.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents an overview of recent research and strategies related to the use of 4-K Clubs in the implementation of competency-based agriculture curriculum in upper primary schools. The literature review has been divided into thematic headings which include; Involvement of agricultural youth clubs in agricultural education, formation, role and current status of 4-K Clubs of Kenya, implementation of agriculture subject under Competency-Based Curriculum, competencies to be acquired by agriculture learners at the upper primary level, linking 4-K Clubs to implementation of agriculture curriculum at upper primary and the use of the teacher-guided 4-K Club activities in the implementation of agriculture subject curriculum. It also presents the theoretical and conceptual frameworks.

2.2 Involvement of Agricultural Youth Clubs in Agriculture Education

Globally, countries have employed youth clubs in teaching the agriculture subject to equip learners with practical skills applicable both in school and in the world of work. However, countries that have successfully used agricultural youth clubs in agriculture education in schools have put in place workable strategies like funding the running of the clubs and keeping them active, to ensure they are well incorporated into teaching and learning (Muthomi, 2017). For example, in the USA, 4-H clubs and Future Farmers of America have actively been involved in agricultural education in schools (Tummons et al., 2017). The 4-H Clubs are a non-formal arm of the agricultural education sector delivery model, which consists of several topics but is not limited to agriculture and educates young people through experiential learning (Floyd, 2020). Among strategies that have been put in place to ensure 4-H clubs are effective in providing agriculture education to learners is by ensuring that they exist in both rural, sub-urban and urban areas (National 4-H History Preservation Team, 2017). All learners are therefore given equal opportunities to participate in the 4-H Club's activities, regardless of the nature of their location. In addition, the clubs are not only run by teachers in schools but also by agricultural extension educators, volunteers and youths (Smith, 2018). This enables learners to acquire diverse knowledge in agriculture.

Future Farmers of America is an agricultural youth club that is actively engaged in the teaching of agriculture in high schools (Wright, 2020). This is shown by the three-ring model presented in Figure 1, of teaching agriculture subject used in schools in the USA.

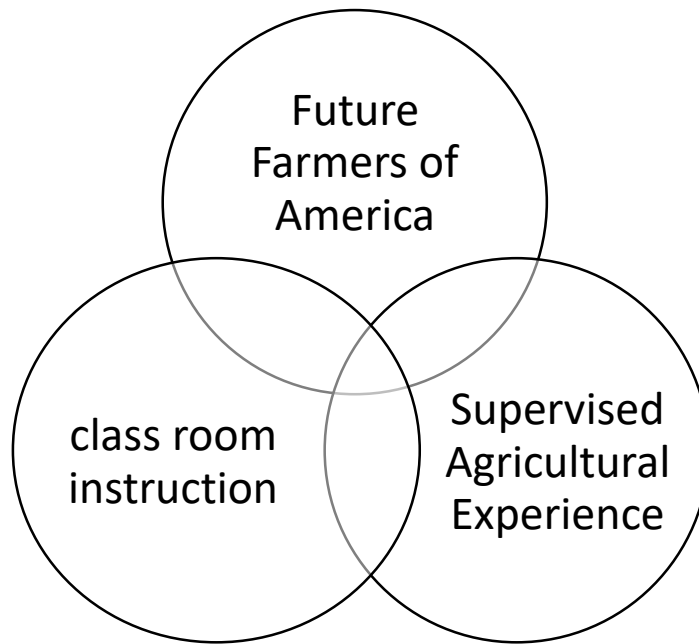


Figure 1: The Three-Ring Model of Agriculture Subject Instruction in the USA

Source: Thomas (2018)

In teaching, FFA is used by agriculture teachers to provide opportunities for learners to learn by working on farms, gardens, livestock, mechanic shops and other facilities that allow learners to learn by applying what is learned in class and real-world experience (Smith, 2018). However, the learners, teachers and schools employ several strategies to ensure the club is effectively used in teaching and learning. For example, schools provide enough facilities and resources for carrying out FFA club activities and ensure the clubs remain vibrant in schools (Martínez, 2019). Teachers engage learners in various FFA club activities, such as carrying out projects and attending academic tours and farm visits, while agriculture learners enrol in the club and actively carry out its activities during learning (Smith & Stevens, 2017). The students also actively engage in FFA club programs such as Career Development Events (CDEs), which help them understand careers in agriculture. CDEs also provide networking opportunities for learners with professionals and apply the curriculum in the real world. The New Century Farmer Program (NCFP) is another program that creates awareness among young people on new opportunities in agriculture in the 21st century (Lundry et al., 2015).

In Canada, the 4-H club and Future Farmers of Canada (FFC) are agricultural youth clubs involved in agriculture education among young people. The 4-H Club is the leading agricultural youth club in mobilizing young people and the community at large to involve themselves in agricultural production by engaging them in carrying out various agricultural

activities (Njoronge, 2015). According to Sansom (2018), 4-H clubs are present in secondary and elementary schools in both rural and urban areas and engage learners in garden activities. The 4-H club in Canada has the motto "learning to do by doing", which aims to engage learners in learning various agriculture skills practically through doing. Learners gain agricultural skills by carrying out agricultural projects, attending workshops, internships on farms, and field trips (Eisenbach, 2015). Several strategies have been put in place to ensure that the clubs are successful in providing agriculture education to learners. Among these strategies are the provision of funds to the clubs to facilitate the carrying out of the activities, promoting home outreach programs where learners replicate the activities of the club at home, and motivating agriculture students by offering them post-secondary school scholarships (Austman, 2016). Future Farmers of Canada mobilizes youths to engage in farming as a profession by instilling a positive attitude towards agriculture, by encouraging them to carry out agriculture-related activities. The club prepares learners to become future farmers of the country by engaging them in practical hands-on activities in school and at home, like carrying out projects on crops and livestock production (Bournesmothers, 2020).

In the United Kingdom National Federation of Young Farmers Clubs (NFYFC) of England and Wales is the biggest rural agricultural youth organisation that joins, brings together and controls all YFCs across the United Kingdom. According to the National Federation of Young Farmers Clubs (NFYFC) (2016), the Young Farmers Clubs are based in high schools as they target youths in the age bracket of between 10 and 26 years. The main aim of YFC in England and Wales is the provision of agricultural education to young people (Bugler, 2017). YFCs instil agriculture skills in young people by engaging them in farming competitions, education tours, as well as holding annual conventions for the clubs in all states (Kirke, 2016). The activities of YFCs have promoted learners' mastery of agricultural skills in the cultivation of various crops and keeping livestock in England and Wales and have motivated learners' interest in agriculture to a greater extent.

In Nigeria, agricultural youth clubs involved in agriculture education include YFCs, 4-H clubs, CIAP and Youth Alliance where their major objective is to equip young people with better agricultural skills, as argued (Salawu et al., 2021). The YFC is made to encourage young people aged between 9 and 20 years to learn about better farming methods (Njoronge, 2015). YFCs are run both in schools and in the community and emphasise on disseminating both theoretical and practical agricultural skills to learners through learning by doing, which is their philosophy (Adesoji & Adewole, 2020). Among strategies that have been employed to ensure YFCs have been used in teaching agriculture education among youths is ensuring that there is

a link between the clubs in schools, parents, extension officers, Non-governmental organisations, community volunteers and villagers, who are actively involved in running the clubs (National Open University Nigeria, 2012). This enables the club members to gain a wide range of knowledge in agriculture-related activities. Youth Alliance in Nigeria is a program that is made to create an agricultural base for youths, while the Children in Agriculture Program (CIAP) is a nationally organised research and development network, whose main objective is to introduce children to agriculture and sustain their interests as they grow (National Open University Nigeria, 2012).

In Ghana, agriculture programs that target young people include YIAP, Youth in Agribusiness Program (YAP) and Youth Farm and Market Program (YFMP). The programs aim to influence youths in the country to accept agriculture and take it as a career (Gough & Thomsen, 2017). In addition, there are also 4-H clubs in Ghanaian schools, which also engage learners with agriculture-related activities, hence equipping them with skills (Cannon, 2018). The 4-H Clubs in schools expect learners to carry out agricultural projects, either individually or in groups and actively engage in club activities (Wright, 2020). However, several strategies have been put in place to ensure the good performance of the clubs in schools. These strategies are such as ensuring a good link between the clubs in school and the parents of the members in the community, regular evaluation of the performance of the clubs, a clear definition of membership procedure and club management (4-H Ghana, 2021).

In Kenya, the Young Farmers Club of Kenya and the 4-K Club are the agricultural youth clubs involved in agriculture education in schools. YFCK is based in secondary schools and tertiary institutions, operating under the umbrella of the Agricultural Society of Kenya (ASK) (Mwangangi, 2012). The main objective of the club is to prepare young people in schools to be effective future farmers by engaging them in practical farming activities. The main roles of the Young Farmers Club of Kenya are; to make learners appreciate agriculture as a profession and help learners develop better farming skills (Agricultural Society of Kenya (ASK), 2022). This is by involving learners in carrying out agriculture projects, farming competitions, ASK agricultural shows, exhibitions and competitions, field visits, annual rallies and camps (Kenya Literature Bureau, 2018). Despite the YFCK being good in providing good opportunities for learning agriculture by doing, little has been done to make the use of the Clubs in teaching agriculture in schools effective. In most schools, the clubs are inactive, and there is a lack of commitment to carrying out the club activities and a lack of support from schools (Njoroge, 2015).

The 4-K Clubs are based in primary schools and outside of the community. The Clubs

work under the umbrella of the MoALF, which has put in place well-defined activities, objectives, principles and motto of the club. It also controls all the 4-K Clubs in the community and primary schools countrywide (Kenya Literature Bureau, 2018). The Club aims to help learners gain agricultural skills through learning by doing. Learning in the 4-K Clubs is achieved through engaging learners in carrying out agricultural projects in both livestock and crop production (Gekonge, 2021). The projects are carried out both in school and at home. Since the agriculture learning area in the upper primary level should be approached practically, the activities of the club are relevant to teaching and learning agriculture subject in the upper primary (Nestle Kenya, 2019). Among the ways of ensuring that the 4-K Clubs in schools remain effective for learning agriculture subject are; ensuring that the clubs remain active in schools, increasing membership in the clubs and providing resources for running the clubs (Saeteurn, 2020). However, the activeness and the link between the 4-K Clubs and teaching agriculture in primary schools are questionable (James, 2021). This study, therefore, sought to document the current and futuristic teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.

2.3 Formation, Role and Current Status of 4-K Clubs in Kenya

According to Karanu and Oniang'o (2017), the 4-K Club was formed in the year 1969 by the Ministry of Agriculture as a replica of the 4-H Club of the United States and it adopted its concepts and principles but changed it to 4-K to portray its identity and ownership. The Club is an agricultural youth organisation made to work among youths who are in the age bracket of between 6 and 14 years. This is the age bracket of learners who should be in the upper primary level, which is between 9 and 11 (Kenya Institute of Curriculum Development, 2017). Therefore, learners in the upper primary level are potential members of 4-K Clubs. The motto of the 4-K Club of Kenya is "*Kujifunza kwa kufanya*", which translates to learning by doing. The club, therefore, aims to help young people in primary schools learn various agricultural skills through hands-on involvement in agriculture-related practices, which is its primary objective (Karanu & Oniang'o, 2017). According to Atela et al. (2018), other objectives of the 4-K Club, as stated by MoALF, are; teaching young people improved methods in agriculture, promoting appreciation of agriculture as a dignified profession by young people, facilitating food production among youths for both home consumption and selling, promoting the development of leadership skills among young people and promoting profitable farming among adults.

The objectives require the engagement of the learners who are members of the 4-K Club in agriculture-related activities. To achieve its objectives, therefore, the 4-K Club of Kenya trains young people in crop production and livestock production (Muldoon, 2010). The training is achieved through engaging young people in projects on both crop and livestock production, which enables learners to gain skills through practical hands-on activities. The clubs thus teach young people in primary schools the best agricultural practices (Saeteurn, 2020). In addition, to carrying out agriculture projects, other functions of 4-K clubs include taking part in competitive shows and attending field trips to places of agricultural interest (Kenya Literature Bureau, 2018). The club therefore provides opportunities for learners to learn by observation during the exhibitions in agricultural shows and agriculture enterprises during the field trips to gain knowledge on various agricultural practices.

Despite the 4-K clubs being a good source of opportunities for learners in primary schools to learn agriculture skills by doing, most of the clubs in schools have remained non-functional since the years of 1990s (Shiundu, 2021). The collapse of the clubs in most schools was caused by a lack of good linkage with the MoA, which is the core body that manages the operation of the 4-K Clubs countrywide. In addition, other causes of the collapse of the clubs were the failure of schools to finance the 4-K Club activities and the failure to prioritise the agriculture subject in schools, which was later scrapped from the primary school curriculum (James, 2021). Researchers and specialists in agriculture education recommended for reintroduction of the clubs back to primary schools as their positive impact on equipping learners with skills and positive attitudes towards agriculture had been witnessed for example, study by (Adam et al., 2017). In addition, following the reintroduction of the agriculture subject back in primary schools under CBE and the government's move to achieve food security under the Big Four agenda, the GoK, through MoALF, has been working to revive the 4-K Clubs in schools (Shiundu, 2021). Revival of the 4-K Clubs aims at mobilizing young boys and girls in primary schools to learn and carry out agriculture-related activities to prepare future generations of competent individuals to ensure the country is food secure.

Also, the 4-K Clubs are being revived so that their activities can be used in teaching and learning agriculture in the upper primary school by helping learners to apply what they learn in class practically on the farm (Gekonge, 2021). Once revived in schools, the clubs are expected to involve learners in projects relevant to class learning and get involved in school nutrition by growing food crops (Adam et al., 2017). This is to ensure that the 4-K Clubs remain relevant to the implementation of the agriculture curriculum in upper primary. The clubs are also expected to captivate the interest of young boys and girls in primary schools in agriculture

and bring up individuals who can employ modern technology in agriculture (Shiundu, 2021). A study by Biovision Africa Trust (BAT) (2018) also stated that 4-K Club members also need to share the knowledge they gain in the clubs with their parents and apply it at home. This is important in helping learners to have more time to practise agricultural skills learned in the classroom and develop communication and collaboration competency, as recommended by (Ministry of Education [MoE], 2021).

2.4 Implementation of Agriculture Subject Under Competency-Based Curriculum

According to Gruber (2018), Competency Based Curriculum is a kind of curriculum where learners are made to work at their own pace to demonstrate the mastery of competencies in various learning areas. The curriculum aims at learners' understanding of concepts, skills and how they can apply them practically in real life (Waiganjo et al., 2019). Competency Based Curriculum is therefore a skill-based curriculum that requires learners to learn by doing to gain various competencies. It is also practical-based and involves the employment of teaching approaches and methods that would engage learners in practical activities during learning (Mulenga & Kabombwe, 2019). The CBE comprises several learning areas where learners should master competencies, including the agriculture subject. Several countries in the world have embraced CBE. Some of the countries include the USA, Finland, Germany, Australia, the Netherlands, South Africa, Tanzania and Nigeria, among others (Semlugu, 2018). These countries have ensured the successful implementation of the curriculum by putting in place several strategies, such as funding and provision of the required facilities and resources, to achieve the required outcomes among learners (Kabombwe & Mulenga, 2019). In countries where competency-based curriculum has been embraced, agriculture is among the learning areas that learners explore as they learn at different levels of education (Mulenga & Kabombwe, 2019). The agriculture subject curriculum has been implemented in various ways in schools.

For example, in the USA, agriculture is taught practically starting from the elementary education level, which is equivalent to the primary school level, to the university level (Lynch et al., 2017). In high schools, besides classroom instruction, learners are also exposed to SAE and agricultural club activities to gain relevant experiences (Thomas, 2018). In SAE, students practice several concepts learned theoretically in class practically in the agricultural field. Agriculture clubs involved in agriculture instruction are 4-H Clubs and Future Farmers of America (FFA) (Connors, 2013). Students are exposed to the club's activities, which include carrying out agriculture projects both in school and at home, educational tours, farm visits and

exchange programs, among others, to gain relevant real-world agriculture experiences. Agriculture youth clubs have been actively engaged in agriculture instruction in schools and have contributed to learners' acquisition of competencies in the agriculture subject (Tummons et al., 2017). The success of using 4-H clubs and FFA in teaching agriculture has been attributed to learners, teachers and schools putting in place strategies to ensure the clubs remain active and vibrant (Alston et al., 2020). Some of these strategies include schools, ensuring there are enough facilities and resources for running the clubs and the FFA club to be part of instruction in the agriculture syllabus. In addition, teachers supervise and facilitate learners to carry out various club activities during learning (Hagedorn et al., 2018).

In the Netherlands, agriculture is taught starting from pre-vocational secondary as an independent subject (Minnaar & Bertram, 2020). Agriculture is taught vocationally through the engagement of learners in practical farming activities to gain competencies (Jjuuko et al., 2021). There is quality teacher training to produce competent individuals to implement vocational agriculture. A study by Mulder and Biemans (2018) revealed that in addition to the practical teaching of agriculture in schools, there is a good link between agricultural extension officers and schools that are also involved in training learners. In addition, the study further posited that the Ministry of Education and the Ministry of Agriculture in the Netherlands partner to provide quality agriculture education to learners. Despite the success in delivering quality agriculture education to learners by the Netherlands agriculture teachers, there is no documented agriculture youth club in schools in which teachers use their activities in the implementation of the agriculture curriculum.

In Nigeria, competency-based agriculture is taught from the secondary school level as agricultural science to equip learners with agricultural skills and attract them to agriculture (Adesoji & Adewole, 2020). Agricultural science is made to be taught through practical methods such as demonstrations, field trips and projects to equip learners with competencies. There are several agriculture youth clubs in Nigeria, such as the 4-H Club, YFC and Youth in Agriculture Program, and their activities could be involved in promoting practical learning among learners in schools (Adebo, 2009). However, a study by Haruna et al. (2019) confirmed that teachers of agriculture mostly use the lecture method with little or no practical engagement of learners during learning. In addition, there is poor funding and infrastructure to promote the practical implementation of agriculture curricula (Onuka & Wever, 2019). This is the reason for the poor involvement of agriculture youth clubs in teaching and learning agriculture. According to Haruna et al., (2019) the following strategies should be employed to ensure the practical implementation of the agriculture curriculum in Nigeria; setting up an agriculture

youth club for teaching and learning in schools, agriculture teachers in collaboration with schools to establish and maintain school farms and ensuring a good link between schools, community and agricultural experts.

In Tanzania, CBE was introduced in the year 2005 (Amulyoto, 2017). Under a CBE, agriculture is taught right from primary school. According to Kafyulilo et al. (2013) in Tanzania, teaching and learning CBE involve learners learning by doing, both in and outside the class environment, to gain experiences and apply skills. To ensure the practical implementation of the curriculum, schools need to be equipped with enough facilities and resources, such as farms and workshops, among others (Mkonongwa, 2018). Teachers of agriculture are required to use teaching methods that enable learners to learn by doing. According to Roberts et al. (2015), one of the ways teachers of agriculture in Tanzania would promote the practical implementation of the agriculture subject curriculum is through the use of agricultural clubs. Among potential agricultural youth clubs in Tanzania that can provide learners with opportunities to learn various agricultural skills by doing is the 4-H Club (Brinn, 2020). However, a study by Roberts et al. (2015) further found that agriculture teachers have never received any training that would enable them to gain knowledge on how to incorporate agriculture youth clubs in teaching agriculture. In addition, a study by Komba and Mwanjani (2015) revealed that teachers in Tanzania have little knowledge of the implementation of CBE and many schools lack enough facilities and resources to ensure the successful implementation of the curriculum. Thus, this is among the reasons for the failure to use agriculture youth clubs in the implementation of the agriculture curriculum in schools.

Kenya has also initiated CBE. The curriculum came into place in 2017, following a proposal to realign the education system to help learners meet 21st-century skills and achieve Vision 2030 (Amulyoto, 2017). Among issues addressed in Vision 2030 is the achievement of food security and poverty alleviation in the country (Government of Kenya, 2018). Agricultural education has therefore been emphasised in the curriculum to help the country attain food security by equipping the young generation with agricultural skills. According to Orina (2020) under CBE, agriculture will be taught as an independent subject starting from upper primary. The subject will aim to prepare learners to be competent in agriculture to contribute positively to the agro-based economy and build competencies for learners' participation in sustainable development (Kenya Institute of Curriculum Development, 2017).

To build competencies in various agricultural concepts, learners are expected to learn by practising various agricultural skills. Learners are required to gain practical skills through producing a variety of food crops on school farms, keeping animals and visiting community

farms for practical lessons (MoE,2019). However, the implementation of the agriculture subject under CBE has been a challenge (Momanyi & Rop, 2019). One of the major challenges is the lack of institutional preparedness in terms of facilities, resources and personnel necessary to facilitate learning by doing. The 4-K Clubs are among the approaches that can be used to implement the competence-based agriculture curriculum (Wambua, 2019). However, establishing strategies that teachers of agriculture would employ to facilitate the use of the 4-K Club activities in implementing the agriculture curriculum at the upper primary level is essential.

2.5 Competencies to be Acquired by Agriculture Learners at the Upper Primary School

CBE targets to enable learners to gain practical skills that they can apply both present and in the future (Karani et al., 2021). It aims to enable learners to acquire various relevant competencies in different learning areas through practical and experiential learning (Kabombwe & Mulenga, 2019). In the agriculture subject at the upper primary level, learners are required to learn by involvement in practical activities to gain skills in both crop and livestock production. According to Momanyi and Rop (2019), agriculture curriculum in upper primary requires learners to acquire the following competencies during the learning process; Communication and collaboration; Communication is the passing of information from one point to another, either visually, verbally or non-verbally, while collaboration is the process where two or more individuals work together to achieve a particular goal (Nyaboke et al., 2021). In learning agriculture, learners will be required to work together and share experiences to complete a given task, such as carrying out a project. Learners are also required to collaborate with the community, parents and agricultural extension officers during the learning process (Ministry of Education [MoE], 2021).

Learners are also required to transfer the knowledge acquired in school and replicate it at home and in the community to develop communication and collaboration competencies (Kenya Institute of Curriculum Development, 2017). At the end of every sub-strand in the agriculture subject, the curriculum design has well-defined learning activities that would promote the learner's acquisition of communication and collaboration competencies. For example, in grade five agriculture, strand three on gardening practices, learners are required to liaise with community extension officers to gain wider knowledge on the development of innovative vegetable gardens. In addition, learners are required to visit the elderly in the community and teach them about the production of various indigenous food crops (Ministry of Education [MoE], 2019a). Critical thinking and problem-solving; critical thinking is the

process of skilfully conceptualizing, analysing and evaluating something to make a judgment, while problem-solving is the process of finding out the cause of a problem and coming up with ways to curb it by generating alternatives for a solution (Manduku & Sang, 2021).

By learning the agriculture subject at upper primary school, learners will develop the core competency by being subjected to think critically to come up with solutions to problems or challenges they face when carrying out various practical agriculture learning activities. Competence-based agriculture curriculum also requires learners to develop critical thinking and problem-solving competency by coming up with new or innovative ways of carrying out various agricultural activities during learning (Kenya Institute of Curriculum Development, 2017). For example, in grade six agriculture, strand one on conserving our environment, learners are required to develop critical thinking and problem-solving competence by devising better methods of conserving water for irrigation in dry areas (Ministry of Education [MoE], 2021). In grade five, strand one, sub-strand 1.3 on living better with wild animals, learners are expected to use locally available materials to control animal pests that destroy farm crops and domestic animals (Ministry of Education [MoE], 2019a).

Creativity and imagination; to acquire this competence, learners are expected to form ideas in their minds and convert them into real creations (Waweru, 2018). The competence is acquired through the learners' innovativeness when carrying out various practical agriculture activities during learning. For example, in grade four, agriculture strand one, learners are required to develop creativity and imagination competence by constructing scarecrows to keep away wild animals that destroy farm crops (Ministry of Education [MoE], 2019b). Other competencies that learners are required to acquire include digital literacy and self-efficacy. In digital literacy competence, learners must watch videos and use electronic devices with software to help them source more agricultural information from the internet. Learners are also required to take pictures of the agricultural activities they carry out during learning and make presentations (Karani et al., 2021). In self-efficacy competence, learners will develop self-confidence when carrying out agricultural activities and assignments during learning. For example, in grade five agriculture strand three, learners are required to carry out a project on vegetable production on their own and sell the products to get income from their efforts (Ministry of Education [MoE], 2019a).

Evaluation in Competency-Based Education is done based on how learners have mastered the competencies during learning, hence a good measure of measuring the level of implementation of the curriculum (Sifuna & Obonyo, 2019). This study will be limited to documenting how learners can achieve competencies in communication and collaboration,

critical thinking and problem-solving and digital literacy through various teacher-guided 4-K Club activities within the school farm, the community and through the incorporation of ICT. Acquisition of digital literacy competency through the use of 4-K Club activities will be studied, since according to (Shiundu, 2021) among the current aims of the 4-K Club in schools is to produce individuals who can employ technology in agriculture. Communication and collaboration and critical thinking and problem-solving competencies will be studied because according to (Karanu & Oniang'o, 2017) in 4-K Clubs, learners are required to interact with each other, parents, agricultural extension officers and the entire community when carrying out the 4-K Club activities. In addition, carrying out 4-K Club activities requires learners to think critically to find solutions for challenges they face when carrying out the 4-K Club projects.

2.6 Linking 4-K Clubs to Implementation of Agriculture Subject Curriculum at Upper Primary School

From the review of previous literature on the nature of MoALF's 4-K Clubs and competency-based agriculture, 4-K clubs of Kenya have been confirmed to have great potential in leading to the implementation of competency-based agriculture curriculum in upper primary. The 4-K Clubs share a wide range of similarities with the agriculture subject implementation requirements in upper primary. The clubs stand out as a source of opportunities that every agriculture teacher in upper primary should incorporate in the implementation of practical-based competency-based agriculture. For example, according to the Kenya Institute of Curriculum Development (2017), upper primary learners need to learn agriculture by practising agricultural skills. Similarly, according to Karanu & Oniang'o (2017), the 4-K Club's motto is learning by doing, where young people will learn various agricultural skills by practising practically on the farm. The provision of enough resources and facilities by schools to facilitate the carrying out of 4-K club activities by learners may facilitate the use of the club's activities in the implementation of the agriculture subject curriculum in upper primary.

Agriculture subject is practical and therefore, its implementation requires a practical approach. According to Diise et al. (2018) practical agriculture is that which learners use their own hands to manipulate real objects during the learning process or observe demonstrations from the teacher and practise them later. Agriculture subject at the upper primary school, being practical oriented, needs to be taught mainly through projects and demonstration methods (Ouma et al., 2020). Similarly, in 4-K Clubs, learners carry out various agricultural projects, both in livestock rearing and crop production, where they learn various skills as portrayed by (Sustainable Organic Farming and Development Initiatives (SOFDI), 2021). The MoALF 4-K

Clubs' activities can therefore support the practical implementation of the agriculture curriculum in upper primary. However, the implementation of learning areas practically under a CBE has been a challenge due to the lack of knowledge and preparedness by teachers (Karani et al., 2021). Most upper primary teachers lack knowledge on how to utilize the club's activities in implementing the agriculture curriculum. This may be attributed to limited knowledge on strategies they should employ to actively engage the clubs in teaching agriculture subject.

The agriculture subject at the upper primary aims to captivate young people's interest in agriculture by introducing them to the field in their early years of education. According to Shiundu (2021), among the aims of 4-K Clubs is to promote the interest of young people in agriculture. GOK sees the great potential of 4-K Clubs in mobilizing young boys and girls to agriculture and has been promoting their revival in primary schools (Ministry of Agriculture Livestock and Fisheries [MoALF], 2017). Recent studies by Adam et al. (2017) and Sustainable Organic Farming and Development Initiatives [SOFDI], (2021) find 4-K Clubs to have currently succeeded in attracting young boys and girls in primary schools to agriculture. Despite the positive influence on learners' attraction to agriculture by 4-K Clubs, most schools still lack the clubs, while in others, they are inactive. This could be among the reasons for the low engagement of the clubs in the implementation of the agriculture curriculum in upper primary. The schools thus need to lay down strategies that would promote the use of 4-K Clubs in the teaching of agriculture, among them being the establishment of the clubs in schools, if not present, keep them active.

Among the aims of introducing competency-based education is to propel Kenya towards the achievement of Vision 2030 is through the preparation of individuals with skills, attitudes and knowledge to help meet the requirements of the vision (Ajuoga & Keta, 2021). Among the issues to be addressed is food security, which led to the introduction of competency-based agriculture. In teaching the agriculture subject at upper primary, learners will be required to carry out practical activities of producing food crops to enhance food security in the country and in addition, gain competencies that enable them to contribute positively to the field of agriculture in the future (Kenya Institute of Curriculum Development, 2017). In 4-K clubs, learners should be involved in the production and processing of various food crops to ensure food security and gain income by selling surplus produce (Shiundu, 2021). According to Nestle Kenya (2018), the clubs are also involved in school nutrition through the production of various food crops in the school farm. The study by the Kenya Institute of Curriculum Development (2017) recommended that, in teaching competency-based agriculture, teachers should ensure that there is interaction and collaboration among learners and society through field visits and

community-based projects at home. In addition, learners should visit community farms and carry out agriculture-related activities learned in school with their parents at home to improve competencies to acquire core competencies in agriculture (Ministry of Education [MoE], 2021).

On the other hand, according to Biovision Africa Trust, (2018), 4-K Clubs provide opportunities for learners to carry out agriculture projects at home, share the knowledge they gain with their parents, as well as replicate what they learn in school back in their homes. However, there is still lack of bond between the school and the outside community (Jane et al., 2020). This could be among the reasons for not achieving the implementation of the agriculture subject curriculum at the upper primary school through the use of 4-K Club activities. According to Ministry of Education [MoE] (2019b) one of the outcomes to be achieved in competency-based agriculture is the active participation of learners in agricultural activities for environmental conservation. On the other hand, in the 4-K Clubs, learners are taught environmentally friendly methods of farming such as organic and sustainable farming, environmental awareness, agroforestry and conservation agriculture (Sustainable Organic Farming and Development Initiatives [SOFDI], 2021). The 4-K Clubs are therefore essential in implementing agriculture subject at the upper primary school.

2.7 Use of the Teacher-Guided 4-K Club Activities in the Implementation of Agriculture Subject Curriculum

Teachers are the key individuals in translating the curriculum blueprint into practice by devising the most appropriate methods and approaches to teach various concepts. One of the ways in which teachers of agriculture at the upper primary level can implement the agriculture curriculum is through the 4-K Club activities. However, to ensure the effectiveness of these clubs, teachers need to put in place well-thought-out strategies. For example, the study by Karanu and Oniang'o (2017) describes teachers as the managers or patrons of the 4-K Clubs in schools, with the role of mobilizing learners to carry out the club's activities. Therefore, teachers of agriculture at the upper primary school play a vital role in mobilizing learners to collect materials needed for the projects and carry out the activities on their own during learning. According to Adam et al. (2017), 4-K Clubs are important in implementing an agriculture curriculum in primary schools.

The incorporation of MoALF 4-K Club activities by teachers of agriculture in upper primary to help learners master various competencies stipulated in the agriculture curriculum is therefore vital. However, this can be achieved through engaging learners in 4-K Club

projects. There is a need to have in place more agricultural projects targeting 4-K Clubs in schools (Ndambuki et al., 2024a). Teachers of agriculture at upper primary have an important role in choosing and exposing learners to more 4-K Club projects during learning to acquire the required learning experiences. However, according to Nestle Kenya (2018) agriculture projects selected for the 4-K Club, both in the school in the community should be relevant to classroom learning to reinforce what learners are taught. The teachers of agriculture have the responsibility of selecting projects and activities that align with the agriculture learning design as stipulated in the curriculum (Wang et al., 2020).

2.8 Theoretical Framework

This study was grounded on two theories which were; experiential learning theory by (Kolb, 1984) and constructivist theory by (Dewey, 1998). Both theories emphasise on learning by doing to create relevant experiences among learners which are paramount for practical-oriented subjects like competency-based agriculture. According to Dung and Minh (2020), experiential learning is defined as the process of creating new knowledge from hands-on experiences and assessments as well as analysing the present experiences and knowledge and its application to help learners develop skills and values. In experiential learning, learners should learn by doing to create relevant learning experiences (Kolb, 1984). Experiential learning enables learners to connect important classroom knowledge with hands-on experiences (Deslauriers et al., 2016). On the other hand, Constructivist theory, as proposed by Dewey (1998), posits that learners construct knowledge of various concepts by learning through doing, during the learning process. In constructivism, learning takes place through doing, experience, reading, thinking and reflection, discussion, movement, writing and is a social activity as argued by (Fernando & Marikar, 2017).

The two theories informed this study as they both advocate for learning by doing and the practical application of theoretical knowledge acquired in class. The two theories view the teacher as a facilitator who has the role of coming up with teacher-guided activities to help learners learn on their own, to create experiences and master relevant core competencies. The 4-K Clubs' activities provide a platform for learners to learn by doing. In addition, the clubs' activities help learners to apply the agriculture subject in practical field settings. This enables learners to gain hands-on experiences during learning, thereby mastering the agriculture subject competencies. Therefore, there is a need to document both current and futuristic teacher-guided 4-K Club activities that teachers assigned to teach agriculture at the upper primary school level should employ to facilitate the acquisition of the core competencies in the subject by learners.

2.9 Conceptual Framework

The study focused on documenting the teacher-guided 4-K Club activities undertaken for learners' acquisition of core competencies in the agriculture subject at the upper primary school in Makindu Sub-County, Kenya. The teacher-guided 4-K Club activities included both current and futuristic teacher-guided 4-K Club activities and formed the independent variable. The current and futuristic teacher-guided 4-K Club activities included the activities undertaken within the school farm, within the community and through the incorporation of ICT when carrying out the 4-K Club activities. The futuristic teacher-guided 4-K Club activities conducted within the school farm included; guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects, helping learners to come up with innovative gardens when carrying out their projects, guiding learners to come up with innovative ways of conserving water when carrying out the projects, helping learners use locally available materials to reduce cost of production when carrying out the 4-K Club activities, placing learners in groups to carry out projects, allowing learners to share experiences when carrying out projects.

The futuristic teacher-guided 4-K Club activities within the community were; linking learners to extension officers, linking learners to community resource persons, facilitating learners to establish 4-K Club plots at home and helping learners to market their 4-K Club projects produced in the community. The futuristic teacher-guided 4-K Club activities through the incorporation of ICT were; guiding learners in sourcing agricultural information from the internet, facilitating learners to take pictures and videos of projects for record-keeping and helping learners to market their 4-K Club plots produce online. Teacher-guided 4-K Club activities are likely to influence the learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya. Therefore, the acquisition of core competencies in the agriculture subject was the dependent variable. These core competencies were; critical thinking and problem-solving, communication and collaboration and digital literacy. The teacher-guided 4-K activities were measured in terms of the level of contribution of each activity to the acquisition of the core competencies by learners when teaching.

The moderating variable in the study was the school type, whose effect on the relationship between dependent and independent variables was studied. The variable was likely to influence the effect of independent variables, which are the futuristic teacher-guided 4-K Club activities, on the dependent variable, which is the acquisition of the core competencies in the agriculture subject. There are two primary school types in Makindu Sub-County, which are

pure day schools and day/boarding schools. The school type was likely to influence the availability of resources, facilities, 4-K Club members' access to the community for replication of 4-K Club activities and access to agricultural extension services, which are important for carrying teacher-guided 4-K Club activities. Figure 2 presents a summary of the conceptual framework showing relationship between the variables in the study.

Independent variables

Dependent variables

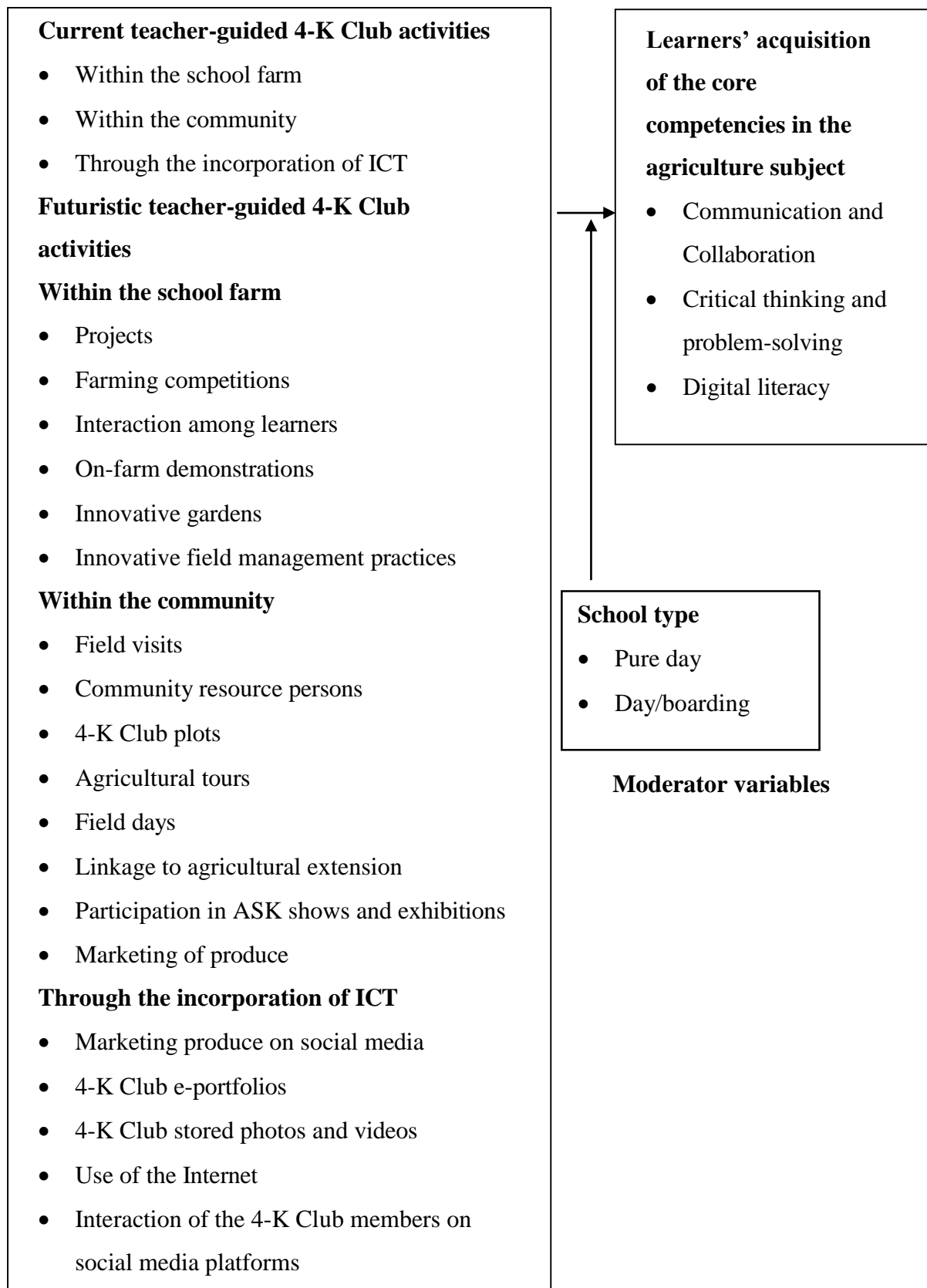


Figure 2: Conceptual Framework Showing Interactions Between Variables in the Study

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design used in this study, location of the study, target population, sampling procedure and sample size, instrumentation, which covers description, validity and reliability of research instruments to be used, ethical considerations, data collection and analysis procedures.

3.2 Research Design

A descriptive survey research design was employed in this study. According to Mugenda and Mugenda (2003), a descriptive survey research design helps to describe conditions or states of affairs as they exist currently. The design fitted this study as it helped to determine teacher-guided 4-K Club activities undertaken to acquire the core competencies in the agriculture subject at upper primary school. The study by Gay (2009) further stated the research design involves collecting data by the researcher to get answers to questions on the current condition of something or a problem. The design involves collecting data through interviews, administration of questionnaires, tests and observation (Atmowardoyo, 2018). The study by Kabugi (2013), further noted that the design is mostly used when collecting data about people's views, attitudes, behaviour and any other social issue that is connected to education. It's upon this ground that descriptive survey research design was employed to collect necessary data from teachers of agriculture in upper primary and extension officers. The data informed on the current and futuristic teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya.

3.3 Location of the Study

The study was conducted among primary schools in Makindu Sub-County which is located in Makueni County in Kenya. The Sub-County borders Nguu, Kathonzweni and Kibwezi Sub-Counties and also Kyulu conservation area, Kitui and Kajiado counties according to a map by (Makueni County Government, 2018). The Sub-County has a coverage of 1,034.7 square kilometres comprising 14 Sub-Locations and 2 wards. According to Mwangi (2019), Makindu Sub-County has an approximate population of 84,946, making up 21,756 households. The Sub-County lies at an altitude of 993 Meters above sea level and has semi-arid characteristics therefore, the common vegetation present is Acacia, Baobab trees, Euphorbia

and thorny shrubs hence is categorised as one of the driest parts of Makueni County (Makueni County Government, 2018). Long rains are present between March to April and short rains between October to December with an average rainfall of 595mm per annum, which is little and unreliable (Makueni County Meteorological Office, 2022). The average temperature of 22.9°C, with the hottest month being March with a temperature of 24.8°C and the coldest being July with an average temperature of 20.4°C (Climate Data Organisation, 2020). The major economic activity in the Sub-County is small-scale mixed farming others being local trade and charcoal burning. The location was chosen for the study as no similar study has ever been conducted in the area (Makindu Sub-County Education Office, 2022). In addition, the sub-county has schools with both active and inactive 4-K Clubs, where the study can be conducted.

3.4 Target Population

The target population for this study consisted of 931 respondents. This comprised five agricultural extension officers from the MoALF and 926 teachers assigned to teach in upper primary school in the 83 primary schools at Makindu Sub-County (Makindu Sub-County Education Office, 2022). The teachers are distributed in two school types, namely pure day and day/boarding schools which are found in the Sub-County. Table 1 shows the number of schools per school type and the target population of teachers in the Sub-County.

Table 1

Number of Schools by Type and Target Population of Teachers in Makindu Sub-County

School type	No. of schools	No. of teachers
Pure day	70	812
Day/boarding	13	114
Total	83	926

Source: Makindu Sub-County Education Office (2022)

The accessible population for this study was made up of a total of 155 respondents. This consisted all five agricultural extension officers and all 150 teachers assigned to teach the agriculture subject in the 54 primary schools with either active or inactive 4-K Clubs. Out of the 150 agriculture teachers making up the accessible population, 44 and 106 teachers were from schools with active and inactive 4-K Clubs, respectively in Makindu Sub-County

(Makindu Sub-County Education Office, 2022; Ministry of Agriculture, Livestock and Fisheries, Makindu Sub-County Office, 2022).

Schools were categorised according to their type to study the effect of moderator variables on the relationship between independent and dependent variables. Teachers assigned to teach agriculture subjects from schools with active and inactive 4-K Clubs were chosen because they have experience and knowledge of running the 4-K Clubs. The teachers also have a key role in making decisions on the kind of strategies and methods to use in teaching agriculture in school. In addition, they are the potential patrons of 4-K Clubs, hence have great control over the running of the club's activities and can influence much in the use of the club's activities in teaching and learning agriculture in upper primary. The five agricultural extension officers were selected to participate in the study because they are the individuals under MoALF, who manage and monitor the performance of the 4-K Clubs at the school level.

3.5 Sampling Procedure and Sample Size

Teachers assigned to teach agriculture at upper primary schools with active and inactive 4-K Clubs and all the agricultural extension officers in Makindu Sub-County formed the sampling frame for this study. All the 54 upper primary schools with either active or inactive 4-K Clubs were included in the study. The study by Israel (2003) recommended that for small populations of 200 or fewer respondents, the census method should be used to select a sample size. Therefore, the census method was used to select all five agricultural extension officers to participate in the study. On selection of the sample size for agriculture teachers, the stratified random sampling method was used. Therefore, the schools were grouped into two strata namely; those with active and inactive 4-K Clubs. A table developed by Krejcie and Morgan (1970) (Appendix D) was used to determine the total sample size for agriculture teachers based on the accessible population of 150, which is equivalent to the sample size of 108 respondents. Proportionate sampling was used to determine the sample size to be drawn from each stratum using the formula;

$$n_i = \left(\frac{n}{N}\right)N_i$$

Where:

n_i =Sample of the strata

n = Sample size

N = Population

N_i =Population of the strata

n=108, N=150, N_i for schools with active 4-K Clubs is 44 and 106 for schools with inactive 4-K Clubs. Therefore, the total sample size for teachers from schools with active 4-K Clubs comprised 32 respondents and that from schools with inactive 4-K Clubs comprised 76 respondents. Within the school, two teachers from schools with three or more teachers assigned to teach agriculture at upper primary were randomly selected to participate in the study through simple balloting. Table 2 shows the number of sampled schools per type and the respective agriculture teachers sample size.

Table 2

Number of Sampled Schools Per Type and Agriculture Teachers Sample Size

School Type	Schools with active 4-K Club	Teachers	Schools with inactive 4-K Club	Teachers	Total no. of
Pure day	14	28	33	66	94
Day/boarding	2	4	5	10	14
Total	16	32	38	76	108

Source: Ministry of Agriculture Livestock and Fisheries Makindu Sub-County Office (2022) and Makindu Sub-County Education Office (2022)

The total sample size for the study was 113 respondents, which comprised 108 sampled teachers who teach the agriculture subject at upper primary school and the five agricultural extension officers. The selection of the above sample size was in line with the recommendation by (Borg et al., 2003) a survey study should have a minimum sample size of 100 respondents. According to Mozzone and Kattan (2020), 8-10 percent of respondents should be added above the recommended sample size to take care of attrition and non-responses when conducting survey studies. Therefore, the extra 13 respondents above the recommended sample size for survey studies were used to take care of attrition and non-responses.

3.6 Instrumentation

The study employed questionnaires to obtain data from teachers of agriculture at the upper primary school and agricultural extension officers from the MoALF. Appendices A and B are questionnaires for teachers of agriculture at upper primary and agricultural extension officers respectively, consisting of sections A-E. Section A yielded data on the demographic

information of the respondents, while section B yielded data on current teacher-guided 4-K Club activities for teaching the agriculture subject at upper primary school in the Sub-County. Sections C, D and E yielded data on teacher-guided 4-K Club activities undertaken within the school farm, within the community and through the incorporation of ICT respectively for the acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya. In addition to the questionnaires, an observation checklist (Appendix C) was used to collect data on current teacher-guided 4-K Club activities being carried out in the school farm, in the community and through the use incorporation of ICT for agriculture subject teaching in schools with active 4-K clubs. The data obtained from the checklist was important in triangulating the data collected by the use of the questionnaires on current teacher-guided 4-K Club activities used for teaching the agriculture subject.

3.6.1 Validity of the Instruments

In the study, both face validity, which involves checking on the general appearance of the instrument and content validity which involves looking at the relevance of content items present to the research objectives, were ensured (Saw et al., 2025). The above types of validity were achieved through discussions with the supervisors on the questionnaires and the observation checklist. Different types of validity were also ensured by discussing the instruments with other experts from the Department of Agricultural Education and Extension of Egerton University. The comments and suggestions raised were included to ensure that all items in the instruments were valid and addressed all the objectives.

3.6.2 Reliability of the Instruments

A pilot study was conducted at Kibwezi East Sub-County to determine the reliability of the questionnaire for agriculture teachers and agricultural extension officers. According to Pearson et al. (2020) pilot studies should not be conducted on or near the main study area to avoid respondent contamination. It's upon this ground therefore that Kibwezi East Sub-County was selected for the pilot study since it does not closely border the Makindu Sub-County where the main study was conducted. According to Kathuri and Pal (1993) the sample size for pilot studies should comprise of between 25 to 50 respondents. Upon this recommendation therefore, a total of 30 agriculture teachers and three agricultural extension officers were sampled to participate in the pilot study. Split-half method was used to estimate the reliability of the questionnaire for agriculture teachers and Cronbach's alpha was used to estimate the reliability of the questionnaire for agricultural extension officers. Both methods were employed since

they require a single administration and are an easy way of measuring the internal consistency of items (Mugenda & Mugenda, 2003).

The reliability of the agricultural extension officer's questionnaire was also determined using Cronbach's alpha since the items were Likert-type. This is as recommended by Kennedy (2021), that Cronbach's alpha is the most appropriate for Likert-type items. For the agriculture teacher's questionnaire, the two halves of the questionnaire were correlated using the Spearman-Brown Prophecy formula, where a correlation coefficient of 0.79 was obtained and for the agricultural extension officer's questionnaire, a Cronbach alpha coefficient of 0.86 was obtained. According to Harikrishna et al. (2021), the reliability coefficient is acceptable if it is 0.7 or higher. Therefore, the above reliability coefficient for both teachers' and agricultural extension officers' questionnaires were above the required threshold and hence was deemed to be fit for data collection. Ambiguities, unnecessary items and deficiencies identified during piloting were corrected to ensure the items were more reliable. The reliability of the observation checklist was determined quantitatively by discussing all the items with the supervisors. The suggestions and comments were included to ensure the relevant research objectives were addressed appropriately.

3.7 Data Collection Procedures

The researcher first obtained an introductory and ethical clearance letters (Appendices F&H) from the Graduate School and ethics review committee of Egerton University respectively. These were used to acquire an authorization letter to undertake research from the National Commission for Science, Technology and Innovation (NACOSTI). After acquiring the research permit, the researcher also obtained permission to access teachers in schools and extension officers in the Sub-County for data collection from the Makueni County Commissioner and Directors of Education and MoALF. In schools, permission to access teachers was first sought from the head teacher. The questionnaires were hand delivered where the researcher first introduced himself, explained to the respondents the purpose of the study and took them through the questionnaire to clarify any unclear items. Both teachers and agricultural extension officers were given 30 minutes to read and respond to the items in the questionnaire and thereafter, the researcher collected them. The researcher also visited the school farm and any other 4-K Club project in the community to put into the record the current teacher-guided 4-K Club activities that were being carried out, as indicated on the observation checklist. The researcher then perused through each questionnaire to ensure that all items were filled in to avoid cases of missing data.

3.8 Ethical Considerations

To ensure research ethics were observed during the study, the researcher began by obtaining permission to conduct research from the relevant government authorities before data collection. The targeted schools were contacted to obtain their consent before data collection. During the data collection exercise, the researcher first explained to the respondents the purpose and importance of the study to keep them informed. The researcher informed all the respondents that participation in the study was voluntary and were free to withhold any information they felt was confidential. The researcher treated all the respondents equally with dignity, respect and avoided violating their rights or causing any physical or mental harm. The privacy and confidentiality of participants was ensured by assigning codes instead of the names of respondents on the data collection tools. This also ensured the confidentiality of the information given by the respondents.

3.9 Data Analysis

The collected data was coded, and a codebook was prepared. Statistical Package for Social Sciences (SPSS) version 28 software was used to carry out all the data computations. Descriptive statistics, which include frequencies, percentages and means were used to analyse the data collected. These were used to describe the various current and futuristic teacher-guided 4-K Club activities conducted within the school farm, within the community and through the incorporation of ICT to lead to the learners' acquisition of the core competencies in the agriculture subject in Makindu Sub-County. Table 3 presents a summary of statistical tests for the research questions.

Table 3*Summary of Statistical Analysis*

Research questions	Independent variable	Dependent variable	Statistical tool
Which are the current teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in agriculture subject at upper primary school in Makindu Sub-County Kenya,	The current teacher guided 4-K Club activities	Learners' acquisition of the core competencies in the agriculture subject	Frequencies, percentages and means
Which are the futuristic teacher-guided 4-K Club activities undertaken within the school farm for learners' acquisition of the core competencies in agriculture subject at upper primary school in Makindu Sub-County, Kenya?	Futuristic teacher guided 4-K Club activities within the school farm	Learners' acquisition of the core competencies in the agriculture subject	Frequencies, percentages and means
Which are the futuristic teacher-guided 4-K Club activities undertaken within the community for learners' acquisition of the core competencies in agriculture subject at upper primary school in Makindu Sub-County, Kenya?	Futuristic teacher guided 4-K Club activities within the community	Learners' acquisition of the core competencies in the agriculture subject	Frequencies, percentages and means
Which are the futuristic teacher-guided 4-K Club activities through incorporation of ICT for learners' acquisition of the core competencies in agriculture subject at upper primary school in Makindu Sub-County, Kenya?	Futuristic teacher guided 4-K Club activities through incorporation of ICT	Learners' acquisition of the core competencies in the agriculture subject	Frequencies, percentages and means

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents analysed data and discussions on the following sub-headings; demographic information of both agriculture teachers and agricultural extension officers, the effect of school type on the use of the 4-K Clubs to help learners acquire core competencies in the agriculture subject at upper primary school, the current and futuristic teacher-guided 4-K Club activities conducted within the school farm, community and through the incorporation of ICT that can be used to help learners acquire core competencies in agriculture subject at upper primary school. Gathered data was analysed and presented in percentages, frequencies and means due to the descriptive nature of the study.

4.2 Demographic Information of the Respondents

According to Waiganjo (2021), it's important to ensure that respondents selected to participate in the study are not biased in terms of age, gender, working experience and level of qualification. It's upon this ground that this study first sought to determine the respondent characteristics of both teachers and agricultural extension officers in terms of gender, age, working experience and levels of qualification. These were presented in sections 4.2.1 and 4.2.2 for agriculture teachers and agricultural extension officers, respectively.

4.2.1 Demographic Information of the Agriculture Teachers

Demographic characteristics of the agriculture teachers covered; gender, level of qualification, years of teaching agriculture subject at upper primary school and training on the use of the 4-K Clubs in teaching.

Gender of the Respondents: All the 108 sampled teachers assigned to teach agriculture at upper primary school were asked to indicate their gender. The results were analysed and presented in Figure 3.



Figure 3: Distribution of the Agriculture Teachers by Gender

The results in Figure 3 above indicated that male teachers dominate in teaching the agriculture subject at upper primary school over female teachers by 57 percent. Similarly, Karani et al. (2022) also noted a higher number of males than females teaching agriculture at the upper primary school. According to Makarova et al. (2019) the low number of females recorded can be linked to the low preference of female teachers for vocational subjects such as agriculture. However, this disagrees with GoK's plan to ensure gender parity in all workplaces (Republic of Kenya, 2019).

Teachers' Experience of Teaching Agriculture subject at Upper Primary: Agriculture teachers were also asked to indicate their experience teaching agriculture at upper primary school. The results were analysed and presented in Figure 4.

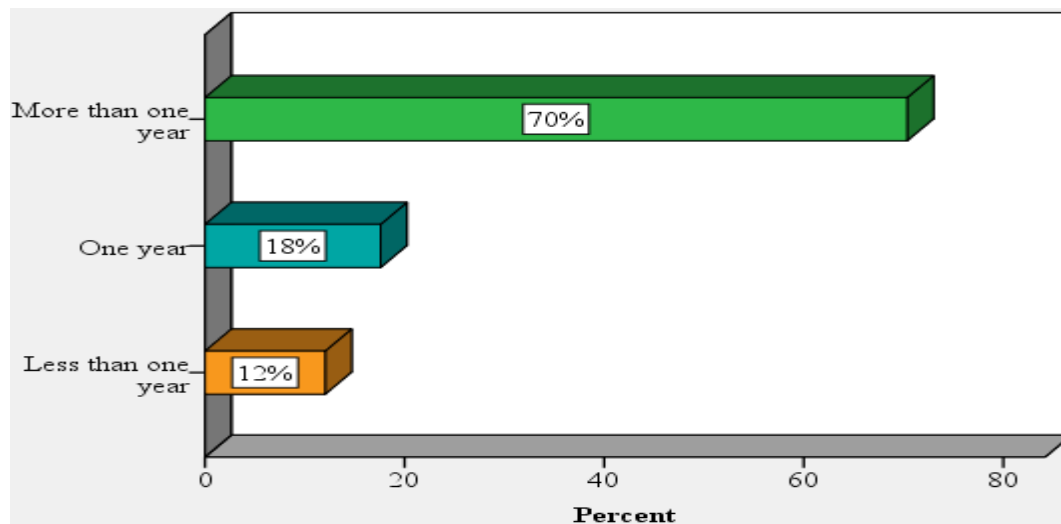


Figure 4: Teacher's Experience of Teaching Agriculture subject at Upper Primary

The results in Figure 4 above indicated that 70 percent of the agriculture teachers at upper primary had taught the agriculture subject for more than one year, 18 percent had taught the subject for one year and 12 percent had less than a year of teaching the agriculture subject

at upper primary school. According to Teacher’s Service Commission (2015), the actual minimum professional period for a teacher in Kenya is six months, after which the teacher is deemed to have gained enough experience in teaching. Therefore, findings of this study portrayed that 88 percent of teachers teaching the agriculture subject at upper primary school in Makindu Sub-County had enough teaching experience. This would enable them to implement the agriculture subject curriculum effectively. Similarly, Kubai (2023) and Kituu (2023) also found out that over 65 percent of teachers teaching CBE had enough working experience of more than one year and therefore they can effectively teach, if well guided. Samoei (2020) links the longer teaching experience of agriculture teachers to teachers' good understanding of the curriculum and competency in employing the right platforms, activities and methods of implementing the agriculture subject curriculum. This implied that most teachers at upper primary school had a longer period of teaching competency-based agriculture subject and are therefore aware of the activities that can help learners acquire competencies, including but not limited to 4-K Club activities.

Agriculture Teacher’s Level of Academic Qualification: The level of the agriculture teacher’s qualification in terms of academic training was also determined and presented in Figure 5.

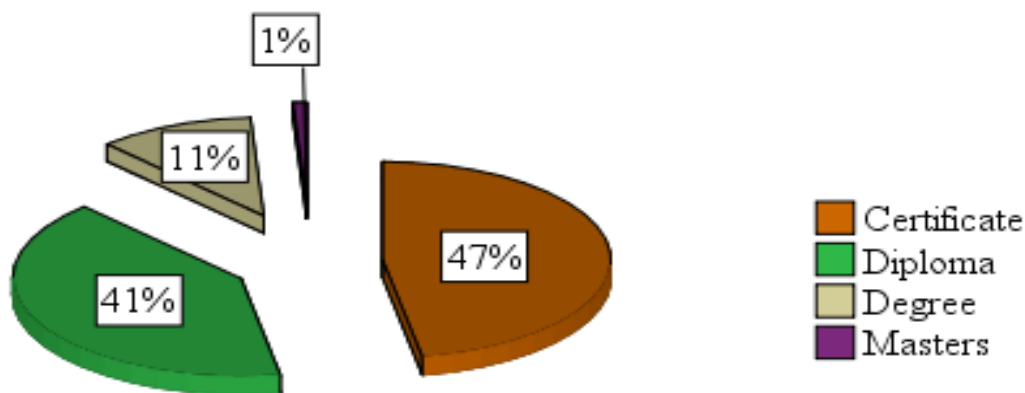


Figure 5: Teacher’s Level of Qualification

The findings in Figure 5 indicated that the highest number of agriculture teachers who participated in the study (47 percent) had only studied up to the certificate level of academic qualification. 41 percent of teachers were diploma holders, with very few teachers attaining bachelor's and master's degrees at 11 percent and 1 percent, respectively. Contrary to the findings, Karani et al. (2022), which noted slightly higher diploma agriculture teachers than certificate teachers. However, Karani et al. (2022), agree with the views of this study in that the increasing number of diploma teachers in primary schools is attributed to Teachers Service

Commission (TSC) move to prioritise on employing teachers who have at least diploma and urging for nine months upgrade training for P1 teachers. This is to ensure that all teachers are competent to implement the CBE (Nyaundi, 2021).

Extent of Training on Use of the 4-K Club in Teaching: Agriculture teachers were asked to indicate the extent to which they had been trained on the use of the 4-K Clubs in teaching at different levels of academic qualification. The results were analysed and recorded in Table 4.

Table 4

The Extent of Upper Primary Agriculture Teachers' Training on Use of the 4-K Club Activities in Teaching

	Frequency	Percent
Not at all	19	17.6
Very inadequately	14	13.0
Inadequately	53	49.0
Adequately	19	17.6
Very adequately	3	2.8
Total	108	100.0

The findings in Table 4 indicate that only 20 percent of the teachers had received either at least adequate or very adequate training on the management of the 4-K Clubs. A large number of teachers at upper primary school (79.6 percent) had received little or no training on how to use 4-K Club activities to lead to the acquisition of core competencies in the agriculture subject by learners. Therefore, this translates to a lack of knowledge by most of the agriculture teachers on how to manage 4-K Clubs in schools. Lack of enough training on the management of 4-K Clubs could be attributed to inadequate preparation and training of teachers on how to implement the practical-oriented CBE (Waweru & Mutua, 2023). According to Ouma et al. (2021) colleges and universities should train agriculture teachers different ways of implementing the competency-based agriculture curriculum. This is to ensure that they are competent in guiding learners to carry out the relevant learning activities for the acquisition of the core competencies.

School Type: As far as school type is concerned, teachers were distributed in two types of schools in Makindu Sub-County namely; pure day and day/boarding schools. Teachers were therefore asked to indicate their school type and the results were summarised in Figure 6.

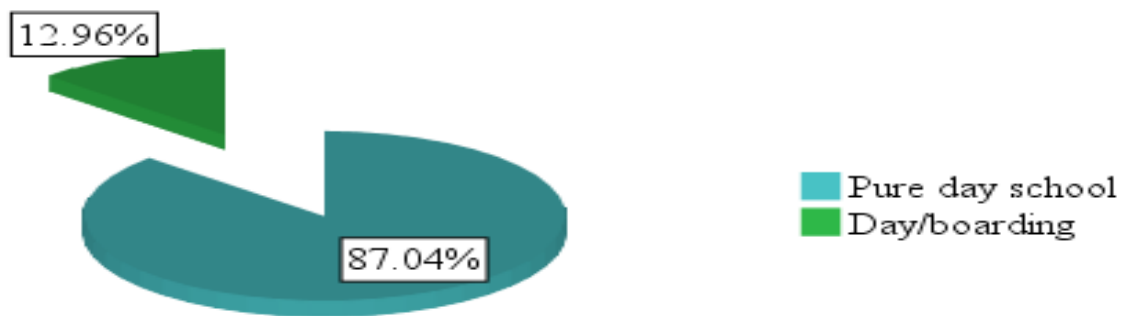


Figure 6: Agriculture Teacher's School Type

The results in Figure 6 indicated that 87 percent of teachers were from pure day schools, while 13 percent of teachers were from day/boarding schools. This was expected since, according to Makindu Sub-County Education Office (2022), there are more pure day than day/boarding primary schools in the Sub-County. In addition, according to Ministry of Agriculture, Livestock and Fisheries Makindu Sub-County Office (2022), there are more pure day than day/boarding primary schools with either active or inactive 4-K Clubs in the sub-county. Therefore, there was a larger sample of teachers from pure day schools than day/boarding schools. Determination of school type in this study was important in studying the effect of school type, which was the moderator variable, on dependent and independent variables.

School Type and Use of the 4-K Club Activities in Teaching Agriculture subject: This section was made to examine the effect of school type (moderator variable) on the relationship between dependent and independent variables. Therefore, selected 4-K Club activities that are likely to be affected were studied, and results were recorded in Table 5.

Table 5*Analysis of the Effect of School Type on the Carrying Out of Selected 4-K Club Activities*

Item	School type									
	Pure day schools					Day/boarding				
	N	Mini mum	Maxi mum	Mean	Std. Deviati on	n	Mini mum	Maxi mum	Mean	Std. Deviatio n
Access to agricultural extension personnel	94	1.00	5.00	2.85	.99415	14	1.00	4.00	3.14	.86444
Access to school resources for carrying out 4-K Club activities	94	1.00	5.00	3.84	1.1198	14	2.00	5.00	3.93	1.07161
Access to community resource persons	94	1.00	5.00	3.40	1.1199	14	1.00	4.00	3.00	.78446

The researcher first developed a scale running from 1-5, that was used to measure the extent to which the selected school type aspects were affecting the use of the 4-K Club activities in leading to the acquisition of the core competencies in the agriculture subject by learners. Any item that scored a mean of between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5.00 as very high. Upon analysis of the findings in Table 5, access to agricultural extension personnel in pure day schools scored a mean of 2.85, while in day/boarding schools, it had a mean of 3.14, which was moderate. This meant that both school types had average access to agricultural extension officers.

The little access to agricultural extension officers by both school types was likely to have been contributed by the low agricultural extension officers to schools ratio in the Sub-County, which is 1:17 according to (Ministry of Agriculture Livestock and Fisheries Makindu Sub-County Office, 2022). This would limit schools in attending field days organised by MoALF, through the agricultural extension department, low access to agricultural extension services by 4-K Club learners and generally poor collaboration between schools and MoALF in ensuring 4-K Clubs are effectively used to help learners acquire competencies in agriculture.

Access to school resources, such as the school farm, by learners to carry out 4-K Club activities scored a mean of 3.84 in pure day schools and 3.93 in day/boarding schools, which was relatively high in both school types.

Therefore, both school types had good access to resources such as school farm, farm tools and equipment for carrying out 4-K Club projects, on-farm demonstrations and other teacher-guided 4-K Club activities to facilitate the acquisition of the core competencies by learners. Contrary to the findings of this study, Karani et al. (2021), noted that primary schools lack enough resources to implement the competency-based agriculture curriculum through 4-K Club activities. Access to community resource persons by schools scored a mean of 3.4 in pure day schools and that of day/boarding mean of 3. Though both means indicate that both school types have moderate access to community resource persons, the mean for pure day schools is slightly higher than the mean for day/boarding schools. This is because all learners in pure day schools have direct interaction with the community, while in day/boarding, some learners cannot easily access the community. Therefore, carrying out teacher-guided 4-K Club activities that involve collaboration with community resource persons is easier in pure day schools and limited in day/boarding schools.

However, according to the agriculture subject curriculum design developed by Ministry of Education [MoE] (2021) learners are required to interact with community resource persons and community members in most of the sub-strands to learn from them and acquire communication and collaboration competency. Therefore, little direct interaction of learners in boarding schools would limit teachers in guiding learners to carry out 4-K Club activities that involve community resource persons. Generally, this study noted that any teacher-guided 4-K Club activity that requires schools to involve the outside community in learning is less commonly conducted in day/boarding schools than in pure day schools. This was because, in day/boarding schools, some learners are full boarders and cannot effectively carry out such 4-K Club learning activities. These activities include replicating 4-K Club projects at home and interacting with community resource persons and agricultural extension officers. This would limit the acquisition of the core competencies that learners would master by conducting such activities. Similarly Jane et al. (2020), observed that in boarding primary schools, learning activities that require the involvement of the outside school community are poorly conducted to help learners acquire the required competencies.

4.2.2 Demographic Characteristics of the Agricultural Extension Officers

This section provides the demographics of agricultural extension officers, which covers the number of years worked in Makindu Sub-County and the extent of primary schools in the management of the 4-K Clubs.

Working Experience of the Agricultural Extension Officers: The extension officers were asked to indicate the number of years they have worked in Makindu Sub-County. The results were analysed and recorded in Figure 7.

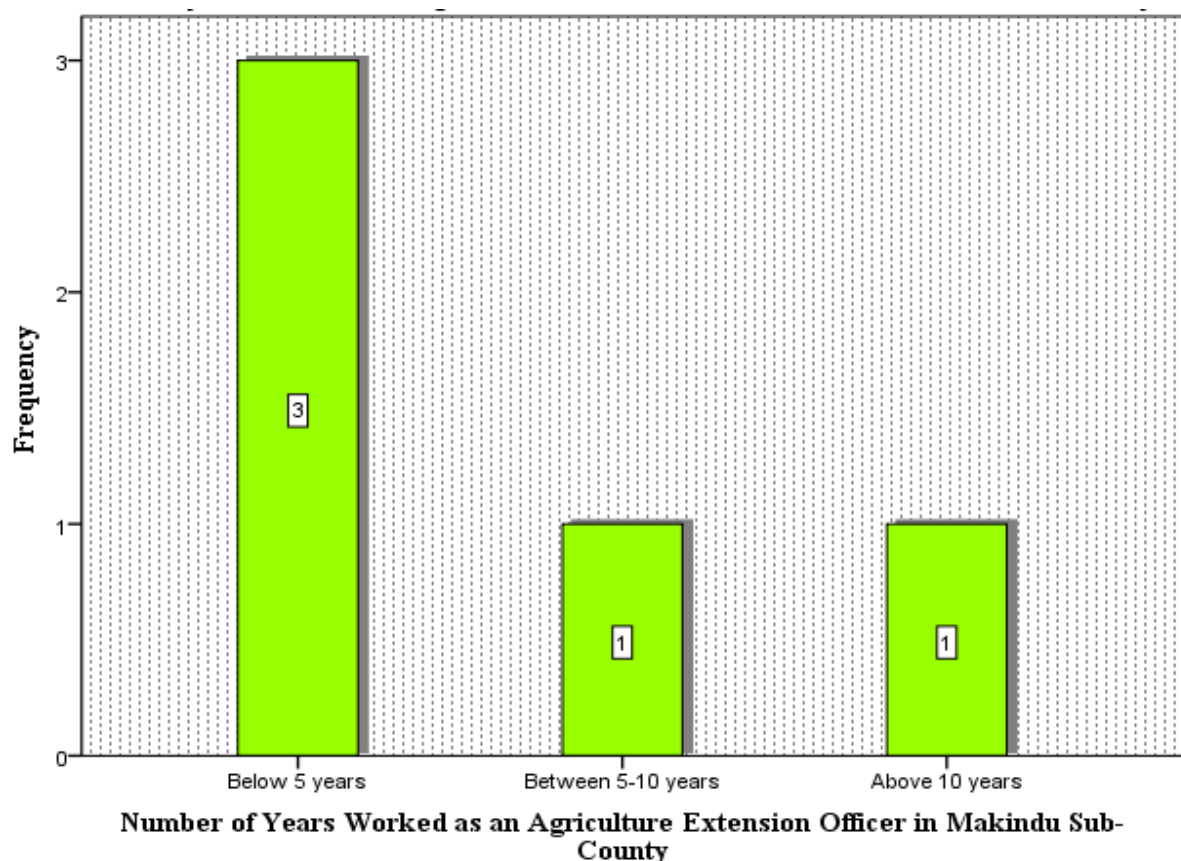


Figure 7: Working Experience of the Agricultural Extension Officers

The results in Figure 7 indicated that 3 out of the 5 extension officers had worked in the sub-county for less than five years, while only one had worked for between 5 and 10 years, and another for more than 10 years. This could have been caused by government regulation of not allowing public servants to overstay in one working station for more than three years (Kirogo, 2020). Therefore, this is likely to affect the period in which agricultural extension officers interact and work in the 4-K Clubs in schools. According to Nyarko and Kozári (2021), a prolonged period of interaction between the agricultural extension officers and the 4-K Clubs in schools enables the officers to gain a good understanding of the 4-K Clubs' performance and

the challenges they face, allowing the clubs to implement long-term plans to keep the clubs active in schools.

Collaboration of Agricultural Extension Officers with Schools: Agricultural extension officers were also asked to indicate the extent to which they collaborate with schools in the management of the 4-K Clubs. The results were analysed and recorded in Table 6.

Table 6

Level of Agricultural Extension Officers' Collaboration with Schools

	Frequency	Percent
Not at all	0	0
Rarely	3	60.0
Sometimes	2	40.0
Often	0	0
Most often	0	0
Total	5	100.0

The results in Table 6 indicated that 60 percent of the extension officers in Makindu Sub-County rarely collaborated with primary schools, while only 40 percent collaborated sometimes. Generally, the linkage between agricultural extension and 4-K Clubs in schools is low, contrary to the expectation by the MoALF. Similarly Agaki (2021), noted that there is little bonding between agricultural extension officers and the 4-K Clubs in schools. Agwu et al. (2023), stated that among the reasons leading to poor linkage between 4-K Clubs in schools and agricultural extension is insufficient funding of extension officers and lack of good transport facilities to enable the officers to reach the schools. This study also noted that there is a low number of extension officers compared to the large number of schools in Makindu Sub-County, which is one of the reasons for poor collaboration between the two. This has prevented most of the learners who are members of the 4-K Clubs unable to access extension services adequately and inadequate monitoring of the clubs by the officers in schools. A similar observation was made by the Ministry of Agriculture, Livestock and Fisheries (2021), that the ratio of agricultural extension officers to individuals who need services is 1:277 in most counties in Kenya. The study further cited that this has been brought about by low staffing and a lack of replacements for the high number of retired extension officers.

4.3 The Current Teacher-Guided 4-K Club Activities

This section presents opinions from agriculture teachers and agricultural extension officers on the extent to which the current teacher-guided 4-K Club activities conducted within the school farm, community and through the incorporation of ICT led to the acquisition of the core competencies by agriculture subject learners at upper primary in schools with active 4-K Clubs. The opinion of both agriculture teachers and extension officers was sought. The opinion of the agricultural extension officers was sought since 4-K Clubs are under the umbrella of the MoALF and are managed by the agricultural extension department, as noted by (Kenya Literature Bureau, 2018) and (Karanu & Oniang'o, 2017). Therefore, the information provided by the agricultural extension officers was deemed to be important in supplementing data collected from the agriculture teachers.

4.3.1 The Current Teacher-guided 4-K Club Activities Within the School Farm

Teachers from schools with active 4-K Clubs were asked to indicate the extent of carrying out the following teacher-guided 4-K Club activities in Table 7, within the school farm to facilitate the acquisition of the core competencies by learners in the agriculture subject.

Table 7

The Current Teacher-Guided 4-K Activities Within the School Farm

Item	Response in frequencies and percentages						Total
	Not at	Rare	Somet	Often	Most		
	all	ly	imes		often		
	1	2	3	4	5		
Guiding learners to carry out projects on crop production	%	0	3.1	21.9	59.4	15.6	100
Guiding learners to carry out projects on livestock production	%	18.8	31.3	25.0	21.9	3.1	100
Organising 4-K Club farming competitions among individual learners	%	9.4	25.0	50	15.6	0	100
Organising learners to share experiences when carrying out 4-K Club activities	%	3.1	12.5	25.0	50.0	9.4	100

Organising 4-K Club farming competitions among learners in groups	%	3.1	21.9	40.6	18.8	15.6	100
Organising learners to consult each other when carrying out 4-K Club activities	%	6.3	6.3	43.8	31.3	12.5	100

The results in Table 7 indicated that 59.4 percent of the teachers agreed that they guided learners to carry out projects on crop production often. Only 3.1 percent and 21.9 percent of teachers engaged learners rarely and sometimes, respectively. Therefore, all teachers engaged learners to carry out projects on crop production to some extent to help learners master competencies in the agriculture subject. Similar findings were recorded in a study by Njura et al. (2020), which noted that a large percentage of agriculture teachers at upper primary guide learners to carry out projects on crop production rather than any other type of project stated in the curriculum design. This could be because crop production projects are cheaper and easier to establish than other types of projects, like livestock production (Odhiambo, 2020). On guiding learners to carry out projects on livestock production, only 24.9 percent confirmed that they engaged learners often and most often. The majority of the teachers engaged learners rarely and sometimes. It can therefore be concluded that most teachers did not prefer guiding learners to carry out livestock production projects to master competencies in the agriculture subject.

The findings further confirm that teachers emphasise more on exposing learners to crop production, rather than livestock production projects, to help them master competencies in the agriculture subject. This could be linked to the findings of the study by Mugambi et al. (2022), that the high number of livestock production projects established by learners does not succeed compared to projects on crop production. However, according to Njura et al. (2020) suggests that teachers should emphasise guiding learners to carry out projects on both livestock and crop production when teaching to help learners acquire agricultural skills in both fields. Only 15.6 percent of teachers agreed that they organised farming competitions among individual learners, while none organised the individual learner competitions most often. 9.4 percent of the teachers stated that they do not organise the competitions, while 25 percent and 50 percent indicated that they do it rarely and sometimes, respectively. Generally, learners are less exposed to farming competitions individually. On organising farming competitions among learners in groups, the largest number of teachers (40.6 percent) indicated that they sometimes organise group competitions to help learners acquire core competencies in the agriculture subject.

Contrary to the findings of this study, 4-K Club (2023) presents the need to actively engage learners in farming competitions to help acquire skills in agriculture and create competent future farmers.

On organising learners to share experiences when carrying out 4-K Club activities, 59.4 percent of teachers organised learners to share experiences when carrying out 4-K Club activities frequently. In addition, teachers were also asked to indicate whether they allow learners to consult each other when carrying out 4-K Club activities. Only 6.3 percent did not engage learners to carry out this activity at all. All the other teachers engaged learners to some extent. On average, most teachers allowed learners to consult each other sometimes when carrying out 4-K Club activities. Emphasis on both sharing experiences and consultations among learners in Makindu Sub-County is supported by the Ministry of Education [MoE] (2019b), which confirms that the two activities can help learners acquire communication and collaboration competency. The study by Njura et al. (2020), also finds the two activities as important in making learning learner-centred, which is a characteristic of a competency-based agriculture curriculum.

Since 4-K Clubs belong to the MoALF under the management of the agricultural extension department, agricultural extension officers were also asked to indicate the extent to which agriculture teachers carried out 4-K Club activities within the school farm, to help learners acquire the core competencies in the agriculture subject. The results were analysed and presented in Table 8.

Table 8

Agricultural Extension Officers' Response on the Current Teacher-Guided 4-K Activities Within the School Farm

Activity	Minimum	Maximum	Mean	Std. Deviation
Guiding learners to establish projects on crop production	2.00	5.00	3.80	1.09545
Guiding learners to establish projects on livestock production	1.00	3.00	2.00	.70711
Guiding learners to prepare 4-K Club plots	3.00	5.00	4.00	.70711
Participation of learners in the 4-K Club competitions among individual learners	2.00	3.00	2.60	.54772
Organising 4-K Club farming competitions among learners in groups	2.00	4.00	2.60	.89443
Organising learners to share experiences when carrying out 4-K Club activities	2.00	4.00	3.40	.89443
Organising learners to consult each other when carrying out 4-K Club activities	3.00	4.00	3.60	.54772
Guiding learners to establish 4-K Club plots at home	1.00	2.00	1.80	.44721

The researcher first developed a scale of measurement running from 1-5 to measure the opinion of agricultural extension officers on the extent to which agriculture teachers from schools with active 4-K Clubs carried out the teacher-guided 4-K Club activities when teaching. Any item that scored a mean of between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5.00 as very high. The results in Table 8 indicated that activities such as guiding learners to establish projects on crop production, organising learners to consult each other when carrying out 4-K Club activities and guiding learners to prepare 4-K Club plots had high mean scores ranging between 3.53-4.53. This meant that most agriculture teachers in schools exposed learners to such activities often. According to extension officers, teachers rarely guided learners to carry out livestock production projects and establish 4-K Club plots at home. This was in line with the results recorded by agriculture teachers. Activities such as organising learners to participate in 4-K Club competitions individually and in groups and share experiences scored moderate mean

scores lying between 2.52-3.52, meaning that learners were exposed to such activities sometimes. The results concur with those of agriculture teachers, where it was found that a large number of teachers (50 percent in individual and 40.6 percent in group competitions) exposed learners to 4-K Club competitions sometimes.

4.3.2 The Current Teacher-Guided 4-K Club Activities Within the Community

Agriculture teachers from schools with active 4-K Clubs were also asked to indicate the current activities based in the community that they carry out to help learners master core competencies in the agriculture subject. The results were analysed and summarised in Table 9.

Table 9

The Current Teacher Guided 4-K Activities Within the Community

Item	Response in frequencies and percentages						Total
	Not at all	Rarely	Some times	Often	Most often		
	1	2	3	4	5		
Taking learners to field visits	%	3.1	56.3	18.8	15.6	6.3	100
Linking learners with community resource persons	%	12.5	53.1	25.0	6.3	3.1	100
Linking learners to agricultural extension officers	%	50.0	34.4	9.4	3.1	3.1	100
Guiding learners to establish 4-K Club plots at home	%	9.4	43.8	25.0	15.6	6.3	100
Taking learners to ASK shows and competitions	%	6.3	31.3	34.4	25.0	3.1	100

The results in Table 9 indicated that 56.3 percent of teachers rarely take learners to field visits, 3.1 percent did not take learners to field visits at all, while 18.8 percent of teachers took learners to field visits sometimes. Only 22 percent took learners to field visits either often or most often, respectively. It can therefore be concluded that most of the teachers (78.2 percent), did not expose learners to field visits properly. This could be due to the little time in the school timetable allocated to teach the agriculture subject, which cannot efficiently allow the carrying out of learning activities that require more time (Kenya Institute of Curriculum Development, 2017). This could limit learners' acquisition of the competencies associated with attending field

visits during learning. Other teacher-guided 4-K Club activities that were conducted less frequently were linking learners to community resource persons, where 12.5 percent did not link at all, while 53.1 percent rarely linked learners to community resource persons.

On guiding learners to establish 4-K Club plots at home, 9.4 percent of the teachers did not guide learners at all, 43.8 percent guided rarely, 25 percent guided sometimes, 15.6 percent guided often, while only 6.3 percent guided learners more often to establish 4-K Club projects at home. Both poor linkages of learners to community resource persons and the establishment of 4-K Club plots at home could have been caused by the presence of full boarding learners who have limited time to access the outside community, as noted by Jane et al. (2020). Regarding taking learners to ASK shows and competitions, the highest number of teachers (34.4 percent), only took learners sometimes. This was because ASK shows are only held periodically, as stated by (Agricultural Society of Kenya (ASK), 2022). The results on agriculture teachers' engagement of learners during learning through field visits, establishment of home-based plots and attending ASK Shows and competitions are contrary Ministry of Education [MoE] (2021), recommendations that these activities should be emphasised to help learners acquire competencies in the agriculture subject. However, studies by Njura et al. (2020) and Mugambi et al. (2022), identify financial constraints and lack of time to conduct activities like establishing home plots, field trips, and attending ASK shows as among the reasons why learners in agriculture are not exposed to such activities during learning.

Despite 4-K Clubs being under the management of the agricultural extension department, 50 percent of teachers from schools with active 4-K Clubs did not link learners to agricultural extension officers at all. Only 6.2 percent linked learners to extension officers, at least often or most often. This is contrary to the expectation by the Ministry of Agriculture, Livestock and Fisheries (2021), that the officers should closely work with 4-K Clubs in schools to monitor their performance and provide agricultural advice to members of the club. This could be attributed to the low number agricultural extension officers assigned to schools in Makindu Sub-County, which is 1 agricultural extension officer made to serve 17 schools and a lack of functioning vehicles to reach schools (Ministry of Agriculture Livestock and Fisheries Makindu Sub-County Office, 2022). Further literature review revealed that the good link between agricultural extension and 4-K Clubs in schools was disrupted by the scrapping of agriculture subjects in primary schools, following the implementation of the Kamunge commission of the year 2001, which led to the collapse of most of the 4-K Clubs (James, 2021). However, with the reintroduction of the agriculture subject back to primary school under CBE

and the revival of 4-K Clubs by the GoK in June 2021, as indicated by (Agwu et al., 2023), 4-K Clubs are expected to work together with agricultural extension officers.

Agricultural extension officers were also asked to indicate the extent to which agriculture teachers from schools were engaging learners to carry out activities within the community. The results were recorded in Table 10.

Table 10

Agricultural Extension Officers' Response on the Current Teacher-Guided 4-K Club Activities Within the Community

Activity	Minimum	Maximum	Mean	Std. Deviation
Guiding learners to establish 4-K Club plots at home	1.00	2.00	1.80	.44721
Taking learners to field visits in the community	2.00	3.00	2.60	.54772
Participation of learners in ASK shows and exhibitions	2.00	3.00	2.80	.44721
Linking learners to community resource persons	1.00	2.00	1.80	.44721
Linking learners to agricultural extension officers	2.00	3.00	2.20	.44721

The researcher first developed a scale, running from 1-5, to measure the extent to which agriculture teachers are engaging learners in 4-K Club activities within the community. Any item that scored a mean of between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5.00 as very high. Findings in Table 10 indicated that activities such as guiding learners to establish 4-K Club plots at home, linking learners to community resource persons and agricultural extension officers scored low mean scores of 1.8, 1.8 and 2.2, respectively. This meant that, according to agricultural extension officers, teachers rarely engaged learners to carry out such activities within the community. These results concur with the responses of teachers on the same items in Table 10. The other activities, which were taking learners to field visits in the community and taking learners to participate in ASK shows and exhibitions, scored moderate mean scores of 2.6 and 2.8, respectively. Similar results were portrayed by teachers, where a high percentage of teachers indicated that they sometimes engaged learners in such activities to help them master core competencies in the

agriculture subject. Despite the low means scored by most of the activities, MoALF still requires members of the 4-K Club to be strongly linked to the community resource persons, nearby farms, extension officers and local leaders and replicate projects they carry out in school back to their homes (4-K Club, 2023a).

4.3.3 The Current Teacher-Guided 4-K Club Activities Through Incorporation of ICT

Agriculture teachers and agricultural extension officers were also asked to indicate the extent of carrying out teacher-guided 4-K Club activities through the incorporation of ICT when teaching competency-based agriculture curricula to help learners acquire core competencies in the agriculture subject. Upon analysis of responses from teachers' results were recorded in Table 11.

Table 11

The Current Teacher Guided 4-K Activities Through Incorporation of ICT

Item		Response in frequencies and percentages					Total
		Not at all	Rarely	Some times	Often	Most often	
		1	2	3	4	5	
Guiding learners to market their 4-K Club project's produce on social media	%	12.5	46.9	34.4	3.1	2.1	100
Guiding learners to take and create profiles of photos of their projects for record keeping on electronic devices	%	0	31.3	37.5	21.9	9.4	100
Guiding learners to carry out an internet search on agriculture projects	%	9.4	25.0	43.8	15.6	6.3	100
Guiding learners to take videos of their projects for record-keeping	%	6.3	31.3	28.1	28.1	6.3	100

The results in Table 11 revealed that most teachers (93.8 percent), inadequately guided learners to market their produce on social media to acquire the required competencies. Only 5.2 percent guided learners at least often or more often. It is therefore evident that there was less emphasis by teachers on guiding learners to market their produce on social media. When asked whether they guide learners to take and create profiles of photos of their projects for record-keeping on electronic devices, all the teachers indicated that they at least guided learners to carry out the activity to some extent. However, despite there being no teacher who indicated

that they do not guide learners on the activity, still large percentage (68.8 percent) of teachers did not guide learners either often or more often. This could have been attributed to a lack of enough digital devices in schools to facilitate the taking of photos and creating photo profiles as noted by (Karani, 2023).

A study by Tejedor et al. (2020), conducted in Spain, Ecuador and Italy on the level of digital literacy among learners, stated that a lack of sufficient learners' exposure to interact with digital devices when learning leads to low acquisition of digital literacy competency. Similarly, the lack of learners' exposure to the use of digital devices when conducting 4-K Club activities while learning in the agriculture subject may lead to low mastery of digital literacy competency. On guiding learners to take videos of their projects for record-keeping, 6.3 percent indicated that they don't guide learners at all, while the largest number of teachers (31.3 percent), guided learners rarely. Only 6 percent of teachers guided more often. Similar to taking photos on 4-K Club projects when learning for record-keeping, low guidance of learners to take videos on projects when learning could have been attributed to the lack of enough facilities to carry out the activity (Karani, 2023).

In addition, a study by Apolo et al. (2020), links low inclusion of ICT-related activities to a lack of knowledge by most teachers in using digital devices. This may limit learners' acquisition of the required competencies. When asked to respond on guiding learners to carry out internet searches on agriculture projects, 9.4 percent did not guide at all, 25 percent guided rarely, 43.8 percent guided sometimes, while only 22 percent of teachers guided learners at least often. Contrary to the results of this study, the upper primary agriculture curriculum designs require teachers to actively employ technology when teaching different strands. In addition, teachers are required to help learners interact with ICT tools relevant to the learning areas, to help learners acquire digital literacy competency (Ministry of Education [MoE], 2021). According to Malik and Godara (2020) the use of ICT facilities in teaching to be among the factors that motivate learners to learn and therefore, recommends teachers to actively incorporate ICT tools in the learning process.

The presence of very few teachers across all items in this study who guided learners either often or more often could be attributed to findings of the study by Karani (2023), which found that there are insufficient ICT facilities for use in learning in most schools. The study further noted a large number of unmaintained ICT facilities in primary schools and therefore hinders their use in the agriculture subject curriculum implementation. In addition, a similar study by Nyikadzino (2023), observed that most teachers lack knowledge on how to incorporate ICT tools in learning the agriculture subject. For triangulation purposes,

agricultural extension officers were also asked to respond to the current teacher-guided 4-K Club activities through the incorporation of ICT to facilitate the acquisition of competencies by learners in the agriculture subject. The data was analysed by use of means and presented in Table 12.

Table 12

Agricultural Extension Officer's Opinion Current Teacher Guided 4-K Activities Through Incorporation of the ICT

Activity	Minimum	Maximum	Mean	Std. Deviation
Guiding learners to market their 4-K Club produce on social media	1.00	3.00	1.60	.89443
Helping learners to take videos of their projects for record-keeping	2.00	3.00	2.40	.54772
Helping learners to take photos and create photo profiles of their projects	2.00	3.00	2.80	.44721
Guiding learners to carry out an internet search for information on agriculture projects	1.00	3.00	2.20	.83666

The researcher developed a scale running from 1-5 to measure the extension officer's agreement level with the indicated items. Any item that scored a mean of between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5.00 as very high. The results in Table 12 indicated that activities such as guiding learners to market their 4-K Club produce on social media, helping learners to take videos of their projects for record keeping and guiding learners to carry out internet searches on agriculture projects scored a mean of 1.6 and 2.4 and 2.2 respectively, which were found to be low. Similar to findings recorded from agriculture teachers in Table 11, this could be linked to the lack of sufficient ICT facilities in schools and the know-how by teachers to use ICT tools to carry out such activities (Karani et al., 2022). The study by Apolo et al. (2020) stated that the lack of know-how by teachers on the use of ICT tools to carry out learning activities could have been contributed by the lack of proper teacher training on how to embrace ICT in learning. This has led to little guidance of learners by teachers to carry out 4-K Club ICT-related activities during learning to help them master the required competencies.

Helping learners to take photos and create photo profiles of their projects had a mean score of 2.8, respectively, which was moderate. The slightly higher mean score of this activity compared to the other activities, such as carrying out an internet search of agriculture information, could be because teachers can guide learners to carry out the activity by use of their phones. This is as recommended by Barasa (2022) that if the schools do not have cameras for use in taking photos of learners' projects, teachers can use their mobile phones, which are readily available. However, generally, the responses by agricultural extension officers concur with those of agriculture teachers, where a large percentage indicated that they either carried out all the activities, rarely or sometimes. Contrary to the findings of this study, Gekonge (2021) noted that in the revamped 4-K Club, learners are expected to actively employ modern technology when carrying out various 4-K Club activities to enhance efficiency in the production and acquisition of 21st-century skills.

4.4 The Futuristic Teacher-Guided 4-K Club Activities Within the School Farm

This section presents analysed data and discussions on the second objective, which sought to document the futuristic teacher-guided 4-K Club activities within the school farm for learners' acquisition of the core competencies in the agriculture subject. The data was collected from agricultural extension officers and upper primary school agriculture teachers in Makindu Sub-County. Agriculture teachers informed on the specific competencies acquired by learners by carrying out a particular 4-K Club activity within the school farm and to which extent activities are leading to the acquisition of the core competencies which was measured in five Likert scale running from 1 to 5 which was; Not at all (1), Very Little (2), Little (3), Average (4) and Above Average (5). The opinion of the agricultural extension officers was sought to determine generally the extent to which the activities are leading to the acquisition of competencies in the agriculture subject by learners. This would inform on the relevance of the activity in teaching of agriculture subject. The analysed data for the agricultural extension officer's opinion was presented in form of means in Table 13.

Table 13

Agricultural Extension Officer's Opinion on the Extent to Which the 4-K Club Activities Within the School Farm Led to the Acquisition of Competencies

Activity	Mini mum	Maxi mum	Mean	Std. Deviation
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects.	4.00	5.00	4.40	.54772
Helping learners to come up with innovative gardens when carrying out their projects.	5.00	5.00	5.00	.00000
Guide learners to come up with innovative ways of conserving water when carrying out the projects.	4.00	5.00	4.60	.54772
Placing learners in groups to carry out projects.	4.00	5.00	4.60	.54772
Allowing learners to share experiences when carrying out projects.	3.00	4.00	3.40	.54772
Carry out an on-farm demonstration in 4-K Club plots during learning.	4.00	5.00	4.80	.44721
Organising 4-K Club farming competitions among individual learners.	4.00	5.00	4.40	.54772
Organising 4-K Club farming competitions among learners in groups.	4.00	5.00	4.80	.44721

The researcher first developed a scale running from 1-5 to measure the level to which the activities lead to the acquisition of competencies in the agriculture subject by learners. Any item that scored a mean of between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5 as very high. The results in Table 13 showed that all the activities scored high and very high mean scores (mean scores lying between 3.53-4.53 and 4.54-5.00) except allowing learners to share experiences when carrying out projects, which had a mean score of 3.4, which was moderate. This indicated that most of the teacher-guided 4-K Club activities were very critical in helping learners acquire competencies or skills in the agriculture subject. The findings were in line with guidelines by the Kenya Institute of Curriculum Development (2017), regarding the activities within the school that teachers of agriculture should conduct to ensure the acquisition of competencies by learners. These learning activities stated by KICD, are such as allowing learners to consult each other, share experiences, establish innovative gardens, carry out on-farm demonstrations, among others.

The study further engaged agriculture teachers at upper primary to provide information on specific competencies that learners would acquire by carrying out the stated teacher-guided 4-K Club activities within the school farm. The study also determined the extent to which each activity contributed to the acquisition of the specific competency. This study focused on studying the acquisition of only three core competencies namely; communication and collaboration, critical thinking and problem-solving and digital literacy. The findings were analysed and presented in Tables 14 and 15. On 4-K Club activities within the school farm, which would lead to the acquisition of communication and collaboration competency, the results were analysed and presented in Table 14.

Table 14

The 4-K Club Activities Within the School Farm Leading to the Acquisition of Communication and Collaboration Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	The extent of leading to the competency				
		Communicati on and Collaboration	NA	VL	L	A
		1	2	3	4	5
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects.	% 38	-	12	17.6	6.5	1.9
Helping learners to come up with innovative gardens when carrying out their projects.	% 35.2	-	2.8	24.1	2.8	5.6
Guide learners to come up with innovative ways of conserving water when carrying out the projects.	% 32.4	-	3.7	14.8	11.1	2.8
Placing learners in groups to carry out projects.	% 99.1	-	-	5.6	47.2	46.3
Allowing learners to share experiences when carrying out projects.	% 100	-	-	5.6	45.4	49.0
Carry out an on-farm demonstration in 4-K Club plots during learning.	% 95.4	-	0.9	0.9	48.1	45.4

Organising 4-K Club farming competitions among individual learners.	%	90.7	-	-	3.7	50.0	37.0
Organising 4-K Club farming competitions among learners in groups.	%	92.6	-	-	3.7	38.9	50.0

The results in Table 14 indicated that 38 percent of the teachers agreed that guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects led to the acquisition of communication and collaboration competency. When asked to indicate the level to which the activity was leading to the acquisition of the competency, out of the 38 percent of the teachers, 30 percent indicated that the level of contribution was either little or very little. Only 6.5 percent indicated average and 1.9 percent indicated above average. The findings implied that guiding learners to come up with innovative pests, parasites and disease control methods has a low contribution to learners' acquisition of communication and collaboration competency. This is because it was found to enhance more of critical thinking, creativity and problem-solving than communication and collaboration among learners (Mmbaka et al., 2020).

On helping learners to come up with innovative gardens when carrying out their projects, 35.2 percent agreed that the activity led to the acquisition of the competency. When asked to indicate the extent to which the activity was leading to the acquisition of the competency, a large number of the teachers (24.1 percent), indicated that the level was little. On guiding learners to come up with innovative ways of conserving water when carrying out the projects, 32.4 percent indicated that the activity was leading to the acquisition of communication and collaboration competency, with the highest percentage of teachers (14.8 percent) indicating that the activity had little impact in leading to the acquisition of the competency. The reason for low responses on the establishment of innovative gardens, coming up with innovative ways of parasite and disease control and water conservation could be linked to the failure of the KICD to categorise the activities as among those which lead to the acquisition of communication and collaboration competency by learners (Ministry of Education [MoE], 2021). A study by Nyaboke et al. (2021), identified these activities as more of those that contribute to the acquisition of critical thinking and problem-solving than communication and collaboration.

When asked to indicate whether allowing learners to share experiences when carrying out projects promoted communication and collaboration competency, all 108 teachers who participated in the study agreed that the activity promoted the competency, with 45.4 percent and 49 percent of the teachers indicating that it promoted average and above average,

respectively. With only 5.6 percent of the teachers indicating that the activity had little impact in promoting communication and collaboration competency, it was concluded that the activity has a great influence on learners' acquisition of the competency. The findings in this study were in line with the statement by the Kenya Institute of Curriculum Development (2017) that allowing learners to share experiences and enables them to develop communication and collaboration competencies. When asked whether carrying out an on-farm demonstration in 4-K Club plots during learning would promote communication and collaboration competency, over 95 percent of the teachers who participated in the study agreed that the activity promoted the acquisition of the competency, with 48.1 percent and 45.4 percent indicating that the impact was average and above average respectively.

A study conducted in Uasin-Gishu by Ouma et al. (2021), on readiness for competence-based agriculture by schools, concurred with this study in that teacher-guided on-farm demonstrations are among the methods that lead to the acquisition of core competencies in agriculture by learners. Further analysis showed that 99.1 percent of the teachers agreed that placing learners in groups to carry out projects promoted the acquisition of communication and collaboration competency, with 47.2 percent and 46.3 percent noting that the activity promoted the acquisition of the competency on average and above average, respectively. A similar study conducted in Nairobi County, noted that teachers placed learners in groups to carry out agriculture projects to enhance communication and collaboration competency. This reaffirmed that placing 4-K Club members in groups to carry out projects is important to help them master communication and collaboration competency in the agriculture subject (Asava, 2021).

On carrying out farming competitions, 90.7 percent of the teachers agreed that individual learner competitions promoted communication and collaboration competency, with 50 percent and 37 percent indicating that the impact was average and above average, respectively. On organising group competitions, 92.6 percent of the teachers agreed that it promoted the acquisition of competency, with 50 percent of the respondents who agreed indicating that the impact was above average. Similar findings were made in a study by Asava (2021) which found that engaging learners in farming competitions when teaching enables them to acquire communication and collaboration competencies. Further analysis noted that teacher-guided 4-K Club activities, such as placing learners in groups to carry out projects, conducting on-farm demonstrations, allowing learners to share experiences when carrying out projects and participating in farming competitions both individually and in groups, had a high impact in promoting communication and collaboration competency. This is because these activities encourage interactions among learners and with their facilitators, as cited by (Kituu,

2023). Teacher-guided 4-K Club activities, such as guiding learners to come up with innovative ways of parasite, pest and disease control methods, innovative gardens and innovative ways of conserving water when carrying out the projects, had little influence on leading to the acquisition of communication and collaboration competency by the agriculture subject learners. This is because the activities aroused learners to think and analyse the issues at hand to come up with their own solutions (Mmbaka et al., 2020).

Agriculture teachers were also asked to indicate whether the teacher-guided 4-K Club activities conducted within the school farm would help learners acquire critical thinking and collaboration competencies. The results were summarised in Table 15.

Table 15

The 4-K Club Activities Within the School Farm Leading to the Acquisition of Critical Thinking and Problem-Solving Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	The extent of leading to the competency				
		Critical thinking and problem-solving	NA	VL	L	A
		1	2	3	4	5
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects.	% 95.4	-	-	2.8	44.4	48.1
Helping learners to come up with innovative gardens when carrying out their projects.	% 97.2	-	-	0.9	41.7	54.6
Guide learners to come up with innovative ways of conserving water when carrying out the projects.	% 95.4	-	-	-	35.2	60.2
Placing learners in groups to carry out projects.	% 28.7	-		3.7	16.7	8.3
Allowing learners to share experiences when carrying out projects.	% 10.2	-	1.9	0.9	2.8	4.6

Carry out an on-farm demonstration in 4-K Club plots during learning.	%	50	-	-	5.6	40.7	3.7
Organising 4-K Club farming competitions among individual learners.	%	66.6	-	-	6.5	41.7	19.4
Organising 4-K Club farming competitions among learners in groups.	%	66.7	-	-	4.6	35.2	26.9

The results in Table 15 indicated that 95.4 percent of the teachers who participated in the study agreed that guiding learners to develop innovative ways of parasite, pest and disease control methods when carrying out their projects, enhanced the acquisition of critical thinking and problem-solving competency. 44.4 percent and 48.1 percent of the respondents who agreed indicated that the impact of the activity in promoting competency was average and above average. On helping learners to develop innovative gardens when carrying out their projects, 97.2 percent of the teachers agreed the activity promoted competency, with a large number of teachers (54.6 percent) indicating that the impact was above average. When asked whether guiding learners to develop innovative ways of conserving water when carrying out the projects promoted critical thinking and problem-solving competency among learners, 95.3 percent of the teachers agreed. 60.2 percent of the teachers who agreed indicated that the impact of the activity on leading to the acquisition of the competency was above average. The results from the three activities, which are innovativeness in pest, disease and parasite control, establishing innovative gardens and methods of water conservation, were in line with a study by Kituu (2023) which observed that any activity encouraging learners to be innovative promoted critical thinking and problem-solving competency.

Very few teachers, 28.7 percent and 10.2 percent, agreed that placing learners in groups to carry out projects and allowing learners to share experiences when carrying out the 4-K Club projects promoted critical thinking and problem-solving among learners. This meant that two activities were less effective in enhancing critical thinking and problem-solving among agriculture subject learners. This was because these activities allowed learners to interact more than enabling them to think critically. A similar observation was made by (Wale & Bishaw, 2020). However, the results contradict the findings by Waiganjo (2021), that by allowing learners in groups to share experiences, strongly enhances the acquisition of critical thinking and problem-solving competency. When asked whether carrying out on-farm demonstrations in 4-K Club plots during learning would promote critical thinking and problem solving among learners, 50 percent of the teachers agreed, with nearly half of the teachers indicating that the level impact of the activity on the acquisition of the competency was average.

On engaging learners in 4-K Club farming competitions, 66.6 percent and 66.7 percent of the teachers agreed that individual and group participation, respectively, would enhance the acquisition of critical thinking and problem-solving competency among learners. In both activities, a large number of teachers, 41.7 percent for individual and 35.2 percent for group competitions, noted that the activities had an average impact on the acquisition of competencies. The findings were supported by Jones and Edwards (2019) and Nzomo (2021), in that on-farm demonstration plots and farming competitions among learners strongly promote mastery of critical thinking and problem-solving competency. None of the teacher-guided 4-K Club activities conducted within the school farm enhanced the acquisition of digital literacy competency. This was because none of the agriculture teachers involved in the study identified any activity that promoted the competency. This could be because none of the activities would involve the learner's direct interaction with digital devices. According to Nikou and Aavakare (2021), any activity that does not involve one's interaction with ICT tools, either directly or indirectly, does not enhance digital literacy. Therefore, the results were expected since all the 4-K Club activities conducted within the school farm that were studied do not require learners to directly use digital devices. These activities were such as farming competitions, conserving water and controlling pests, parasites and diseases, among others.

4.5 The Futuristic Teacher-Guided 4-K Club Activities Within the Community

This section presents analysed data on the third objective, which sought to document the futuristic teacher-guided 4-K Club activities within the school community for the acquisition of core competencies in the agriculture subject at upper primary. Agriculture teachers were involved in the study to provide data on specific competencies that learners would acquire by carrying out the listed teacher-guided 4-K Club activities within the community and the extent to which activities are leading to the acquisition of the competencies which was measured in five key Likert scale, running from 1 to 5 which was; Not at all (1), very little (2), little (3), average (4) and above average (5). Agricultural extension officers were involved to inform on the extent of relevance of the teacher-guided 4-K Club activities in helping learners to acquire competencies in agriculture subject. Table 16 provides data on the extension officer's opinion on the extent to which the futuristic teacher-guided 4-K Club activities within the community would contribute to the acquisition of competencies in agriculture subject by the learners.

Table 16

Agricultural Extension Officer's Opinion on the Extent to Which the 4-K Club Activities Within the Community Led to the Acquisition of Competencies

Activity	Mini mum	Maxi mum	Mean	Std. Deviation
Linking learners to extension officers	5.00	5.00	5.00	.00000
Linking learners to community resource persons	4.00	5.00	4.60	.54772
Helping learners to establish 4-K Club plots at home	4.00	5.00	4.40	.54772
Helping learners to market their 4-K Club project produce in the community	4.00	5.00	4.40	.54772
Taking learners to participate in ASK shows competitions and exhibitions	4.00	5.00	4.40	.54772
Taking learners on agricultural tours to places of agricultural interest for learning	4.00	5.00	4.80	.44721
Taking learners to field days organised by MoALF through the agricultural extension department	4.00	5.00	4.60	.54772

Means were used to analyse data. The researcher therefore, developed a measurement scale that runs from 1-5 to determine the extent to which each activity leads to the acquisition of competencies by learners. Any item that scored a mean between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5.00 as very high. The results in Table 16 revealed that all the activities conducted within the school farm had a very high effect on learner's acquisition of competencies in the agriculture subject. This is because all the activities scored both high and very high mean scores of between 3.53-4.53 and 4.54-5.00, respectively. Despite the weak linkage between agricultural extension and 4-K Clubs in schools, as found in section 4.2.2, the activity scored the highest mean of 5.0. This meant that all the agricultural extension officers who participated in the study agreed that linking learners in 4-K Clubs to agricultural extension officers greatly helps them acquire competencies in the agriculture subject. Generally, agricultural extension officers find that the teacher-guided 4-K Club activities within the community were very important in helping the learners acquire skills in agriculture. The observation by the extension officers was in line with recommendations by Ministry of Education [MoE] (2021) that learners taking the agriculture subject should be well-linked to the school surrounding community and replicate agriculture activities carried out in the school to the community to enable them to acquire the required competencies.

Agriculture teachers were also asked to indicate the specific competencies that learners would acquire by carrying out the stated activities and the extent to which learners would acquire them. The competencies studied were; communication and collaboration, critical thinking and problem-solving and digital literacy. Table 17 indicates responses on teacher-guided 4-K Club activities within the community, which would lead to the acquisition of communication and collaboration competency.

Table 17

The 4-K Club Activities Within the Community Leading to the Acquisition of Communication and Collaboration Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	The extent of leading to the competency					
		Communication and Collaboration	NA	VL	L	A	AA
			1	2	3	4	5
Linking learners to extension officers	% 98.1	-	2.8	6.5	62.8	36.1	
Linking learners to community resource persons	% 100	-	-	3.7	54.6	41.7	
Helping learners to establish 4-K Club plots at home	% 89.8	-	-	0.9	41.7	47.2	
Helping learners to market their 4-K Club project to produce in the community	% 97.2	-	-	6.5	34.3	56.5	
Taking learners to participate in ASK shows, competitions and exhibitions	% 100	-	-	4.6	33.3	62.0	
Taking learners on agricultural tours to places of agricultural interest for learning	% 96.3	-	-	0.9	45.4	50	
Taking learners to field days organised by MoALF through the agricultural extension department	% 95.4	-	-	1.9	41.7	51.9	

The results in Table 17 revealed that 98 percent of the teachers agreed that linking learners to agricultural extension officers promoted the acquisition of communication and

collaboration competency, with the majority of teachers (62.8 percent), noting the activity has an average enhancement of the competency. This was contrary to what agriculture teachers practise currently, as they rarely link learners to the agricultural extension officers when teaching agriculture subject, as observed in Table 8 in this study and as cited by (Agaki, 2021). All the 108 agriculture teachers agreed that linking learners to the community resource persons and taking them to participate in ASK shows, competitions and exhibitions would enable them to acquire communication and collaboration competency. When asked to indicate the extent to which these two activities contributed to the acquisition of the competency, 54.6 percent of teachers who participated in the study agreed that the impact of linking learners to community resource persons was average.

On taking learners to ASK shows and exhibitions, 62 percent of the teachers agreed that the impact of the activity on leading to the acquisition of communication and collaboration competency was above average. Therefore, linking learners to community resource persons and taking them to ASK shows were very effective in helping learners acquire communication and collaboration competency. The results were in line with the findings by Gwada (2020), in that by attending ASK shows and competitions, learners interact with learners from other schools and agriculture experts, where they share ideas, experiences and learn from each other. When asked whether helping learners to establish 4-K Club plots at home would enhance communication and collaboration competency among learners, 89.8 percent of the teachers who participated in the study agreed. Further analysis of responses regarding the activity indicated that only 0.9 percent of the responding teachers reported that the activity contributed little to the acquisition of the competency. However, 47.2 percent of teachers indicated that the level of impact of the activity on the acquisition of communication and collaboration competency was above average. This suggested that this activity would be effective in promoting the acquisition of communication and collaboration competencies among learners.

These findings agree with the views of Nestle Kenya (2019), 4-K Club members should establish agricultural plots at home and transfer what they learn in school to the community, hence enhancing the acquisition of communication and collaboration competency. A similar study in Nigeria by Haruna et al. (2019), recommended members of YFC and 4-H clubs in schools collaborate actively with outside communities and establish home-based plots to enable them to master required competencies in the agriculture subject. On helping learners to market their 4-K Club project produce in the community, 97.2 percent of the teachers agreed that this led to the acquisition of communication and collaboration competency. Further

analysis showed that 56.5 percent of teachers indicated that the level of contribution was above average.

This suggested that helping learners market their 4-K Club produce in the community strongly leads to the acquisition of communication and collaboration competency. On taking learners to agricultural tours in places of agricultural interest for learning, 96.3 percent of the agriculture teachers agree that the activity would lead to the acquisition of communication and collaboration competency. Further analysis indicated that 45.4 percent and 50 percent of the teachers stated that the level of contribution of the activity was average and below average, respectively. The findings agreed with a study by Shabani et al. (2023) taking learners on agricultural trips enables them to master the competencies needed in agriculture. However, a study conducted by Nzomo (2021) noted that agriculture teachers rarely take learners on field trips for learning, despite being a good method of enhancing communication and collaboration among learners. This was linked to more emphasis on the use of lecture methods by teachers, the lack of time allocated in the timetable for conducting agricultural tours and the high cost of organising trips, as noted by (Njura et al., 2020).

Concerning taking learners to field days organised by MoALF through the agricultural extension department, 95.4 percent of the teachers agreed that the activity led to the acquisition of the competency, with the majority of the teachers who responded to the item, (51.9 percent) stating that the level of contribution was above average. Generally, the results indicated that all the teacher-guided 4-K Club activities within the school farm are very effective in helping learners acquire communication and collaboration competency. This is because the activities allow learners to interact with the outside community during the learning process. The observations in this study are supported by CBE agriculture subject designs, developed by the Ministry of Education [MoE] (2021) and the Ministry of Education [MoE] (2019a), that suggest community service learning activities at the end of every strand to enable learners to interact with the community. Among these activities are such as participating in ASK shows, field days, linkage to agricultural extension officers and community resource persons, among others. This enables them to master communication and collaboration competency while carrying out these activities.

The respondents were also asked to indicate whether the futuristic teacher-guided 4-K Club activities within the community can enhance critical thinking and problem-solving competency among agriculture subject learners at upper primary. The results were analysed and presented in Table 18.

Table 18

The 4-K Club Activities Within the Community Leading to the Acquisition of Critical Thinking and Problem-Solving Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	The extent of leading to the competency				
		Critical thinking and Problem-solving	NA	VL	L	A
		1	2	3	4	5
Linking learners to extension officers	% 7.4	-	-	1.9	1.9	3.7
Linking learners to community resource persons	% 7.4	-	1.9	-	5.6	-
Helping learners to establish 4-K Club plots at home	% 56.5	-	-	1.9	42.6	12
Helping learners to market their 4-K Club project produce in the community	% 43.5	-	-	-	34.3	9.3
Taking learners to participate in ASK shows, competitions and exhibitions	% 16.7	-	-	4.6	12	-
Taking learners on agricultural tours to places of agricultural interest for learning	% 25.9	-	-	12	13.9	-
Taking learners to field days organised by MoALF through the agricultural extension department	% 17.6	-	-	8.3	8.3	0.9

The results in Table 18 revealed that only one activity, which is helping learners establish 4-K Club plots at home, had a majority of teachers (56.5 percent), indicating that it enhanced critical thinking and problem-solving competency among learners. Further analysis of the item indicated that the majority of teachers indicated that the level of contribution of the item to the acquisition of the competency was average. Only 12 percent of the teachers believed that the activity's contribution to the acquisition of the competency was above average. This suggests that this activity can strongly help learners acquire critical thinking and problem-solving competency. The findings were in line with a study by Waiganjo (2021), which noted that engaging agriculture learners in projects at home and in school enables them to develop

critical thinking competency. Most of the activities presented very few agriculture teachers, who agreed that these activities would enhance critical thinking and problem-solving competency among learners taking the agriculture subject at the upper primary. For example, on linking learners to extension officers and community resource persons, only 7.4 percent of the teachers agreed. Also, 43.5 percent and 16.7 percent of the teachers agreed that helping learners to market their produce in the community and participation in ASK shows and exhibitions respectively would promote the acquisition of critical thinking and problem-solving competency.

On taking learners on agricultural tours and field days, 25.9 percent of teachers who participated in the study agreed that both activities would promote the acquisition of critical thinking and problem-solving competencies. Generally, the activities were found to be very weak in enhancing the acquisition of critical thinking and problem-solving competency, unlike the acquisition of communication and collaboration competency. This was justified by Mahanal et al. (2019), who stated that for a learner to achieve critical thinking and problem-solving competency, he or she should be involved in activities that require analysis, evaluation and questioning issues to make reasonable judgment. This study also agreed with the agriculture subject curriculum designs developed by the Ministry of Education [MoE] (2019b) and Ministry of Education [MoE] (2021) presents activities such as learners attending ASK shows and all forms of learners interaction with the community as ways of promoting communication and collaboration but not more on enhancing critical thinking and problem-solving competency. On whether the teacher-guided 4-K Club activities within the community promoted the acquisition of digital literacy competency, the results were analysed and presented in Table 19.

Table 19

The 4-K Club Activities Within the Community Leading to the Acquisition of Digital Literacy Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	The extent of leading to the competency				
		Digital literacy	NA 1	VL 2	L 3	A 4
Taking learners to participate in ASK shows, competitions and exhibitions %	6.5	-	6.5	-	-	-
Taking learners on agricultural tours to places of agricultural interest for learning %	5.6	-	2.8	2.8	-	-

The findings in Table 19 revealed that only two activities were identified, though they were found to be very weak in promoting the acquisition of the digital literacy competency by learners. These were; taking learners to participate in ASK shows competitions and exhibitions, where only 6.6 percent of the teachers agreed that the activity would promote the acquisition of the competency. All 108 respondents who participated in the study noted that the level of contribution was very low. The other activity that was found to promote digital literacy competency was taking learners on agricultural tours to places of agricultural interest for learning, with only 5.6 percent agreeing with it. On the extent of contribution, 2.8 percent of the teachers indicated that it was very little or little. These activities were found to enhance digital literacy because attending ASK shows and agricultural tours may help to learn modern technologies or interact with digital devices in agriculture, which are on display (Katunyo, 2019).

4.6 The Futuristic Teacher-Guided 4-K Club Activities Through Incorporation of ICT

This section presents analysed data on objective four, which sought to document the futuristic teacher-guided 4-K Club activities through ICT facilities to develop the core competencies in the agriculture subject. The core competencies selected in this study were communication and collaboration, critical thinking and problem-solving and digital literacy. Upper primary school agriculture teachers were involved in providing information on specific competencies that learners would acquire by carrying out the 4-K Club activities. Teachers were also informed on the extent to which activities are leading to the acquisition of the core

competencies which were measured in five Likert scales, running from 1-5 which was; Not at all (1), Very Little (2), Little (3), Average (4) and Above Average (5). Opinion of agricultural extension officers was sought first to determine to what extent the 4-K Club activities, through the incorporation of ICT, help learners acquire the core competencies through the agriculture subject. Data from agricultural extension officers was analysed using means and presented in Table 20.

Table 20

Agricultural Extension Officer's Opinion on the Extent to Which the 4-K Club Activities Through Incorporation of ICT Led to the Acquisition of Competencies

Activity	Mini mum	Maxi mum	Mean	Std. Deviation
Guiding learners in sourcing agricultural information on the internet.	4.00	5.00	4.40	.54772
Facilitating learners to take pictures and create profiles for their project stands for record-keeping.	3.00	5.00	4.00	.70711
Facilitating learners to take videos for their project stands for record-keeping.	3.00	4.00	3.60	.54772
Helping learners to market their 4-K Club project produce online.	3.00	4.00	3.80	.44721
Guiding learners to use ICT facilities to create portfolios for their projects.	3.00	5.00	4.60	.89443
Linking learners to other 4-K Club members from other schools through social media platforms for interaction.	2.00	4.00	3.40	.89443

The researcher developed a scale of measurement, running from 1-5, to determine the level to which the 4-K Club activities would lead to learner acquisition competencies. Any item that scored a mean of between 1-1.50 was categorised as very low, 1.51-2.51 as low, 2.52-3.52 as moderate, 3.53-4.53 as high and 4.54-5.00 as very high. The results in Table 20 indicate that only one activity scored a moderate mean score, which is linking learners to other 4-K Club members from other schools through social media platforms for interaction, which scored a mean of 3.4. All the other activities had their means lying between 3.53-4.53 and 4.54-5.00, which were termed to be high and very high, respectively. Therefore, it was concluded that all

the 4-K Club activities through the incorporation of ICT are relevant in leading to the acquisition of competencies in the agriculture subject by learners. The findings were in line with Asava (2021), who observed that any activity involving the integration of ICT during learning promotes and enhances learners' acquisition of competencies such as effective communication, digital literacy, critical thinking and problem-solving, among others.

Agriculture teachers were then asked to identify specific competencies that learners would acquire by carrying out various 4-K Club activities through the incorporation of ICT and the extent of acquisition of the core competencies. On the activities that would lead to the acquisition of communication and collaboration competency, results were analysed and presented in Table 21.

Table 21

The 4-K Club Activities Through Incorporation of ICT Leading to the Acquisition of Communication and Collaboration Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	Extend of leading to the competency					
		Communicati on and Collaboration	NA	VL	L	A	AA
		1	2	3	4	5	
Guiding learners in sourcing agricultural information on the internet	%	10.2	-	3.7	6.5	-	
Facilitating learners to watch videos for their project stands for record-keeping	%	6.5	-	1.9	1.9	2.8	
Facilitating learners to take pictures and create photo profiles for their project stands for record-keeping	%	5.6	-	0.9	1.9	2.8	
Helping learners to market their 4-K Club project online.	%	56.5	-	2.8	1.9	48.1	3.7
Guiding learners to use ICT facilities to create portfolios for their projects	%	22.2	-	5.6	8.3	5.6	2.8

Linking learners to other 4-K Club members from other schools through social media platforms for interaction.	%	64.8	-	-	1.9	48.1	14.8
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The findings in Table 21 showed that all teacher-guided 4-K Club activities through the incorporation of ICT facilities enhanced communication and collaboration among learners to some extent. However, most of the items did not strongly promote the acquisition of competency by learners. For example, when guiding learners in sourcing for agricultural information on the internet, only 10.2 percent of the teachers agreed that the item promotes the competency. On facilitating learners to use videos and pictures for their project, which stands for record keeping, only less than 7 percent of the teachers agreed, while only 22.2 percent agreed that guiding learners to use ICT facilities to create portfolios for their projects promoted the acquisition of communication and collaboration competency. The low percentage of response on whether to allow learners to carry out an internet search, take videos and pictures of the projects for record-keeping could be attributed to the lack of an internet network and enough ICT facilities in schools for learners to use and interact with (Waweru & Mutua, 2023). In addition, taking pictures, videos of the projects and searching for agriculture information on the internet provides fewer platforms for learners to interact and communicate (Van Haeften et al., 2021).

Activities that strongly promoted the acquisition of communication and collaboration competency were; linking learners to other 4-K Club members from other schools through social media platforms for interaction, where 64.8 percent of the teachers agreed. When asked the level to which the item promoted the acquisition of the competency, the majority of the teachers (48.1 percent) who responded indicated that it was average, while 14.8 percent indicated that it was above average, with only 1.9 percent indicating that the level of contribution was little. The feeling by the majority of the teachers that allows 4-K Club members to interact on social media, strongly promotes the competency can be attributed to findings from previous studies that through social media platforms, learners meet virtually and share ideas, either by texting or having video meetings (Ansari & Khan, 2020). These social media platforms are such as WhatsApp, Facebook, Tiktok, Instagram, among others, where learners from different schools can create common groups where they can share ideas, photos and videos of their projects or hold common meetings to address issues facing them. This enhances learner's acquisition of the communication and collaboration competency (Hernández-Sellés et al., 2019). Similar observations were made in a study by Muthuprasad et al. (2021), which was done in India to determine learners' perception and preference for online

education. The study found that allowing learners to interact online and on social media enhances communication and collaboration competency.

The other item was helping learners to market their 4-K Club project produce online, where over 55 percent of the teachers agreed that the activity would promote the acquisition of communication and collaboration competency. When asked about the level to which the item promoted the acquisition of the competency, the majority of teachers (48.1 percent), indicated that it was above average. This was because learners would need to communicate with buyers of their products either through video simulations, direct audio calls, recorded audio or by sending text messages when transacting, thus strongly acquiring communication and collaboration competency. Agriculture teachers were also asked to indicate whether the teacher-guided 4-K Club activities through the incorporation of ICT promoted the acquisition of critical thinking and problem-solving competency. The results were analysed by use of frequencies and percentages and were recorded in Table 22.

Table 22

The 4-K Club Activities Through Incorporation of ICT Leading to the Acquisition of Critical Thinking and Problem-Solving Competency

Key: NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	Extend of leading to the competency				
		Critical thinking and problem-solving	NA	VL	L	A
		1	2	3	4	5
Guiding learners in sourcing agricultural information on the internet. %	58.3	-	-	12	35.2	11.1
Facilitating learners to watch videos for their project stands for record-keeping. %	46.3	-	-	24.1	19.4	2.8
Facilitating learners to take pictures and create photo profiles for their project stands for record-keeping. %	46.3	-	-	22.2	21.3	2.8

Helping learners to market their 4-K Club project produce online.	%	53.7	-	-	7.4	33.3	13
Guiding learners to use ICT facilities to create portfolios for their projects.	%	51.8		0.9	4.6	35.2	11.1
Linking learners to other 4-K Club members from different schools through social media platforms for interaction.	%	9.3	-	-	-	6.5	2.8

The results in Table 22 showed that 58.3 percent of the teachers noted that guiding learners in sourcing for agricultural information on the internet would promote the acquisition of digital literacy competency. This was because 35.2 percent and 11.1 percent indicated that the level of contribution of the activity to the acquisition of digital literacy is average and above average, respectively. The findings concur with the views of Mokhtar et al. (2021), that allowing learners to search and discover information on the internet enhances critical thinking among them. This is because to search for new information, learners will critically analyse, comprehend and discover relevant sites with information and materials they require. However, the study by Chesire et al. (2022), cites the lack of internet subscriptions in schools as of the reasons limiting online research by learners in the agriculture subject. A study by Barasa (2022) suggested that MoE should provide enough ICT facilities and a stable internet connection in schools to facilitate learners to carry out research during learning to acquire the required competencies.

On facilitating learners to take videos and pictures for their project stands for record keeping, 46.3 percent of teachers in both activities indicated that the activities would promote the acquisition of the competency if carried out. However, in both activities, it was noted that the contribution level to the acquisition of the competency was low, since over 20 percent out of 46 percent of the teachers indicated that the contribution level was little. The findings contradicted the findings by Suing et al. (2023), who noted that learners' interaction with digital devices such as cameras and mobile phones when taking videos and photos of their project work strongly enhances critical thinking and problem-solving competency. When asked whether helping learners to market their 4-K Club project produce online would promote the acquisition of critical thinking and problem-solving competency, 53.7 percent of the teachers agreed with the majority (33.3 percent), indicating that the contribution level was average.

Study by Erdoğan (2019) defines critical thinking as that which involves the identification and skilful analysis of a problem to come up with a solution. According to Kingiri

and Nderitu (2014), among the challenges facing members of the 4-K Club is a lack of sufficient market for their produce. Therefore, learners finding a sustainable market for their agricultural project produce online strongly enhances critical thinking and problem-solving among them. Analysis on guiding learners to use ICT facilities to create portfolios for their projects indicated that 51.8 percent of the teachers agreed that the activity promoted the acquisition of critical thinking and problem-solving. When asked about the level to which this activity contributes to the acquisition of the competency, 35 percent, who were the majority, indicated that it was average. It was concluded that guiding learners to create portfolios strongly enables them to acquire critical thinking and problem-solving competency.

On linking learners to other 4-K Club members from different schools through social media platforms for interaction, less than 10 percent of the teachers who participated in the study indicated that it enhanced critical thinking and problem-solving competency. This suggests that this activity is weak in promoting the acquisition of the competency. This is because less critical thinking and problem-solving skills will be needed for learners to interact on social media platforms. However, a study by Muthuprasad et al. (2021) stated that online social media platforms only promote critical thinking when learners are provided with materials in video, photograph form or questions online to comprehend. Therefore, to enhance critical thinking and problem-solving among learners through social media platforms, teachers of agriculture need to encourage learners to share problems and issues affecting their projects on the social media-based groups and allow their peers to respond to them (Hernández-Sellés et al., 2019). This would encourage learners to embrace critical thinking when analysing the issues affecting their peers' projects to help them come up with the right solutions and decisions.

Agriculture teachers were also asked to indicate whether the 4-K Club activities through the use of ICT facilities can lead to the acquisition of digital literacy competency. The results were analysed and presented in Table 23.

Table 23*The 4-K Club Activities Through Incorporation of ICT Leading to the Acquisition of Digital Literacy Competency***Key:** NA= Not at All; VL= Very Little; L=Little; A=Average; AA= Above Average

Activity	Competency	Extend of leading to the competency					
		Digital literacy	NA	VL	L	A	AA
			1	2	3	4	5
Guiding learners in sourcing agricultural information on the internet.	% 99.1	-	-	4.6	47.2	47.2	
Facilitating learners to videos for their project stands for record-keeping.	% 100	-	-	3.7	38.9	57.4	
Facilitating learners to take pictures and create photo profiles for their project stands for record-keeping.	% 100	-	0.9	1.9	36.1	61.1	
Helping learners to market their 4-K Club project produce online.	% 98.1	-	-	-	40.7	57.4	
Guiding learners to use ICT facilities to create portfolios for their projects.	% 100	-	-	-	38	62	
Linking learners to other 4-K Club members from other schools through social media platforms for interaction.	% 100	-	-	0.9	36.1	63	

The results in Table 23 indicated that most of the teacher-guided 4-K Club activities involving the incorporation of ICT had all 108 teachers selected to participate in the study, indicating that they enhanced the acquisition of digital literacy competency. In all these activities, the majority of teachers indicated that the level of contribution to the acquisition of digital literacy was above average. For example, on guiding learners in sourcing for agriculture information on the internet, 99.1 percent of the teachers agreed that it helped learners acquire digital literacy, with the majority (47.2 percent) stating that the contribution level was average and above average. Regarding helping learners to market their 4-K Club project produce online, 98.1 percent of the teachers agreed that it promoted the acquisition of digital literacy, with 57.4 percent indicating that the contribution level is above average. The findings were in line with Stehle and Peters-Burton (2019), who stated that learning activities in the agriculture subject

involving digital devices and creating, using or managing digital information strongly equips learners with digital literacy competence. In addition to promoting the acquisition of digital literacy, guiding learners to carry out ICT-based activities motivates them to learn and increases their interest in the agriculture subject (Kituu, 2023). Therefore, a study by Mutua and Waweru (2023) recommended that teachers should emphasise guiding learners to carry out learning activities involving use of digital devices to help them master digital literacy competence.

According to the grade five agriculture subject course book authored by Mmbaka et al. (2020), some teacher-guided activities through the incorporation of ICT that should be emphasised during learning of different strands include taking videos and pictures of projects. Others include searching for agricultural information on the internet to broaden understanding of different strands and interactions on social media platforms. For the successful implementation of teacher-guided 4-K Club activities during learning, teachers of agriculture should be equipped with appropriate digital skills and schools need to be equipped with ICT infrastructure (Kubai, 2023). However, studies by Ngwacho (2019), Karani et al. (2022) and Nyikadzino (2023), cite the presence of insufficient ICT infrastructure in schools and teachers of agriculture who are not competent in guiding learners to carry out ICT-related activities during learning. This could limit the effective use of ICT-related teacher-guided 4-K Club activities to facilitate the acquisition of digital literacy competency by learners in the agriculture subject.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the key findings of the study, the conclusions drawn from these findings and recommendations based on the conclusions. It also includes recommendations for further research based on the identified research gaps in the study.

5.2 Summary of the Study

This study sought to document the current and futuristic teacher-guided 4-K Club activities undertaken for the acquisition of the core competencies in the agriculture subject at upper primary school in Makindu Sub-County, Kenya. The objectives of the study were to document the current and the futuristic teacher-guided 4-K Club activities undertaken within the school farm, community and through the incorporation of ICT for learners' acquisition of the core competencies in the agriculture subject at upper primary school. This study focused on testing the acquisition of three core competencies that learners would acquire by carrying out teacher-guided 4-K Club activities. These were; communication and collaboration, critical thinking and problem-solving and digital literacy.

Results on the first objective which sought to document the current teacher-guided 4-K Club activities undertaken for learner's acquisition of core competencies in the agriculture subject revealed that; within the school farm, teachers of agriculture only emphasised on guiding learners to carry out projects on crop production, where 59.4 and 15.6 percent of teachers from schools with active 4-K Clubs agreed that they guide learners on carrying out the activity often and most often respectively. On the current teacher-guided 4-K Club activities within the community and through the incorporation of ICT, it was generally noted that agriculture teachers inadequately guided learners to carry out such activities during the teaching process. Similar results were recorded by agricultural extension officers and observation checklists, where the activities recorded low and moderate means.

Analysis of the second objective on documenting the futuristic teacher-guided 4-K Club activities within the school farm undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school revealed that all the activities promoted the acquisition of communication and collaboration and critical thinking and problem-solving competencies to some extent. However, none of the activities promoted the acquisition of digital literacy competency. Generally, the teacher-guided 4-K Club activities, which involved learners working together in groups, were found to strongly promote the acquisition of communication and collaboration competency. Teacher-guided 4-K Club activities, which

encouraged learners' analysis of situations to come up with a certain solution, were found to strongly promote the acquisition of critical thinking and problem-solving competency. For example, guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects, helping learners to develop innovative gardens and ways of conserving water.

On the third objective, which sought to document the futuristic teacher-guided 4-K Club activities within the community undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school the following was established; that all the teacher-guided 4-K Club community-based activities studied would strongly promote acquisition of communication and collaboration by learners. Only by helping learners to develop 4-K Club plots at home would strongly promote the acquisition of critical thinking and problem-solving competencies by learners. In addition, only by taking learners to participate in ASK shows competitions and exhibitions and agricultural tours to places of agricultural interest for learning 4-K Club activities would promote the acquisition of digital literacy competency among learners to some extent, though very little.

The results of the fourth objective which sought to document the futuristic teacher-guided 4-K Club activities through incorporation of ICT facilities undertaken for learners' acquisition of the core competencies in the agriculture subject at upper primary school revealed that; all the activities that were tested led to the acquisition of the three core competencies which were being studied to some extent. However, activities that encouraged online interaction of learners strongly enhanced the acquisition of communication and collaboration competency. Activities that involved searching for information on the internet or using digital devices to carry out a certain activity strongly promoted the acquisition of critical thinking and problem-solving competency. On the acquisition of digital literacy, all the 4-K Club activities through the incorporation of ICT strongly promoted the acquisition of the competency.

5.3 Conclusions

Based on the findings of the study, the following conclusions were made;

- i. That agriculture teachers at the upper primary school have inadequately guided learners to undertake most of the 4-K Club activities within the school farm, community and through the incorporation of ICT for the acquisition of the core competencies in agriculture subject.
- ii. That according to the perceptions of agriculture teachers, any futuristic teacher-guided 4-K Club activity conducted within the school that allows learners to work together, strongly enhances the acquisition of communication and collaboration competency. For

example, placing learners in groups to carry out projects and allowing learners to share experiences when carrying out projects. Any teacher-guided activity that involves learners' analysis of a situation to come up with a solution strongly enhances the acquisition of critical thinking and problem-solving competency. For example, guiding learners to develop innovative ways of parasite, pest and disease control, innovative gardens and ways of conserving water when carrying out their projects.

- iii. That all the futuristic teacher-guided 4-K Club activities carried out within the community strongly enhance the acquisition of communication and collaboration competency by learners taking the agriculture subject at upper primary school. On the acquisition of critical thinking and problem-solving, guiding learners to establish 4-K Club plots at home strongly enhances the acquisition of the competency.
- iv. That all the futuristic teacher-guided 4-K Club activities conducted through the incorporation of ICT strongly promote the acquisition of digital literacy competency. Any teacher-guided 4-K Club ICT-based activity that allows learners' interactions online strongly promotes the acquisition of communication and collaboration competency. In addition, any teacher-guided 4-K Club ICT-based activity that involves learners' research on the internet or use of ICT tools to conduct an activity during learning strongly enhances the acquisition of critical thinking and problem-solving competency.

5.4 Recommendations

Based on the conclusions, the following recommendations were made;

- i. Upper primary agriculture teachers from schools with active 4-K Clubs to emphasise on guiding learners to undertake all the 4-K Club activities, either within the school farm or community and through the use of ICT facilities during teaching of the agriculture subject to help them master the required subject's core competencies.
- ii. Agriculture teachers at upper primary school to engage learners in conducting the futuristic 4-K Club activities within the school farm to help them master communication and collaboration and critical thinking and problem-solving competencies.
- iii. Agriculture teachers at upper primary school to engage learners in conducting the futuristic 4-K Club activities within the community to help them master communication and collaboration competency.

- iv. Agriculture teachers at upper primary school to guide learners to carry out the futuristic ICT-based 4-K Club activities when teaching the agriculture subject to help them acquire digital literacy, critical thinking and problem-solving competencies.

5.5 Recommendations for Further Research

Based on research gaps that were realized in the study, the following areas were recommended for further research;

- i. A similar study to be conducted to document the acquisition of the other subject-based core competencies that were not of interest in this study, which are; self-efficacy, learning to learn, creativity and imagination and citizenship.
- ii. A study to be conducted in the future to assess the level of use of the futuristic teacher-guided 4-K Club activities documented in this study in teaching competency-based agriculture subject at upper primary schools.
- iii. A similar study to be conducted to document learner-based 4-K Club activities undertaken for the acquisition of the core competencies in the agriculture subject at upper primary school.
- iv. Further research to be conducted to determine the existing gaps in teachers' current use of the 4-K Club activities in implementing the competency-based agriculture subject curriculum.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR THE AGRICULTURE TEACHERS.

Introduction

I am Robert Kyalo Ndambuki, a student at Egerton University pursuing a Master of Science in Agricultural Education. As part of my studies, I am conducting research to document the current and futuristic teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at the upper primary school. I kindly request your assistance in providing the necessary information by completing the questionnaire below, where applicable. Your responses will be treated with strict confidentiality. Please do not include your name on the questionnaire. Thank you.

Section A: Demographic Information of the Respondents.

1. Gender

Male Female

2. How many years have you been teaching agriculture in primary school?

Less than one year

One year

More than one year

3. (a) What is your highest level of qualification as a teacher?

Certificate Diploma Degree Master's

(b) In your level of qualification identified in question 3(a), rate the extent of training on management of 4-K Clubs.

Not at all Very Inadequately Inadequately Adequately Very adequately

4. Indicate the type of your school.

Pure day school Day/boarding school

5. In the type of your school named in question (4), rate the ease of access to the following;

Statement	None 1	Very little 2	Little 3	Average 4	Above average 5
Access to agricultural extension personnel					
Access to school resources for carrying out 4-K Club activities					

Access to community resource persons					
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Section B: Current Teacher-Guided 4-K Club Activities Within the School Farm, Community and Through Incorporation of ICT Undertaken When Teaching Agriculture in Schools with Active 4-K Clubs.

6. If your school has active 4-K Clubs, please indicate the frequency with which you guide learners to carry out the following stated activities when teaching the agriculture subject. Tick (√) where appropriate

Activity	Response				
	Not at all	Rarely	Sometimes	Often	Most often
	1	2	3	4	5
The current teacher guided 4-K Club activities within the school farm					
Guiding learners to carry out the project on crop production.					
Guiding learners to carry out the project on livestock production.					
Organising 4-K Club farming competitions among individual learners.					
Organising learners to share experiences when carrying out 4-K Club activities.					
Organising 4-K Club farming competitions among learners in groups.					
Organising learners to consult each other when carrying out 4-K Club activities.					
Current teacher guided 4-K Club activities within the community					
Taking learners to field visits.					

Linking learners with community resource persons.					
Linking learners to agricultural extension officers.					
Guiding learners to establish 4-K Club plots at home.					
Taking learners to ASK shows and competitions.					
Incorporation of ICT when carrying out 4-K Club activities					
Guiding learners to market their 4-K Club project's produce on social media.					
Guiding learners to take and create profiles of photos of their projects for record keeping on electronic devices.					
Guiding learners to carry out an internet search on agriculture projects.					
Guiding learners to take videos of their projects for record-keeping.					

SECTION C: Core Competencies Acquired by Learners After Carrying Out the Stated Teacher-Guided 4-K Club Activities Within the School Farm, Within the Community and Through Incorporation of ICT

7. Give your opinion by indicating the competencies that learners will acquire by carrying out the stated teacher-guided 4-K Club activities within the school farm, within the community and through incorporation of ICT and rate the extent to which the activity leads to the acquisition of the indicated competency. You may tick (√) more than one competency where appropriate.

Key: NA=Not at all VL=Very little, L=Little, A=Average and AV=Above average

Activity	Competency	Rating					Competency	Rating					Competency	Rating					
		N	V	L	A	A		N	V	L	A	A		N	V	L	A	AA	
		1	2	3	4	5													
	Communication and collaboration						Critical thinking and problem solving												
Teacher guided 4-K Club activities within the school farm																			
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects.																			

Helping learners to come up with innovative gardens when carrying out their projects.																		
Guide learners to come up with innovative ways of conserving water when carrying out the projects.																		
Placing learners in groups to carry out projects.																		
Allowing learners to share experiences when carrying out projects.																		
Carry out on farm demonstration in the 4-K Club plots during learning.																		
Organising 4-K Club farming competitions among individual learners.																		

Organising 4-K Club farming competitions among learners in groups.																		
Teacher guided the 4-K Club activity within the community																		
Linking learners to extension officers.																		
Linking learners to community resource persons.																		
Helping learners establish 4-K Club plots at home.																		
Helping learners to market their 4-K Club project produce in the community.																		
Taking learners to participate in ASK shows, competitions and exhibitions.																		
Taking learners for agricultural tours to																		

places of agricultural interest for learning.																		
Taking learners to field days organised by the MoALF through the agricultural extension department.																		
Teacher guided 4-K Club activities through incorporation of ICT																		
Guiding learners in sourcing agricultural information on the internet.																		
Facilitating learners to take videos for their project stands for record-keeping.																		
Facilitating learners to take pictures and create photo profiles for their project stands for record-keeping.																		

Helping learners to market their 4-K Club project produce online.																		
Guiding learners to use ICT facilities to create portfolios for their projects.																		
Linking learners to other 4-K Club members from different schools through social media platforms for interaction.																		

Thank you for your time and responses.

APPENDIX B: QUESTIONNAIRE FOR THE AGRICULTURAL EXTENSION OFFICERS

Introduction

I am Robert Kyalo Ndambuki, a student at Egerton University, pursuing a Master of Science in Agricultural Education. As part of my studies, I am doing research to document the current and futuristic teacher-guided 4-K Club activities undertaken for learners' acquisition of the core competencies in the agriculture subject at the upper primary school. I kindly request your assistance in providing the required information by completing the relevant sections of the questionnaire where appropriate. Your responses will be treated with strict confidentiality. Please do not include your name on the questionnaire. Thank you.

Section A: Demographic Information of the Respondents.

1. How many years have you worked as an agricultural extension officer in the sub-county?

Below 5 years [] Between 5-10 years [] Above 10 years []

2. Rate the extent to which you collaborate with schools in the management of the 4-K Clubs.

Not at all [] Rarely [] Sometimes [] Often [] Most often []

Section B: Current Teacher-Guided 4-K Club Activities Within the School Farm, Community and Through the Incorporation of ICT.

(3). If you collaborate with schools to some extent as indicated in question (2) above, rate the extent to which agriculture teachers guide learners to carry out the following 4-K Club activities within the school farm, within the community and through the incorporation of ICT in schools with active 4-K Clubs. Tick (√) where appropriate.

Activity	Frequency				
	Not at all	Rarely	Sometimes	Often	Most often
	1	2	3	4	5
The current teacher guided 4-K Club activities within the school farm					
Guiding learners to establish projects on crop production.					
Guiding learners to establish projects on livestock production.					
On the preparation of 4-K Club plots.					

On the management of their projects to improve production.					
Participation of learners in the 4-K Club competitions among individual learners.					
Participation of learners in the 4-K Club competitions in groups.					
Organising learners to share experiences when carrying out 4-K Club activities.					
Current teacher guided 4-K Club activities within the Community					
Guiding learners to establish 4-K Club plots at home.					
Taking learners to field visits in the community.					
Participation of learners in ASK shows and exhibitions.					
Linking learners to community resource persons.					
Linking learners to agricultural extension officers.					
The current teacher guided 4-K Club activities through the use of ICT facilities					
Guiding learners to market their 4-K Club produce on social media.					
Helping learners to take videos of their projects for record-keeping.					
Helping learners to take photos and create a photo profile of their projects.					
Guiding learners to carry out an internet search to source agriculture information on the internet.					

SECTION C: Extend to Which Teacher-Guided 4-K Club Activities Within the School Farm, Community and Through the Incorporation of ICT Lead to the Acquisition of Competencies in the Agriculture Subject at the Upper Primary School.

3. Rate the extent to which the following teacher-guided 4-K Club activities within the school farm, within the community and through ICT facilities can help learners in upper primary acquire competencies in the agriculture subject.

Activity	Frequency				
	Not at all	Very little	Little	Average	Above average
	1	2	3	4	5
Teacher guided 4-K Club activities within the school farm					
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects.					
Helping learners to come up with innovative gardens when carrying out their projects.					
Guide learners to develop innovative ways of conserving water when carrying out the projects.					
Placing learners in groups to carry out projects.					
Allowing learners to share experiences when carrying out projects.					
Carry out on farm demonstration in the 4-K Club plots during learning.					
Organising 4-K Club farming competitions among individual learners.					
Organising 4-K Club farming competitions among learners in groups.					

The teacher guided 4-K Club activity within the community					
Linking learners to extension officers.					
Linking learners to community resource persons.					
Helping learners to establish 4-K Club plots at home.					
Helping learners to market their 4-K Club project produce in the community.					
Taking learners to participate in ASK shows, competitions and exhibitions.					
Taking learners to agricultural tours to places of agricultural interest for learning.					
Taking learners to field days organised by the MoALF through the agricultural extension department.					

Teacher guided 4-K Club activities through the use of ICT facilities					
Guiding learners in sourcing agricultural information on the internet.					
Facilitating learners to take pictures and create photo profiles for their projects.					
Facilitating learners to take videos for their project stands for record-keeping.					
Helping learners to market their 4-K Club project produce online.					
Guiding learners to use ICT facilities to create portfolios for their projects.					
Linking learners to other 4-K Club members from other schools through social media platforms for interaction.					

Thank you for your time and responses.

APPENDIX C: OBSERVATION CHECKLIST ON 4-K CLUB ACTIVITIES BEING CARRIED OUT CURRENTLY IN THE SCHOOL FARM, WITHIN THE COMMUNITY AND EVIDENCE ON INCORPORATION OF ICT

Item	Availability	
	Present	Absent
The 4-K Club activities present on the school farm		
Crop production project		
Livestock production project		
Records of 4-K Club competitions among learners within the school		
The 4-K Club activities present within the community		
4-K Club plots at home		
4-K Club demonstration plots in the community		
Animals reared by 4-K Club members at home		
Community resource persons		
Attendance records for ASK shows and competitions		
Attendance records of field days		
Evidence of 4-K Club members' interaction with other schools		
Evidence of the use of the ICT facilities in 4-K Clubs		
Stored photos of 4-K Club projects		
Stored videos of 4-K Club projects		
Electronic gadgets for keeping 4-K Club records		
E-portfolios for 4-K Club projects		
Access to the computer lab for use by 4-K Club members		
Reliable source of internet for the 4-K Club members		

APPENDIX D: TABLE FOR DETERMINING SAMPLE SIZES FROM A GIVEN POPULATION

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size.
S is sample size.

Source: Krejcie and Morgan (1970)

APPENDIX E: ANALYSIS OF THE OBSERVATION CHECKLIST FOR SCHOOLS WITH ACTIVE 4-K CLUBS

The researcher used observation checklists to document evidence of current 4-K Club activities conducted in the 16 schools with active 4-K Clubs in Makindu Sub-County. The results on whether the evidence is present or absent were analysed and presented in percentages and frequencies.

Item	N	Present		Absent	
		F	%	F	%
Crop production project	16	13	81.3	3	18.8
Livestock production project	16	6	37.5	10	62.5
Records of 4-K Club competitions among learners within the school	16	7	43.8	9	56.3
4-K Club plots at home	16	5	31.3	11	68.8
Animals reared by 4-K Club members at home	16	3	18.8	13	81.3
Community resource persons	16	4	25	12	75
Attendance records for ASK shows and competitions	16	8	50	8	50
Attendance records of field days	16	4	25	12	75
Evidence of 4-K Club members' interaction with other schools	16	6	37.5	10	62.5
Stored photos of 4-K Club projects	16	8	50	8	50
Stored videos of 4-K Club projects	16	6	37.5	10	62.5
Electronic gadgets for keeping 4-K Club records	16	9	56.3	7	43.8
E-portfolios for 4-K Club projects	16	-	-	16	100
Access to the computer lab for use by 4-K Club members	16	3	18	13	81.3
Reliable source of internet for the 4-K Club members	16	2	12.5	14	87.5

The results from the checklists indicated that within the school farm, 13 schools out of 16 had crop production projects for learners, while only 6 schools where there were livestock production projects for learners. Upon cross-examination of records to check whether the learners were involved in 4-K Club competitions, whether individually or in groups, in 7 schools that were found to have evidence records for the activity. This was below the average of the total number of schools. It can be concluded that schools with active 4-K Clubs emphasised exposing learners to carry out projects on crop production. On the evidence of carrying out 4-K Club activities within the community, it was evident that most schools only

emphasised taking learners to participate in ASK shows and exhibitions. This is because 50 percent of the schools were found to possess records of learners' attendance to ASK shows either at the national, regional levels or both. Only five and three schools had 4-K Club plots and reared animals at home, respectively. Only four schools had evidence on attending field days and interacting with community resource persons, while only 6 schools allowed learners to interact with others from other schools.

On evidence of carrying out 4-K Club activities through ICT facilities, over 55 percent of schools were found to own electronic gadgets that can be used in keeping the club's records. However, only three schools had constructed computer labs for use by 4-K Club members. In the presence of a reliable source of internet, only two schools had functioning internet routers to provide sufficient internet for 4-K Club members. Eight schools were found to have 4-K Club photo albums either printed or stored in electronic gadgets, while only six schools had saved videos of 4-K Club activities in the electronic gadgets. None of the schools had prepared e-portfolios of 4-K Club projects.

APPENDIX F: INTRODUCTORY LETTER FROM GRADUATE SCHOOL

EGERTON

Tel: Pilot: 254-51-2217620
254-51-2217877
254-51-2217631
Dir. line/Fax: 254-51-2217847
Cell Phone



UNIVERSITY

P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: bpgs@egerton.ac.ke
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

ESM11/01005/18

26th May, 2023

Ref:.....

Date:.....

The Director General
National Commission for Science Technology and Innovation,
P. O. Box 30623-00100
NAIROBI.

Dear Sir,

RE: REQUEST FOR RESEARCH PERMIT – MR. ROBERT KYALO NDAMBUKI REG. NO. ESM11/01005/18

This is to introduce and confirm to you that the above named student is in the Department of Agricultural Education & Extension, Faculty of Education & Community Studies, Egerton University.

He is a bona-fide registered M.Sc student in this University. His research topic is **“Documenting the Current and Futuristic Teacher-Guided 4-K Club Activities Undertaken for the Acquisition of the Core Competencies in Agriculture Subject at Upper Primary School in Makindu Sub-County, Kenya.”**

He is at the stage of collecting field data. Please issue him with a research permit to enable him undertake the studies.

Your kind assistance to him will be highly appreciated.

Yours faithfully,



Prof. George M. Ogendi, PhD
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

GMO/vk

Transforming Lives Through Quality Education

**APPENDIX H: ETHICAL CLEARANCE APPROVAL FROM THE EGERTON
UNIVERSITY ETHICS REVIEW COMMITTEE (EUREC)**

EGERTON

TEL: (051) 2217808
FAX: 051-2217942



UNIVERSITY

P. O. BOX 536
EGERTON

**EGERTON UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICS
REVIEW COMMITTEE**

EU/RE/DIR/009
Approval No. *EUISERC/APP/263/2023*

29th June 2023

Robert Kyalo Ndambuki,
P.o. Box 61-90137,
Kibwezi
Telephone: 0716599324.
E-mail: robandambuki@gmail.com

Dear Robert,

**RE: ETHICAL APPROVAL: DOCUMENTING THE CURRENT FUTURISTIC
TEACHER-GUIDED 4K CLUB ACTIVITIES UNDERTAKEN FOR THE ACQUISITION
OF CORE COMPETENCES IN AGRICULTURAL SUBJECTS AT UPPER PRIMARY
SCHOOL MAKINDU SUB-COUNTY, KENYA**

This is to inform you that *Egerton University Institutional Scientific and Ethics Review Committee* has reviewed and approved your above research proposal. Your application approval number is *EUISERC/APP/263/2023*. The approval period is *29th June, 2023 – 30th June, 2024*

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by *Egerton University Institutional Scientific and Ethics Review Committee*.
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to *Egerton University Institutional Scientific and Ethics Review Committee* within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to *Egerton University Institutional Scientific and Ethics Review Committee* within 72 hours.

"Transforming Lives through Quality Education"

- v. Clearance for Material Transfer of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to *Egerton University Institutional Scientific and Ethics Review Committee*.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,



Prof. Raphael M. Ngure





**CHAIRMAN, EGERTON UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICS
REVIEW CTTEE**

RMN/BK/



“Transforming Lives through Quality Education”

APPENDIX I: RESEARCH PERMIT FROM THE NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION (NACOSTI)

 <p>REPUBLIC OF KENYA</p>	 <p>NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION</p>
Ref No: 366941	Date of Issue: 25/October/2023
RESEARCH LICENSE	
	
<p>This is to Certify that Mr. Robert kyalo ndambuki of Egerton University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Makueni on the topic: DOCUMENTING THE CURRENT AND FUTURISTIC TEACHER-GUIDED 4-K CLUB ACTIVITIES UNDERTAKEN FOR THE ACQUISITION OF THE CORE COMPETENCIES IN AGRICULTURE SUBJECT AT UPPER PRIMARY SCHOOL IN MAKINDU SUB-COUNTY, MAKUENI COUNTY, KENYA for the period ending : 25/October/2024.</p>	
License No: NACOSTI/P/23/30402	
366941	
Applicant Identification Number	Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code	
	
<p>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p>	
See overleaf for conditions	

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108 The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way:
 - i. Endanger national security
 - ii. Adversely affect the lives of Kenyans
 - iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
 - iv. Result in exploitation of intellectual property rights of communities in Kenya
 - v. Adversely affect the environment
 - vi. Adversely affect the rights of communities
 - vii. Endanger public safety and national cohesion
 - viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Wariyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

**APPENDIX J: AUTHORIZATION LETTER FROM MAKUENI COUNTY
COMMISSIONER**



**OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND NATIONAL ADMINISTRATION**

Telegram:
Telephone:
Fax:
Email: makuenicc@yahoo.com

**COUNTY COMMISSIONER
MAKUENI COUNTY
P.O. Box 1-90300
MAKUENI**

Ref: MKN/CC/ADM.6/1 VOL.V/125

30th October, 2023

**Robert Kyalo Ndambuki
EGERTON UNIVERSITY**

RE: RESEARCH AUTHORIZATION

Reference is made to Director General National Commission for Science Technology and Innovation Research License Ref. No. NACOSTI/P/23/30402 dated 25th October, 2023 on the above subject.

You are hereby authorized to undertake research on “Documenting the current and futuristic teacher-guided 4-K Club Activities undertaken for the acquisition of the core competencies in agriculture subject at Upper Primary School in Makindu Sub County” for the period ending 25th October, 2024.

By a copy of this letter the Deputy County Commissioner, Makindu Sub County is requested to give you the necessary assistance.

**J. M. MWANGALA
FOR: COUNTY COMMISSIONER
MAKUENI**



**C.C.
County Director of Education
MAKUENI**

**Deputy County Commissioner
MAKINDU SUB COUNTY**

APPENDIX K: AUTHORIZATION LETTER FROM MAKUENI COUNTY
DIRECTOR OF EDUCATION



REPUBLIC OF KENYA

MINISTRY OF EDUCATION
STATE DEPARTMENT FOR BASIC EDUCATION

Telephone:
Fax:
Email:cdemakueni@gmail.com
When replying please quote

County Director of Education Office
Makueni County
P.O. BOX 41 - 90300
MAKUENI

Ref No. MKN/C/ED/5/33/VOL.II/180

30th October, 2023

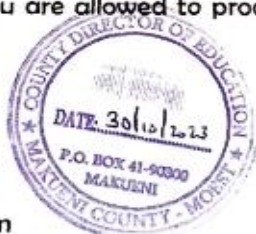
Robert Kyalo Ndambuki
EGERTON UNIVERSITY

RE: RESEARCH AUTHORIZATION

This office is in receipt of a letter from the Director General, National Commission for Science, Technology and Innovation (NACOSTI) Dated 25th October, 2023 authorizing you to carry out research on **"Documenting the current and futuristic teacher-guided 4-K club activities; undertaken for the Acquisition of the Core Competencies in Agriculture Subject at upper Primary School in Makindu Sub County in Makueni County"**, for the period ending **25th October, 2024.**

Following this authorization, you are allowed to proceed with your research as requested.

Samuel Maghanga
For County Director of Education
MAKUENI COUNTY



CC:
Director General/ CEO, NACOSTI



**APPENDIX L: AUTHORIZATION LETTER FROM THE MAKUENI COUNTY
DIRECTOR OF THE MoALF**

REPUBLIC OF KENYA

GOVERNMENT OF MAKUENI COUNTY



DEPARTMENT OF AGRICULTURE, IRRIGATION, LIVESTOCK, FISHERIES &
COOPERATIVE DEVELOPMENT

Office of the director, Agriculture and Irrigation
P.O. BOX 78-90300 MAKUENI

30th October, 2023


ROBERT KYALO NDAMBUKI
EGERTON UNIVERSITY

RE: RESEARCH AUTHORIZATION

I refer to your letter reference ESM11/01005/18, Dated 26th May 2023 and NACOSTI /P/23/30402 Dated 25th October, 2023 on the above matter.

You are hereby authorized to undertake research on "*Documenting The Current and Futuristic Teacher Guidance 4k Club Activities Undertaken for The Acquisition of the Core Competencies in Agriculture Subject at Upper Primary School in Makindu Sub County*" for the period ending 25th October, 2024.

By a copy of this letter the sub county ward agricultural officer is requested to give you the necessary assistance.


Mary Muteti

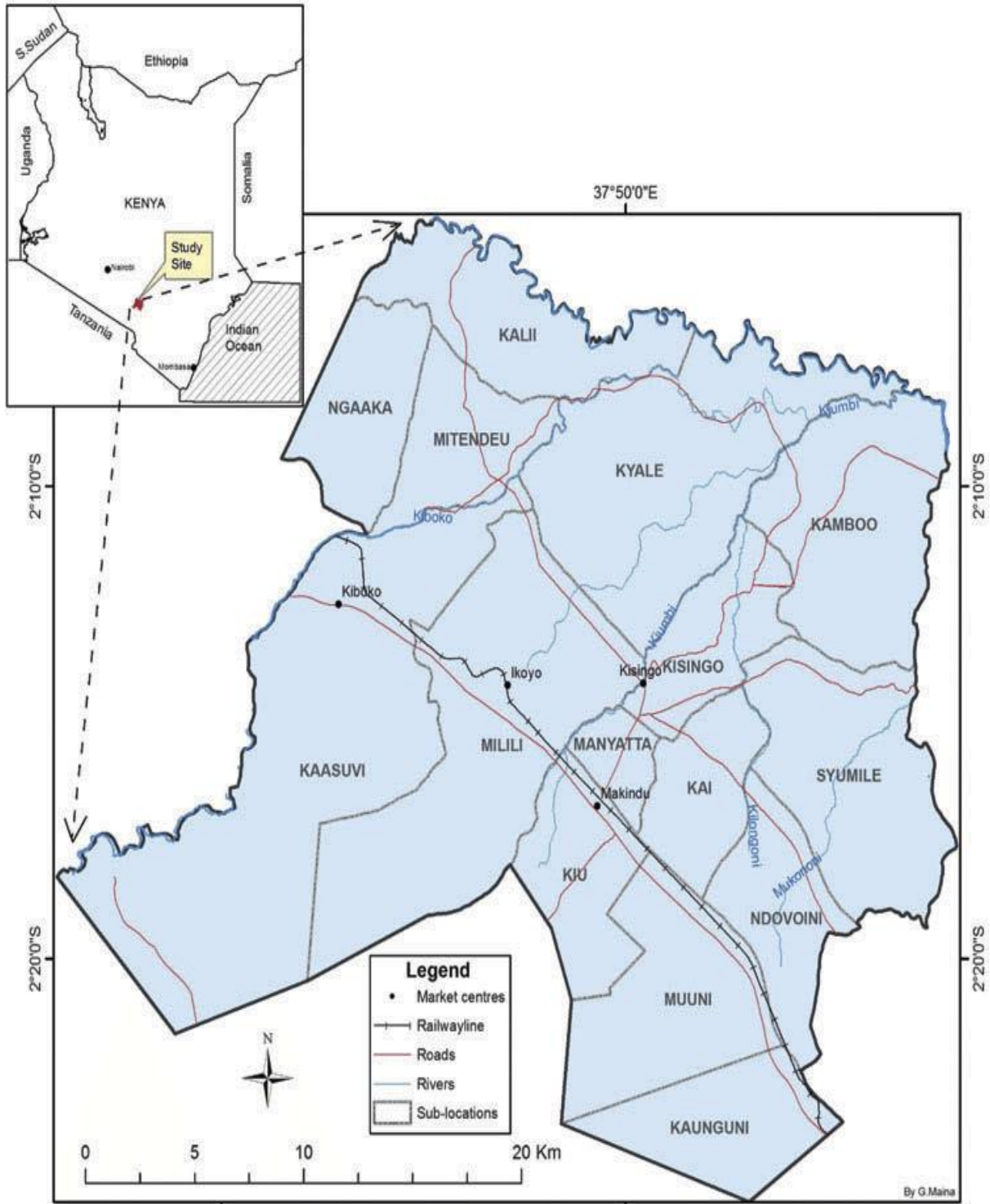
Director Agriculture and Irrigation



Copy to:

- Chief Officer – Agriculture and Irrigation
- Ward Agricultural Officer – Makindu

APPENDIX M: MAP OF MAKINDU SUB-COUNTY



Source: (Makueni County Government, 2018)



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IJETS
International Journal of
Education Technology and
Science

**THE TEACHER GUIDED 4-K CLUB ACTIVITIES UNDERTAKEN
WITHIN THE SCHOOL FARM FOR THE ACQUISITION OF THE
CORE COMPETENCIES IN AGRICULTURE SUBJECT AT UPPER
PRIMARY SCHOOL IN KENYA**

(Research article)

Robert Kyalo Ndambuki ^{a *}, Miriam Nthenya Kyule ^b, Jacob J. Konyango^c

^{a,b} Egerton University, P.O Box 536, Egerton, 20115, Kenya

^c Machakos University, P.O Box 136, Machakos, 90100, Kenya

Received: 21.10.2023

Revised version received: 02.01.2024

Accepted: 04.01.2024

Abstract


Competency based agriculture subject at upper primary should be taught practically so as to enable learners to master the required core competencies. Among ways which teachers of agriculture at upper primary would ensure practical implementation of agriculture subject curriculum is through use of the 4-K Club activities conducted within the school farm. However, paucity of information on how agriculture teachers can use the 4-K Club activities in teaching to help learners master core competencies agriculture subject exists. It's upon this research gap therefore that this study sought to document the teacher-guided 4-K Club activities undertaken within the school farm for the acquisition of the core competencies in agriculture subject at upper primary. This study focused on documenting acquisition communication and collaboration and critical thinking and competencies. Descriptive survey research design was employed in the study. Table by Krejice and Morgan was used to obtain a sample size of 108 teachers from schools with either active or inactive 4-K Clubs in Makindu sub-county. Descriptive statistics were used in data analysis where Statistical Package for Social Sciences (SPSS) was used. This study found out that various teacher-guided 4-K Club activities have significant contribution to the acquisition of communication and collaboration and critical thinking and competencies.

Keywords: Teacher-guided; 4-K club activities; core competencies; agriculture subject

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*Corresponding author (Robert Kyalo Ndambuki). ORCID ID.: <https://orcid.org/0009-0007-1729-1165>
E-mail: robandambuki@gmail.com

An Assessment Study on the Current Use of the 4-K Club Activities in Teaching of the Competency-Based Agriculture Subject in Grades 4-6 at Primary Schools in Makindu Sub-County, Kenya.

 Robert Kyalo Ndambuki ^{1*}, Miriam Nthenya Kyule ², Jacob J.J.O Konyango ³

^{1*,2} Egerton University, P.O Box 536-20115, Egerton, Kenya

³ Machakos University, P.O Box 136-90100, Machakos, Kenya

<https://orcid.org/0009-0007-1729-1165>

Accepted: 4th Jun 2024 Received in Revised Form: 4th Jul 2024 Published: 1st Aug 2024



Abstract

Purpose: This study sought to assess the current use of the 4-K Club activities in teaching of competency-based agriculture subject in grades 4-6 at primary schools in Makindu Sub-County, Kenya.

Methodology: A descriptive survey research design was employed in the study. The target population of this study comprised of 926 teachers assigned to teach in grades 4-6 at primary schools in Makindu Sub-County in Kenya. The accessible population for the study comprised of 32 teachers assigned to teach agriculture subject in grades 4-6 in the 16 schools with active 4-K Clubs in Makindu Sub-County. The census method was used to select all 32 agriculture teachers from schools with active 4-K Clubs to participate in the study. Structured questionnaires were used to collect data from the respondents. Quantitative data was analyzed descriptively using statistics such as percentages and frequencies. Data was coded and analyzed using the Statistical Package for Social Sciences (SPSS v28.0). Results were then presented in tables.

Findings: The results indicated that there is little use of most of the 4-K Club activities conducted within the school farm, community and through use of ICT facilities in teaching of the competency-based agriculture subject in grades 4-6 by the agriculture teachers. However, the 4-K Club activity that was conducted at least frequently by most teachers when teaching was only guiding learners to carry out projects on crop production.

Contribution to Theory, Policy and Practice: The study recommended that the teachers assigned to teach agriculture subject at upper primary to increase use of the 4-K Club activities within the school farm, community and through use of the ICT facilities in teaching of the agriculture subject. In-service training to be conducted to train primary school teachers on use of the 4-K Clubs in teaching of the agriculture subject. Government of Kenya to lay down strategies needed to keep the 4-K Clubs active in schools for current use in teaching of the competency based agriculture subject.

Keywords: 4-K Clubs, Agriculture Subject, Competency Based Curriculum, Upper Primary School, Teaching and Learning