



Research Paper

## Integration of Information and Communication Technology In Agriculture Curriculum Implementation In Secondary Schools In Kimilili Sub County Bungoma.

GITAU GERSHON KIMANI

*A Thesis Submitted to the Graduate School in Partial Fulfillment for the Requirements of the Degree of Masters of Education in Curriculum and Instruction of Kibabii University.*

Dr. Carolyn Simiyu

*Department Of Curriculum and Pedagogy  
Kibabii University*

Dr. Kefa Nyende

*Department Of Agriculture and Veterinary Sciences  
Kibabii University*

*Received 01 Aug., 2024; Revised 08 Aug., 2024; Accepted 10 Aug., 2024 © The author(s) 2024.  
Published with open access at [www.questjournals.org](http://www.questjournals.org)*

### ACKNOWLEDGEMENT

I wish to express my sincere gratitude to all those who have assisted me toward writing this thesis. My sincere gratitude goes to the Almighty God for being my provider, priest and protecting me throughout the course of my studies. Moreover I appreciate the entire staff of the Department of Curriculum and Pedagogy of Kibabii University for their sincere and honest support since I enrolled for my studies. Special thanks also go to my supervisors, Dr. Carolyn Simiyu and Dr. Kefa Nyende for their support, patience, guidance and constructive criticism throughout the whole period. I wish to acknowledge the contribution of Dr. Edwin Masibo of the Department of Curriculum and Pedagogy, Kibabii University, for giving guidelines toward writing this thesis.

### ABSTRACT

*In recent times, considerable investment in Information and Communication Technologies (ICT) integration has been made by many countries with a belief that it will transform teaching and learning in the education system. ICT is an umbrella term for any learning that takes place electronically in digital learning platforms. Classes, teaching materials, support, and assessments are all delivered using ICT facilities. The COVID 19 pandemic caused the government of Kenya to gradually shut down education institutions. Students and teachers had to embrace ICT mediated instructions. The purpose of this study was to analyse the extent of Integration of ICT in Agriculture curriculum implementation in Secondary Schools in Kimilili Sub- County. The main focus of this study was to analyse the Integration of ICT in Agriculture Curriculum Implementation in Secondary schools in Kimilili sub county, Bungoma. The study sought to examine the main challenges faced in integrating ICT in Agriculture curriculum implementation and the effect on students' performance. The study was guided by the E-learning Theory and Bruner's Constructivism Theory and adopted a descriptive survey design. Stratified proportional sampling was used to select 22 schools out of the targeted 25 schools while purposive sampling was used to select 30 teachers out of 90 targeted teachers in the selected schools. Data collection instruments included questionnaires for both teachers and learners, interview schedules for teachers and Principals. The observation checklist was used by the researcher to collect data on the extent of integration of ICT in Agriculture Curriculum implementation. Content validity was determined by piloting in four schools that were not part of the study schools. Reliability established that all the entire research instruments were considered to be reliable for use in collection of data. A correlational research design investigated the relationships between the use of ICT and the students' academic performance in Agriculture subject. The Eta squared value was found to be 0.26 implying that*

*a positive change of perception of the teachers towards integration of ICT in Agriculture Curriculum Implementation by 100% would increase the extent to which ICT resources are used by 26%. The Pearson's correlation coefficient (r) value of 0.65 indicated that ICT integration in Agriculture curriculum implementation affects 65% of the variance in academic performance of Agriculture subject. The study found that on challenges of ICT integration, a low standard deviation of 0.563 was achieved on inadequate ICT resources due to large class size. The findings form evidence based information regarding Integration of ICT in Agriculture curriculum implementation which can be used in decision making towards training of Agriculture Teachers. The study recommends that the stakeholders in secondary schools embrace the use of ICT in order to achieve good academic results. Further the study recommends for change of perception of teachers and learners who are the key decision makers in Integration of ICT in Agriculture curriculum implementation.*

## **I. INTRODUCTION**

### **1.1 Overview of the Chapter**

This section comprises of background to the study, statement of the problem, purpose of the study, research objectives, research questions, and significance of the study, limitations of the study, assumptions of the study, theoretical and conceptual framework.

### **1.2 Background Information**

In America, the government is rapidly adopting new and better teaching technologies. ICT is seen as a way to developing a nation that gives the Americans the best Education Hong, (2016). The development of the National Information Infrastructure and the increase of computers at home and at work are offering new opportunities for ICT.

An analysis of teacher education in Ghana indicated some challenges associated with the integration of ICT in Agriculture Curriculum Implementation. It revealed that, these challenges were not only linked to unavailability of technological resources, but also lack of enough skilled human resources and low enrolment rate Msila, (2015). According to the International Telecommunications Union (2019), similar to other countries in Africa, Ghana lagged behind with regard to integration of ICT in teacher education.

In Uganda, The Ugandan Government promulgated a National ICT Policy in January 2010 whose main aim was to improve the livelihoods of Ugandans by ensuring the availability of accessible, efficient, reliable and affordable ICT services. In the policy, the Uganda government committed itself to improving the quality of ICT in agriculture curriculum implementation in schools, colleges, universities and other educational institution.

In Kenya, the Government came up with the Kenya Vision 2030, in which on education, the Government digitized all secondary school curriculums and carried out in-service and capacity building to teachers. Other initiatives that the Government has adopted include ICT in agriculture curriculum implementation training programs for teachers by the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA).

The Ominde report of 1964 stated that there was need to start teaching of agriculture subject in secondary schools and this led to more schools taking up the subject .The Report recommended agriculture to be taught among the science subjects and be classified under technical subject. Teaching and learning of agriculture has become a tool in eliminating poverty in many developing countries including Kenya, and therefore, more measures have been put in to make it more affordable and accessible.

On March 15, 2020, the Kenyan government abruptly closed schools and colleges nationwide in response to COVID-19, disrupting nearly 17 million learners countrywide. Since schools closed in Kenya, the Ministry of education and other agencies indicated that learners should undertake online lessons at home. There was need for ICT integration on Agriculture Curriculum implementation.

ICT resources may be a combination of text, images, audio, video and animations that than be downloaded from the internet and stored. Some of the ICT tools used in teaching include live broadcast for radio and television and generic software applications such as audio cassettes, CDs, tapes, video satellite, the internet, and web-based content. The use of media such as radio, television, expands options for interacting in teaching and learning at all levels according to Aydin, (2018).

The Education Management Information Society Survey which was done between 2016- 2017 showed that about two thirds of secondary schools and many primary schools were connected to electricity. The national Information strategy for education and training policy paper of 2020 recognizes that Kenya lags far behind in ICT.

The Government of Kenya has indicated in various documents the important role that ICT plays in education. Kenya put in place a National Information Policy in January 2014, a policy whose major objective was to ensure the availability of ICT services, which were reliable. The government, in the policy, also advocated for the introduction and use of ICT in schools in order to improve the quality of teaching and learning. The Government of Kenya, (GOK, 2020) continues to invest in Integration of ICT in agriculture curriculum implementation in secondary schools.

The Government mandated the Kenya Institute of Curriculum Development (KICD) to digitalize the secondary school content and avail it to schools (Ratemo, 2019). This has been done and the digitized secondary school Agriculture subject content from Form 1 to 4 are in digitalized form. The digitized Compact Disks (CDs) are now available to schools and can be downloaded from the internet. Despite these numerous investments, the performance of Agriculture subject has not shown any significant improvement. Agriculture as a subject in secondary schools is important, for example, it helps in the placement of careers among students such as animal health, veterinary medicine just to mention a few. But students’ performance in Agriculture in National examinations has had no significant evidence of improvement in the recent years as attested by the Kenya Certificate of Secondary Education (KCSE) statistics. Table 1.1 shows the results of KCSE Agriculture examination nationally from 2020 to 2022

**Table 1. 1: Performances of students in KCSE Agriculture examination nationally (2020- 2022)**

Year	Candidature	Maximum score	Mean score
2020	41,581	100	41.31
2021	46,846	100	36.71
2022	52,442	100	31.31

Source: KNEC (2023)

**Table 1. 2: Performance of students in KCSE Agriculture examination – Kimilili Sub County**

Year	Enrollment	Mean	Mean grade
Max = 12			
2020	700	4.81	C-
2021	900	4.57	C-
2022	1200	4.79	C-

Source: Sub County Director office, Kimilili Sub County (2023)

Evidence shows that the mean score in Agriculture for the last three years has been C- in Kimilili. The performance of students in KCSE examinations in Agriculture over the last 3 years has not shown any significant improvement (KNEC reports, 2023). Agriculture being the backbone of Kenya Economy is destined to improve the living standards of people, ways and means should be found to improve performance of learners in the subject. Samuel F. (2017) observed that Integration of ICT in Agriculture Curriculum Implementation creates a unique opportunity for learners to understand agricultural concepts and learning becomes interesting and meaningful resulting to good performance.

### 1.3 Statement of the problem

This study was to analyse Integration of ICT in agriculture curriculum implementation in Secondary School in Kimilili Sub County, Bungoma County. Despite the government’s substantial investment in integration of ICT in Agriculture Curriculum Implementation, there is no evidence based information regarding the effectiveness of ICT Integration in Kenya. Therefore, it is useful to find out how well ICT resources are being used and managed, especially for the benefit of students. . Agriculture can help to reduce poverty, raise the living standards and improve on food security. Agriculture subject is classified under technical subjects and it is an optional subject. The enrollment of agriculture in secondary school is low as attested by KNEC report 2023. The Performance of Agriculture in the national examination is average as attested by the Kenya Certificate of Secondary Education (KCSE) statistics. Research in Integrating ICT in Agriculture curriculum implementation has been done in developed countries. However, no research has been conducted on Integration of ICT in agriculture curriculum implementation in Kimilili Sub County, Bungoma.

### 1.4 Purpose of the study.

The purpose of the study was to analyze the Integration of ICT in agriculture curriculum implementation in secondary schools in Kimilili Sub County, Bungoma County.

### 1.5 Objectives of the study

This study was guided by the following objectives with respect to secondary schools in Kimilili Sub County Bungoma:

- i. to evaluate the relationship between stakeholder's perception on the extent to which ICT resources are used.
- ii. to investigate the effect of ICT Integration on the performance of learners in Agriculture.
- iii. to examine the challenges of ICT Integration in Agriculture curriculum implementation.

### **1.6 Research Questions**

In order to achieve the objectives of this study, the following research questions addressed the following with respect to Secondary Schools in Kimilili Sub County Bungoma.

- i. What is the relationship between stakeholder's perception and the extent to which ICT resources are used?
- ii. What is the effect of ICT Integration on performance of Agriculture?
- iii. What are the challenges of ICT integration in Agriculture curriculum implementation in secondary schools?

### **1.7 Significance of the study**

The findings form evidence based information regarding attitude towards ICT integration which can be used in decision making towards training of Agriculture Teachers. The findings of the study will inform the Ministry of Education on the challenges of ICT Integration in agriculture curriculum implementation. The study will encourage the ministry of education to improve on its ICT resources in the schools. The findings and suggestions of this study will also add to the already existing literature in the field of ICT integration in Agriculture curriculum implementation. The findings will increase efficiency in the training and selection of Agriculture teachers; and encourage teachers to have more interest towards ICT integration in Agriculture curriculum implementation. Additionally, the study will be beneficial in building a knowledge base of perceptions of teachers of Agriculture about use of ICT integration in Agriculture curriculum implementation.

### **1.8 Limitations of the study.**

Some of those who were to be interviewed had other commitments such as lessons to attend to and therefore they were not available to respond. The researcher used many questionnaires to solve this problem and also increased the number of respondents by 10% to cater for non- responsive people.

Given the poor road conditions in the county, there was a problem of accessing some of the schools selected for this study and therefore the collection of accurate and in-depth data for the purpose of this study took a longer time than was expected. The researcher send more data collection assistants to administer questionnaires simultaneously in different schools to cut on total time spent on data collection.

### **1.9 Assumptions:**

- i. The study assumed that the findings shall apply to general population.
- ii. There is a correlation between ICT integration in Agriculture Curriculum Implementation and the academic performance of agriculture subject.
- iii. The perception of teachers and students towards ICT integration translates to the extent to which ICT resources are used.

### **1.10 Theoretical Framework**

For the purpose of this research, E -learning theory of teaching and learning was used. E-learning theory is built on cognitive science principles and can be used to demonstrate how the integration of ICT in agriculture curriculum implementation can enhance effective learning David, (2015). Applying the principles of e-learning theory with its design principles can promote effective learning.

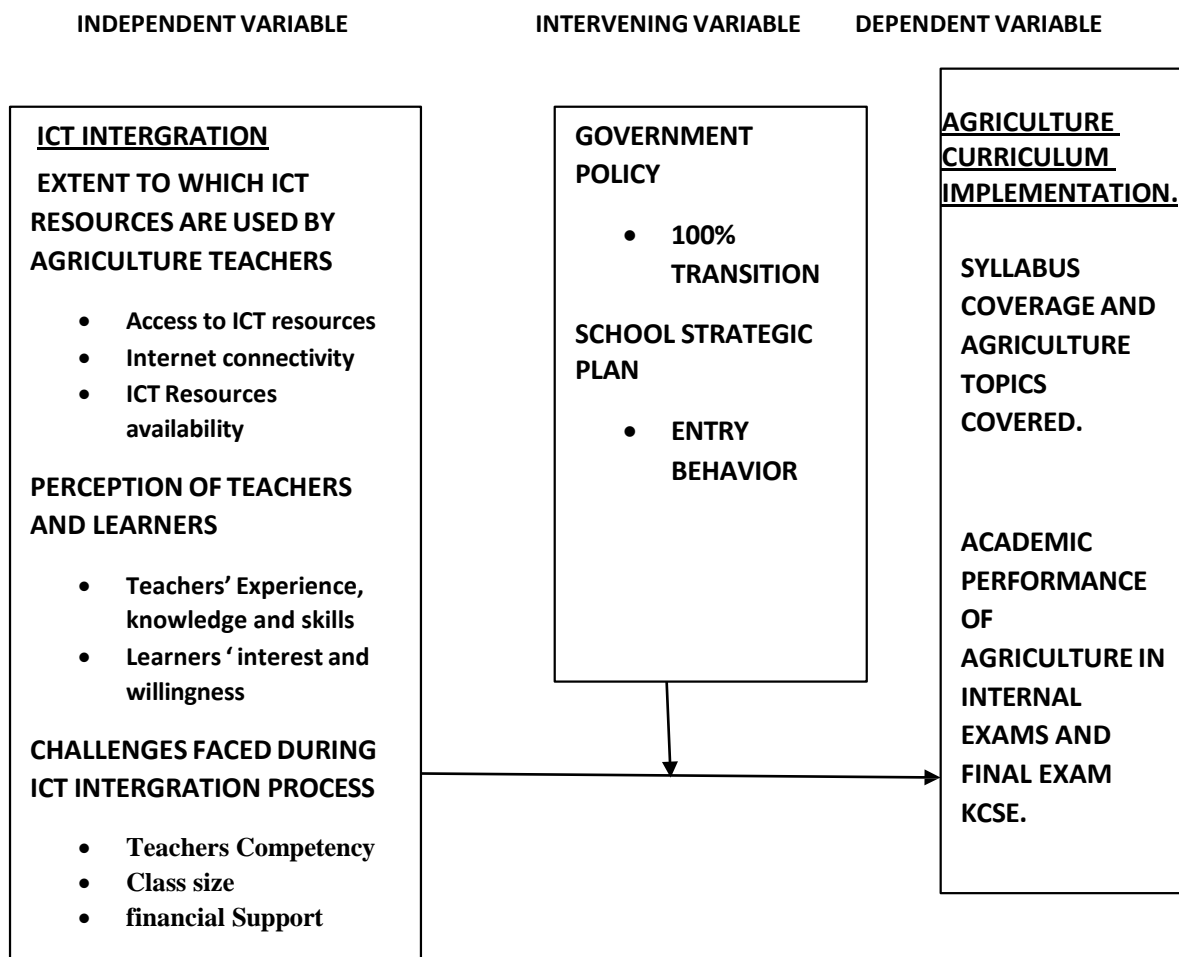
Therefore, e-learning theory was useful to understand how ICT tools can be integrated to promote effective learning and to describe the perception of teacher and learners on ICT. Furthermore, teachers may apply the e-learning theory model in their classrooms to solve the challenges they face. For example, teachers can help students manage their intrinsic cognitive load by splitting the content so that students can acquire knowledge step by step (Clark et al., 2015). Teachers integrate ICT tools with visuals, text, and audio to demonstrate learning content in ways that learners will understand.

For the purpose of this research, constructivist theory of teaching and learning was also used. The ICT integration in Agriculture curriculum implementation involves constructivism theory of teaching and learning. Basically, learners create knowledge for themselves. Individually and communally, each learner creates implication in the learning process. In essence, through experiencing and reflecting on those experiences, people make individualized perception of the world. Using ICT integration method in learning emanated from the social constructivism paradigm. Integration ICT in learning would create an environment that is very rich for both teachers and learners to construct knowledge to advance the expertise in reading, writing, and listening. ICT facilities such as computers, PowerPoint presentations, mobile phones and internet facilities facilitate the learning

of Agriculture subject and offer motivation as the users wants to explore the world of knowledge through the internet.

**1.11 Conceptual framework**

The conceptual framework of this study was to show the relationship between ICT Integration and academic performance of the students. The study conceptualizes that ICT Integration in Agriculture Curriculum implementation would lead to meaningful learning and good academic results. The conceptual framework is used to ensure that the programme is geared towards improving learner’s perception and facilitate better performance.



**Figure 1. 1: Effect of ICT Integration in Agriculture Curriculum Implementation Conceptual Framework**

**Source:** Adapted from Maithya R. and Ndebu S. (2017)

**II. LITERATURE REVIEW**

**2.1 Introduction**

This chapter focuses to literature review on the extent of ICT integration in Agriculture Curriculum Implementation, Perception of Agriculture teachers, learners and school administrators, performance and challenges in ICT integration in Agriculture Curriculum Implementation. The literature was sourced from on-line journals, on-line books and the internet. The literature is organized into the following sections:

- (a) Extent to which ICT resources are used,
- (b) Perception of Agriculture teachers, learners and school administrators,
- (c) Effect of ICT integration in Agriculture curriculum implementation on performance,
- (d) Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation.

## **2.2 Extent to which ICT resources are used**

According to Torruam (2018), ICT resources are handling tools that are used to produce, store and process, distribute and exchange information in the internet. UNESCO (2016) also highlighted some of the available ICT resources like radio, television, video, DVD, phones, satellite systems, computer and network equipment and software as well as the equipment and services provided by these technologies like video- conference and electronic mail. Valasidou (2018) indicated that there are different kinds of ICT resources such as tele-conferencing, video- conferencing and e-learning tools. Internet is rich a resource where both the teacher and learners can get updated information on Agriculture concepts (Balbin, 2016). The teacher can assign students to visit websites, search for knowledge and answer some questions. This study focused on collection of data on extent of Integration of ICT in Agriculture Implementation and thus provided a clear picture on Integration of in agriculture curriculum implementation at classroom level.

Learners and teachers can discuss through electronic mail or chat beyond the classroom. Students can chat online with teachers or with other students. The school should have the required resources such as computers and Internet service. In the absence of a computer, Agriculture teachers and students can still access Internet through mobile phones which are now cheap and affordable. Research studies on the use of mobile phone for ICT integration in Agriculture Curriculum Implementation processes have been carried out worldwide. Ekanayake (2019) argues that a mobile phone is personal, portable and performs functions such as talk, text, video and could make the process of ICT integration in Agriculture Curriculum Implementation meaningful.

Despite the many benefits of mobile phones in the Online teaching of Agriculture, their use in the secondary schools for learning could be hindered due to the fact that students are not allowed to carry mobile phones to school (MoE, Kenya, 2018). However, schools could buy some mobile phones that could be used specifically for learning purposes under supervision of Teachers.

With the coming of computers and Internet, it is possible to listen to live and recorded audio and video.

Recorded radio and TV programs can be saved and then downloaded for later listening. The computer makes it possible for the teacher to select specific content according to subject and topics (Kavagi, 2019). Thus, the study focused on identifying various tools used in Integration of ICT in Agriculture Implementation.

ICT resources is a term that includes any communication device or application, encompassing: radio, television, cellular phones, computer, network hardware, software and satellite systems as well as the various services and applications associated with them, such as video conferencing and distance learning (UNESCO, 2017). ). Thus, the study focused on identifying various tools used in Integration of ICT in Agriculture Implementation. Since most of the researchers have not reported on extent in which ICT tools are used in Integration of ICT on agriculture Curriculum implementation.

Smart phones can also act as a tutee, as students learn to program their devices to better assist their efforts in education, simultaneously building technical skills necessary for the future. Internet is a resource where both the teacher and learners can get information on Agriculture concepts. The teacher can assign students to search websites for questions (Balbin, 2015).

Hennesy (2014), observed that schools in Kenya were increasingly being equipped with computers for Agriculture curriculum implementation. ICT integration enhances efficiency of agricultural thought and enables learners to make conclusion. It also offers multiple agricultural representations that enhance generality of agriculture concepts and provide opportunity for more examples, unlike in a paper and pencil environment (Ogwel, (2018). Thus, the study focused on identifying various tools used in Integration of ICT in Agriculture Implementation. Since most of the researchers have not reported on extent in which ICT tools are used in Integration of ICT on agriculture Curriculum implementation.

ICT integration in Agriculture Curriculum Implementation could help teachers to visually present abstract concepts. ICT integration in Agriculture curriculum implementation could change negative perceptions of learners about Agriculture. Teachers can use ICT resources to present information in multiple formats (For example, text, pictures, sound, animations, and video clips). Facilitators also could present activities in a layered order and with varying scaffolding levels. ICT integration in Agriculture curriculum implementation has a great potential to enhance learner achievement (Bransford et al., 2015). The researcher was interested in investigating Extent of to which ICT tools are used in Integration of ICT in Agriculture Implementation.

## **2.3 Perception of Agriculture teachers, learners and school administrators**

Yusuf and Juliana (2018) conducted a study on perception of Agriculture teachers in Indonesia on ICT integration in Agriculture Curriculum implementation .The findings of the study showed that participant teachers had positive perceptions towards ICT integration in Agriculture curriculum implementation. Teachers believe that ICT resources enable them to find information that enriches their lessons easily and quickly. Hong, (2016) carried out

a study on perception of Agriculture teachers' on ICT integration in Agriculture curriculum implementation of Agriculture in different parts of Colorado, USA. The study revealed that Agriculture teachers involved in the study had a positive perception towards ICT integration in Agriculture curriculum implementation. Teachers wanted to learn new ways of using ICT resources in classroom. As much as the study had similar variables, the researcher was interested in investigating perception of students in Integration of ICT in Agriculture Implementation.

A study conducted in Ghana to establish the relationship between Agriculture teachers' perception on the extent to which ICT resources are used revealed that teachers' perceptions on the extent to which ICT resources are used was positive and low but not statistically significant (Buabeng, 2018). This finding is in agreement with Eugene, (2016) who studied the effect of Agriculture teachers' perception towards the use of ICT resources in Agriculture curriculum implementation. The study revealed that Agriculture Teachers' perception was found not to match their actual use of ICT resources in classroom. Since most of the researchers have not reported on the perception of teachers towards Integration of ICT in Agriculture curriculum implementation, this study focused on perception of teachers and learners on integration of ICT in agriculture Curriculum implementation.

The role and importance of Agriculture Teachers perception in ICT integration in Agriculture Curriculum Implementation is a very well documented area in educational research. This is also true when it comes to studying the relationship between perception of Agriculture Teachers and ICT integration in Agriculture Curriculum Implementation (Jegade, 2018). Negative perception is reinforced by the belief that ICT integration in Agriculture Curriculum Implementation is an expensive medium. Adegbenro, (2017) carried out study among Agriculture teachers in Kenya on use of ICT integration in Agriculture Curriculum Implementation. The study indicated that teachers who viewed ICT integration in Agriculture Curriculum Implementation positively had high levels of use while those who viewed it negatively did not use online tools in teaching Agriculture. As much as the study had similar variables, the researcher was interested in investigating perception of students in Integration of ICT in Agriculture Implementation.

Teachers' perception determines the extent to which ICT resources are used in Agriculture Curriculum Implementation process as revealed by a number of studies. According to Gakuu, (as cited in Maithya, 2018), how people perceive and react to technologies is far more important than technical factors hindering Integration of ICT integration in Agriculture Curriculum implementation. Drent,(2017) an Australian researcher argues that integrating ICT in Agriculture Curriculum Implementation requires change and different teachers will handle the change differently. Meelissen, (2017) conducted a study on the use of ICT resources by teachers in Agriculture Curriculum Implementation in Netherlands and found that positive perception has direct positive influence on the Extent to which ICT resources are used. If Agriculture teachers want to successfully Integrate ICT in Agriculture Curriculum Implementation they need to possess a positive perception towards Integration of ICT in Agriculture curriculum implementation. However, if teachers lack the technological ability needed to Integrate ICT in Agriculture Curriculum Implementation their perception towards the use of ICT resources will be negative. Mundy, (2017) confirmed this argument that negative perception leads to poor Integration of ICT in Agriculture curriculum implementation. As much as the study had similar variables, the researcher was interested in investigating perception of students in Integration of ICT in Agriculture Implementation.

Rogers, (2017) observers that it is important to consider the perceptions of Agriculture teachers and learners towards integration of ICT integration in Agriculture curriculum implementation. Hismanoglu, (2017) noted that when teachers have a positive perception towards ICT integration in Agriculture curriculum implementation, they are willing to use ICT resources meaningfully. He therefore recommended that Agriculture teachers need training to use ICT resources into their lessons. Odisho, (2014) discussed the importance of learner's perception in using ICT resources to cater for different learning styles. These include visual and auditory learners. Auditory students learn through voice. Visual learners learn better through visual images. Positive perceptions are pointers that teachers and learners will integrate ICT integration in Agriculture Curriculum Implementation (Khan, 2014). As much as the study had similar variables, the researcher was interested in investigating perception of students in Integration of ICT in Agriculture Implementation.

Syrjälä (2014) observed that teacher's personal preferences in selecting ICT resources is an obstacle in ICT integration in Agriculture curriculum implementation. He noted that some teachers are still reluctant to use some ICT tools. In a research conducted by Vian (2015), students were more willing to use ICT resources in the teaching Agriculture subject compared to the regular teachers. Having a positive perception is important in integrating ICT in Agriculture Curriculum Implementation. Since most of the researchers have not reported on the perception of teachers towards Integration of ICT in Agriculture curriculum implementation, this study focused on perception of teachers and learners on integration of ICT in agriculture Curriculum implementation.

The role and importance perception in Integration of ICT in Agriculture curriculum implementation is a very well documented area in educational research. This is also true when it comes to studying the relationship between perception and Extent of Integration of ICT in Agriculture curriculum implementation (Jegade, 2018). Teachers' perception determines the extent of Integration of ICT in Agriculture curriculum implementation as revealed by a number of studies. According to Gakuu, (2019), how people perceive and react to Integration of ICT in Agriculture curriculum implementation is far more important than obstacles in Integration of ICT in Agriculture curriculum implementation. Watson (2018), an Australian researcher argues Integration of ICT in Agriculture curriculum implementation requires change and different teachers will handle the change differently. Drent, (2017) conducted a study Integration of ICT in Agriculture curriculum implementation in classroom found that positive ICT perception has direct positive influence Integration of ICT in Agriculture curriculum implementation. Teachers have very often been identified as significant resource in the Integration of ICT in Agriculture curriculum implementation into schools but they could also be one of the main barriers. The teacher's knowledge and skills in Integration of ICT in Agriculture curriculum implementation have a considerable impact on the outcomes to be achieved. A study conducted in Ghana revealed that teachers' perceptions with regards Integration of ICT in Agriculture curriculum implementation were positive and low but not statistically significant (Buabeng, 2022). Since most of the researchers have not reported on the perception of teachers towards Integration of ICT in Agriculture curriculum implementation, this study focused on perception of teachers and learners on integration of ICT in agriculture Curriculum implementation.

### **2.3 Effect of ICT integration in Agriculture curriculum implementation on performance of learners in Agriculture.**

Research shows that ICT integration in Agriculture curriculum implementation as a positive effect on students' performance. Based on the findings of Volman, (2015), the use of ICT resources creates a powerful learning environment and transforms the teaching and learning process in which students deal with knowledge in a more active and constructive way. ICT integration in Agriculture curriculum implementation has brought new ways of delivering content to the learners. YouTube is an online video sharing site that has become popular among teachers who teach Agriculture. This is because it has video clips that show application of Agriculture in the real world (Godwin, 2017). Apart from capturing the attention of the students, YouTube videos motivate students and make it easy for the teacher to teach them (Watkins, 2019). As much as the study had similar variables, the researcher was interested in investigating Effect of ICT integration in Agriculture curriculum implementation on performance of learners in Agriculture.

Unkovich, (2018) observed that when learners learn using videos, they are able to retain what they have learnt for a longer duration. This is because a video enables learners to see concepts that would have been abstracted. ICT tools such as videos enable the teacher to bring real life examples in class. Use of ICT tools in classroom can improve Problem-solving skills among learners (Burke, 2019).

ICT integration in Agriculture curriculum implementation gives the learner an opportunity to learn through observation and mimicry. Through watching what a farmer is doing, the learner is provided with a more realistic expectation about what were required of them as they go on to learn complex Agricultural skills. Online tools such as video clips and cartoon animations can help Agriculture students to acquire farming skills (Ayres et al., 2016). Students who score highly in Agriculture in national exams find it easy to use ICT resources (Sarwar et al., 2014). This calls for teachers to integrate ICT integration in Agriculture Curriculum Implementation in classroom. The internet is a potentially rich resource for teaching Agriculture since it has videos showing real agricultural production by real people. The nature of Agriculture is presented in a more realistic manner by the characters in the videos (Mayora (2019). ICT integration in Agriculture curriculum implementation help learners see real life examples of Agriculture in use instead of abstracting the same. A teacher can formulate a tasks by telling the learners to comment on the video they have watched. Pino (2017) adds that giving the learners the opportunity to participate allows them to think critically. As much as the study had similar variables, the researcher was interested in investigating Effect of ICT integration in Agriculture curriculum implementation on performance of learners in Agriculture.

Yassanne (2014) ascertains that the integration of ICT integration in Agriculture curriculum implementation improves students' academic achievement. He revealed that the performance and participation of students in the ICT integration in Agriculture curriculum implementation were better compared to the normal classroom situation. This result indicates a significant difference between the academic performances of students in Agriculture who were exposed to ICT integration in Agriculture Curriculum Implementation and those exposed to the traditional method of teaching. Therefore, the researcher was determined to communicate on the effect Integration of ICT in Agriculture Implementation on academic performance since, most studies conducted have concentrated on challenges facing Integration of ICT in Agriculture Implementation and not reporting on the way ICT integration influences students' performance.



According to Nyaga (2016), he revealed that ICT integration in Agriculture Curriculum Implementation promotes students' communication skills, problem- solving, and deep understanding of the Agriculture content. He further confirmed that ICT integration in Agriculture curriculum implementation ensures more effective learning environment.

Use of ICT resources therefore translates to improved learning outcomes which are reflected in improved students' performance in examinations. Use ICT in teaching facilitates learning more effectively and enhances students' understanding of concepts. This is expected to translate into expansion of knowledge and improved examination outcomes resulting to good performance. Teachers play a very important role in teaching using ICT resources, they prepare students to live in the society in which the knowledge on ICT resources is used access information on agriculture (Samah et al., 2014). Therefore, the researcher was determined to communicate on the effect Integration of ICT in Agriculture Implementation on academic performance since, most studies conducted have concentrated on challenges facing Integration of ICT in Agriculture Implementation and not reporting on the way ICT integration influences students' performance.

#### **2.4 Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation.**

Research studies in Australia found that teachers who lacked knowledge and skills to use ICT resources were not enthusiastic about integrating ICT integration in Agriculture Curriculum Implementation (Newhouse, 2018). Research done in developing countries revealed that lack of skills is the main obstacle to integration of ICT in Agriculture curriculum implementation by teachers in classroom .Access to ICT resources is an important factor that could influence the teachers' perception towards integration of ICT in Agriculture curriculum implementation.

Onchwari,(2016) notes that, despite rapid growth in the use of ICT resources, there is limited access to ICT resources by teachers and students both at home and school. Most teachers are not keen in adapting and integrating ICT in Agriculture Curriculum implementation. Several studies show that teachers who are inexperienced in using ICT resources will most likely avoid using it in the classroom for fear of failure. Thus, the study focused on identifying Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation.

According to Bingimlas, (2019) limitations in teacher's ICT skills and knowledge will make them feel anxious when integrating ICT in Agriculture curriculum implementation thus not confident. This is in line with findings of a study by Becta, (2014) who found that many teachers who do not consider themselves to be well skilled in using ICT tools feel anxious about using it in front of a class of children who perhaps know more than they do. Therefore, the researcher was determined to communicate on the effect Integration of ICT in Agriculture Implementation on academic performance since, most studies conducted have concentrated on challenges facing Integration of ICT in Agriculture Implementation and not reporting on the way ICT integration influences students' performance.

Sadegül (2016) noted that lack of resources is an obstacle to ICT integration. ICT resources include: computers, laptops, phones, televisions, radios, software, Internet access, and other supporting equipment provided in the school (Van Braak, 2019). Pelgrum's (2016) explains that when teachers observe others integrating ICT in Agriculture Curriculum Implementation they are likely to try out the same in their lessons. However, if an institution has few machines, lacks internet access and teachers have limited time, they may choose not to utilize those ICT resources.

A study conducted in Europe found that lack of access to ICT resources is the largest barrier to integrating ICT integration in Agriculture curriculum implementation. Further, a study carried out in Europe revealed the first challenge of ICT integration in Agriculture Curriculum Implementation emanated from the institution. The online site could be blocked by the school thus making access difficult. Another problem can result from the content in the online videos. Jones and Kristen 2019 emphasized the importance of choosing appropriate material that will aid in simplifying the content to be learnt. The videos must be: age appropriate, be aligned with instructional objectives, meet audio and video standards and be relevant (Everhart, 2019).

According to Sicilia (2015), technical problems were found to be a major barrier for teachers. Such technical problems include: waiting for website to open due to slow Internet and failing to connect to Internet. Gomes (2015) argues that ICT integration in Agriculture Curriculum Implementation needs technical skills. The GOK formulated a number of policy recommendations aimed at having coordinated approach to ICT integration in Agriculture Curriculum Implementation in education (MoEST, 2016). Educational institutions are expected to carry out ICT integration in Agriculture Curriculum Implementation policies based on these recommendations. Therefore, the researcher was determined to communicate on the effect Integration of ICT in Agriculture Implementation on academic performance since, most studies conducted have concentrated on challenges facing Integration of ICT in Agriculture Implementation and not reporting on the way ICT integration influences students' performance.

Teachers need to bring about the required changes in their own attitude and approach to online teaching. Miheo (2015), in his research findings stated that, the main factor affecting ICT integration in Agriculture Curriculum Implementation is the gap between the curriculum's expectations and teachers' beliefs. The less experienced young teachers are more positive about ICT integration in Agriculture Curriculum Implementation compared with the highly experienced old teachers who were mainly more negative. Thus, the study focused on identifying Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation

Other challenges include lack of computers. Although government agencies and individuals have continued to donate computers to schools, there are still a big percentage of the schools unable to purchase computers for use by the students and teachers since computers are still very expensive to purchase and repair calls for a substantial amount of money. Thus, the study focused on identifying Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation.

The performance of national exams is a reflection of how students utilize ICT. The Kenyan Education system is exam-oriented and students for the purpose of passing exams. The students are taught how to answer questions instead mastering content. The integration of ICT is expected to support the students to be independent. It will help them to carry out research and analysis. These students will acquire skills used for solving life challenges. The schools that have promoted the use of ICT have produced students who are confident than those who have not Intergrade ICT. Teachers play a very important role in the teaching-learning process, they must be able to prepare young people for the knowledge society in which the competence to use ICT to access information is very important (Samah, 2019). Research studies in Australia found that teachers who lacked knowledge and skills to use computers however they were not enthusiastic about integrating ICT in teaching and learning Newhouse, (2022).

Inadequate ICT tools is one of the problem in facing ICT integration in secondary schools in Kimilili Sub county Bungoma .There is need for the institutions to recruit technical experts that will help in managing these technological tools. Roberts, (2021) revealed teachers should also be retrained on the use of technology in teaching. This will make them competent in training students also. This study also implies that there is need for the government to come up with online platforms for all secondary schools' teachers and students to help in the sharing of resources According to Balanskat, (2016) limitations in teacher's ICT knowledge makes them feel anxious about using ICT in the classroom and thus not confident in using it in their teaching. This is in line with findings of a study by Becta (2014) who found that many teachers who do not consider themselves to be well skilled in using ICT feel anxious about using it in front of a class of children who perhaps know more than they do. Therefore, the researcher was determined to communicate on the effect Integration of ICT in Agriculture Implementation on academic performance since, most studies conducted have concentrated on challenges facing Integration of ICT in Agriculture Implementation and not reporting on the way ICT integration influences students' performance.

Teachers are key to the success of Integration of ICT in Agriculture curriculum implementation. They must be equipped with basic ICT skills to meet their individual administration and teaching requirements. Teachers have to undergo ICT based pedagogical training so as to ensure effective Integration of ICT in Agriculture curriculum implementation (MoE, 2008). Research done in developing countries revealed that lack of technological skills is the main obstacle to Intergration of ICT in Agriculture curriculum implementation by teachers in classroom instruction (Pelgrum, 2001). Teachers must feel confident in Integration of ICT in Agriculture curriculum implementation. Access to ICT facilities is an important factor that could influence Integration of ICT in Agriculture curriculum implementation. Various research studies show that barriers related to accessibility tools for Integration of ICT in Agriculture curriculum implementation are wide spread and differ from country to country. A study conducted in Europe found that lack of access is the largest barrier to Integration of ICT in Agriculture curriculum implementation. Teachers gave reasons such as: lack of computers and slow Internet as cited in Bingimlas, (2019). Thus, the study focused on identifying Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation.

Studies carried out by various scholars indicate that availability of time, determines Integration of ICT in Agriculture curriculum implementation (Becta, 2014). According to Kozma (2020), lack of time available in planning in is a major factor influencing Integration of ICT in Agriculture curriculum implementation. Further, a study carried out in Saudi Arabia shows that time is an important factor affecting Integration of ICT in Agriculture curriculum implementation since teachers have on average 28 lessons per week (Alwani, 2015). Both teachers and students have little time to work on Integration of ICT in Agriculture curriculum implementation. Thus, the study focused on identifying Challenges faced by teachers and learners during ICT integration in Agriculture curriculum implementation

### **2.5 Summary of the Literature Review and Research Gap**

The literature reviewed indicates that ICT integration in Agriculture curriculum implementation has led to good academic performance in the subject. Integration of ICT in Agriculture curriculum implementation has been a popular topic everywhere in the world. Most of the literature on integration of ICT integration in Agriculture curriculum implementation was from outside Kenya. However, no research has been conducted on integration of ICT in Agriculture curriculum implementation in Kimilili Sub County, Bungoma County.

Many researchers have studied and identified factors that affect Integration of ICT in Agriculture curriculum implementation .The Literature also revealed that there is low knowledge and skills on how to use ICT resources among teachers and students in Kenya. The purpose of this study was to examine the challenges faced by Agriculture teachers and learners during Integration of ICT in Agriculture curriculum implementation. From the reviewed literature, it is evident that the integration of ICT in Agriculture curriculum implementation could be influenced by the availability of ICT resources in secondary schools, teachers' skills on integration of ICT and teachers' perception towards integration of ICT in Agriculture Curriculum Implementation. Teachers have been trained on how to integrate ICT in Agriculture Curriculum Implementation. The training included topics such as using ICT resources as well as how to integrate ICT in Agriculture Curriculum Implementation.

A lot of research findings also reported good academic performance in Agriculture subject as a result of integrating ICT in Agriculture curriculum implementation. The research findings did not compare performance of Agriculture subject in secondary schools that are integrating ICT in Agriculture curriculum implementation and those schools that do not integrate ICT in agriculture

## **III. RESEARCH METHODOLOGY**

### **3.1 Introduction**

This Chapter deals with methodology that was used to carry out the study under the following subheadings; research design, study location, target population, sample size and sampling techniques, instrumentation, data collection procedure and data analysis techniques

### **3.2 Research design**

The study used descriptive survey design and Correlational research design. Descriptive survey design was used to explain the relationship between integration of ICT and students' academic performance .A correlational research design investigated the relationships between the use of ICT and the students' academic performance in Agriculture subject. Descriptive survey method was used in collecting information by interviewing and administering questionnaires to students, teachers and school administrators on integration of ICT in Agriculture curriculum Implementation.

Inferential analysis (ANOVA and Chi square) was used to answer the questions of how often ICT Integration is done in Agriculture Curriculum Implementation in schools and to show the effect of Integrating ICT in agriculture on student academic achievement in the subject.

### **3.3 Location of the study**

The study was carried out in Bungoma County, Kenya. It consists of nine sub-counties, namely; Bumula, Bungoma Central, Bungoma East, Bungoma North, Bungoma South, Bungoma West, Cheptais, Kimilili/Bungoma and Mt.Elgon. It borders Uganda to the North and North West, Counties of Kakamega to the South and South West, Busia to the West and Trans Nzoia to the East and North East. It has a population of 1,375,063 and an area of 2,069 km<sup>2</sup>.

### **3.4 Target Population**

The target population of the study consisted of Agriculture teachers, Principals and all Agriculture students in Kimilili Sub County. The figure 3.1 shows secondary schools in Kimilili Sub County offering Agriculture Subject.

**Table 3. 1: Secondary Schools in Kimilili Sub County offering Agriculture Subject.**

School category	Frequency	Schools Offering	Percentage
National	1	1	100
Extra county	3	2	100
County	6	6	100
Sub county	15	12	80
<b>Total</b>	<b>25</b>	<b>22</b>	<b>88</b>

**Source:** Ministry of Education Kimilili sub county office.

### 3.5 Sampling Techniques and Sample size

This section will look at the sample size and sampling techniques to be used. Sampling is defined as the process of selecting a subset of cases in order to draw conclusions about the entire set (Orodho, 2017).

#### 3.5.1 Sampling Techniques

The study sample comprise of 15 schools that have had Agriculture subject for at last three years. This is because some schools don't offer Agriculture in their curriculum and others introduced Agriculture in the within the last two years. The schools were selected using stratified, random and purposive sampling techniques. This was to ensure that all categories of schools: National (N),Extra County (EC), County (C) ,Sub County (SC) and different school types, Boys only (B), Girls only (G) and mixed (M) was represented in the sample. The only national school in the Sub County was purposively sampled. The numbers of students selected per sample school depended on the total population of Agriculture students in the school.

#### 3.5.2 Sample size

**Table 3. 2: Sample for the study**

Target population		Sample population	%
Number of secondary schools in Kimilili	25	22	88
Number of Agriculture teachers in Kimilili	90	30	33
Number of Agriculture students in Kimilili sub County	1500	400	27
Number of school principals in Kimilili	25	22	88

**Source:** Kimilili Sub County Education QASO Office (2021)

A total of 22 out of 25 public secondary schools that have had Agriculture as a subject for some time was sampled for this study. These comprised of one national school, three extra county schools, six county schools and twelve sub county schools, and these represented 88% of the total number of public secondary schools in the Sub County. A total of 400 out of 1500 students, representing 25% of Agriculture students in the sub county were sampled for this study. Thirty (30) out of 90, which represents 33% of the Agriculture teachers participated in the study. Twenty two school principals out of 25 participated in the study. This represented 88% of public secondary school principals in the Sub County.

### 3.6 Research instruments

The study employed three instruments to collect data in secondary schools in Kimilili sub-County. It adopted questionnaires, an observation checklist and an interview schedule to collect data.

The observation checklist was used by the researcher to collect data on the extent of integration of ICT in teaching of Agriculture. An observation checklist is used as a checklist to record what the researcher observed and to verify the information collected on the questionnaire and interview schedule (Mutethia, 2017).

The interview schedule was set to capture the challenges and perception of teachers, learners and principals in relation to integration of ICT in teaching of Agriculture.

Collection of data from the school principals was done using an interview guide. This is a convenient way of gathering data from the school principals who did not have adequate time to respond to a questionnaire. As indicated by Kless (2017), an interview plan is viewed as suitable when a sample is small since the researcher can get more data from the respondents.

Lesson observation tool provided information on the Integration of ICT in teaching of Agriculture. This is an important tool because it provides information about the actual behavior of those under observation.

### 3.7 Data Collection Procedure

The researcher sought an introductory letter from Kibabii University School of Graduate studies that allowed him to apply for a research permit from the National Commission for Science, Technology and Innovation (NACOSTI). After the permit was issued, the researcher obtained permission letters from the sub-county director of the Ministry of Education from Kimilili sub-County, which enabled him to visit the school within the sub-County.

Preliminary visits were made to each of the sample schools before carrying out the study. During the visits the researcher stroke a rapport with school authorities and verbally explained the purpose of the study .The researcher promised the respondents to uphold professionalism. The confidentiality and consent of the respondents was upheld.

The researcher collected class time tables which enabled him to prepare a schedule to guide the school visits in order to avoid interrupting lessons during the visits and actual observation. During the actual school visits the researcher sat at the back of the classroom and observed how teachers and learners were integrating ICT in learning Agriculture. The researcher took notes on the extent in which ICT resources were used in agriculture curriculum implementation and the challenges faced by teachers and learners during the lesson.

The researcher then proceeded to the Agriculture Departmental office where he requested for documents such as Agriculture schemes of work, lesson plans for agriculture and Merit list that showed the performance of agriculture subject for the last 5 years. The documents were checked to gather data on availability of ICT facilities, their working conditions and if teachers planned their lessons with these facilities in mind. The academic performance merit lists was checked and mean score of Agriculture subject recorded from when the school started integrating ICT in Agriculture curriculum implementation.

Questionnaires were administered to the Agriculture teachers and students. The items in the questionnaire gathered data on ; the extent in which ICT resources are used in Agriculture curriculum implementation, the perception of teachers and learners towards integrating ICT in Agriculture curriculum implementation and the challenges faced by teachers and learners when Integrating ICT in Agriculture curriculum Implementation. While the respondents were filling the questions, the researcher collected Data through document analysis. Once the respondents completed filling the questions the researcher collected all the questionnaires and checked whether all the sections have been filled correctly.

Collection of data from the school principals was done using an interview guide .Using this tool, the researcher collected data regarding management support given to Agriculture teachers in Integrating ICT in agriculture curriculum implementation. The researcher also collected data from the school principal on challenges faced in integrating ICT in agriculture curriculum implementation.

### **3.8 Pilot Study**

Piloting was conducted to determine the reliability and validity of the research instruments. This involved four public secondary schools in Kanduyi constituencies that were not part of study schools. The schools were purposively sampled and included two Boys' schools and two Girls' Secondary schools. Four Agriculture teachers, 40 Form Three students and three school principals participated in the study. Three Agriculture lessons were observed in Form Three. The piloted schools were not included in the main study. The school selected had been integrating ICT in agriculture curriculum implementation .The pilot study helped confirm whether the questions were well interpreted and understood by the teachers and learners and whether they elicited the required responses. From the pilot study, ambiguous items were changed. The research instruments were administered to four Agriculture teachers and two Principals in the two schools. The piloted schools were not included in the main study.

#### **3.8.1 Validity of the research instruments**

Samuel, F. (2020) defines Validity as a measure of the degree to which a research instrument measures what it is meant to measure. In determining the content validity of the instruments, care was taken to ensure that research instruments covered all the issues under investigation according Carmines, (2018). To ensure construct validity, the level of language and clarity of research instruments was checked. This was done through piloting of the instruments and thereafter consultations with the supervisors and ICT specialists.

#### **3.8.2 Reliability of the research instruments**

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials Bagozzi, (2018). He explains that reliability can be seen from two sides: reliability (the extent of accuracy) and unreliability (the extent of inaccuracy). It is a measure of the proportion of true score variability that is captured across the respondents relative to the total observed variability Kartis, (2015).

The best way to assess the reliability of a question is by comparing answers people give to the question on one occasion with the answers these same people give to it a short time later; test-retest reliability Alemu, 2015). The instruments were tested twice using the same respondents. A comparison between the responses obtained from the first and the second finding was correlated by employing Pearson's product-moment correlations.

Creswell, (2014) maintains that The Pearson correlation measures the strength of the linear relationship between two variables. It has a value between -1 to 1, with a value of -1 meaning a total negative linear correlation, 0 being no correlation, and + 1 meaning a total positive correlation.. It is arrived at by applying the following formula;

$$r = \frac{\sum xy - (\sum x)(\sum y)}{\sqrt{\left[\left(\sum x^2 - \frac{(\sum x)^2}{N}\right)\left(\sum y^2 - \frac{(\sum y)^2}{N}\right)\right]}}$$

*r* -the Pearson's coefficient of correlation index

*x* =value of x variable

*y* = value of y variable

*N* =Number of observations x and y subjects.

**Table 4. 1: Reliability Analysis**

Variables	the Pearson's coefficient of correlation index Results
Extent to which ICT resources used	0.920
The perception of agriculture teachers	0.801
The effect of Integration of ICT in Agriculture Curriculum Implementation on performance	0.923
The challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation	0.786

It was established that all the **four** study variables yielded the Pearson's coefficient of correlation index greater than 0.7 as recommended by Creswell (2014). Therefore, the entire research instrument was considered to be reliable for use in collection of data.

### 3.9 Data analysis

The data collected from the field was systematically organized for analysis. The researcher assembled the entire instrument for quantitative data for editing and coding. This was for identifying and correcting errors and inconsistent codes for accuracy of the data, Abudullahi, (2014). The data collected was categorized based on the study objectives. All the questionnaires were checked to ensure they have all been correctly filled.

To determine the extent to which ICT resources are used in Agriculture curriculum implementation, relevant items in questionnaires were analyzed. To establish the perception of teachers and students towards integration of ICT in agriculture curriculum implementation, respondents were required to give their views regarding certain statements on the questionnaire. To examine the challenges encountered in integration of ICT in Agriculture curriculum implementation, the observation check list was analyzed. Pearson Product Moment Correlation was used to find the relationships between extent to which ICT resources are used and perception towards ICT curriculum implementation.

Analysis of variance (ANOVA) test was used to investigate the effect of Integration of ICT on academic performance of Agriculture subject. The researcher used ICT integration as the independent variable and Academic performance in agriculture as the dependent variable.

The researcher collected both qualitative and quantitative data. The qualitative data collected was edited and cleaned up before coding. The edited, proof read and coded data was then analyzed. This study used qualitative and quantitative data analysis and synthesis techniques. Qualitative method was used to answer interpretive and explanatory questions of why, how and which why while quantitative methods was used to answer objective questions of when, where how many, at what time and to what extent. Qualitative data was evaluated, classified and categorized into appropriate themes based on the objectives and then coded.

## IV. FINDINGS, INTERPRETATION AND DISCUSSIONS

### 4.1 Introduction

The results of the study are presented, analyzed and discussed in this chapter as per the objectives of the study which includes: What is the relationship of perception on the extent to which ICT resources are used? What is the effect of ICT integration on performance of Agriculture? What are the challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation?

The chapter discusses the findings of the study under the following areas: Demographic information of the respondents, Extent to which ICT resources used by Agriculture teachers in the curriculum implementation process, The perception of agriculture teachers, learners and school administrators on Integration of ICT in Agriculture Curriculum Implementation .The effect of Integration of ICT in Agriculture Curriculum Implementation on performance of Agriculture and The challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation. Finally, a summary of the study findings is

provided.

**4.2 Demographic information of the respondents.**

The study considered the following demographic characteristics: Gender, Age, Level of Education and Teaching experience. The study sampled 30 (N=30) Agriculture teachers and the information from them were obtained through questionnaires and interview schedules.

**(a) Gender**

The results indicated that 27% and 73% of the Agriculture teachers in the sample schools were females and males respectively as shown in figure 4.1.

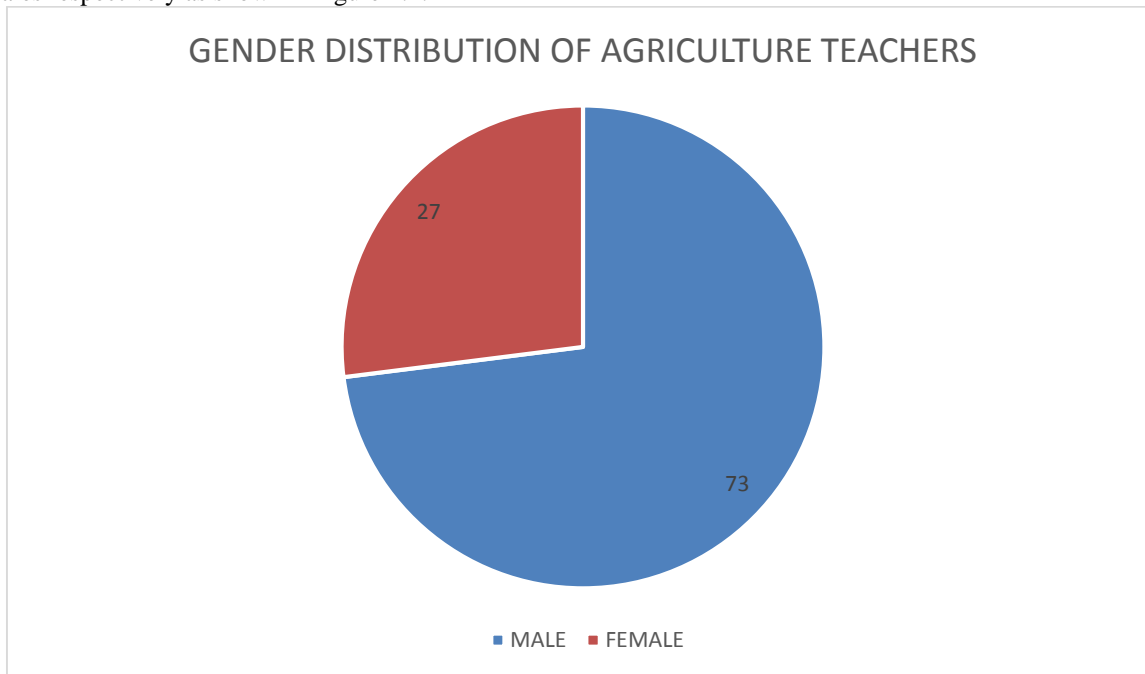


Figure 4. 1: Distribution of Agriculture teachers by gender

**(b) Level of Qualification**

Information on Agriculture teachers' level of Qualifications were obtained through the Questionnaire for teachers. Figure 4.2 shows the results.

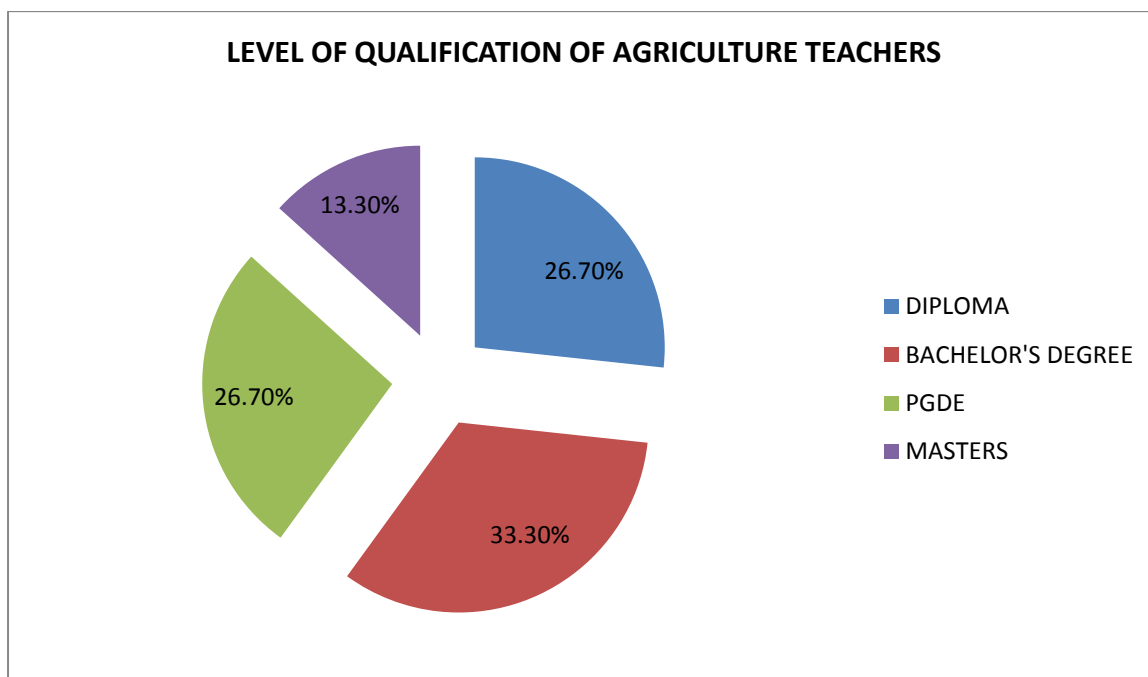


Figure 4. 2: Level of qualification of Agriculture Teachers

This study showed that all Agriculture teachers in the sample schools are professionally qualified with 33.3% and 13.3% having Bachelors and Masters Degrees respectively. This is an important aspect since according to Juliana, (2018) skilled labour is closely linked with successful integration of ICT in Agriculture Curriculum Implementation.

**(c) Teaching experience**

The experience of teachers in their teaching profession was considered in the study. The distribution were as presented in table 4.1

**Table 4. 1: Teaching Experience**

Experience	Frequency	Percent
Below 5yrs	5	16.7
5-9 yrs	11	36.7
10-14yrs	9	30
15yrs and above	5	16.6
<b>Total</b>	<b>30</b>	<b>100.0</b>

**Source:** Author.

Table 4.1 shows 16.7% of respondent teachers had below 5 years of experience, 36.7% of the teachers had between 5 and 9 years of teaching experience. Furthermore, 30 % of teachers had the experience of between 10 and 14 years, and 16.6% of the teachers had experience of 15 years and above.

**(d) Agriculture Teachers Trained on ICT integration in agriculture Curriculum Implementation.**

The main interest was training specifically in ICT integration in agriculture Curriculum Implementation. Such training is said to be effective if teachers are able to use ICT resources in teaching Agriculture in the classroom. Table 4.2 shows the percentage teachers trained on Integration of ICT in Agriculture Curriculum Implementation.

**Table 4. 2: Teachers Trained On Integration of ICT in Agriculture Curriculum Implementation.**

Trained	Frequency	%
No	10	33.0
yes	20	66.7
<b>Total</b>	<b>30</b>	<b>100.0</b>

Source Author.

**(e) Agriculture Students' Experience on Integration of ICT in Agriculture Curriculum Implementation**

The figure below shows how students have been using Integration of ICT in Agriculture Curriculum Implementation and teaching.

**Table 4.3: Students' Experience on integration of ICT in Agriculture Curriculum Implementation**

Experience	Frequency	%
none	25	6.3
Below one year	83	20.75
1-2 years	170	42.5
3 to 4 years	122	30.5
<b>Total</b>	<b>400</b>	<b>100.0</b>

**Source:** Author.

The study showed that 93.7% of the students have done Integration of ICT in Agriculture Curriculum Implementation. Only 6.3 % of the students had no Experience.

**(f) School principals trained on Integration of ICT in Agriculture Curriculum Implementation.**

The principals were required to state whether they have attended any formal training on Integration of ICT in Agriculture Curriculum Implementation. This is considered important because a principal who is trained could easily use knowledge and skills gained to guide other teachers on the same. The table below shows principals who had been trained expressed as a percentage.



**Table 4.4: School principals trained on Integration of ICT in Agriculture Curriculum Implementation**

TRAINED	FREQUENCY	PERCENTAGE
YES	10	67
NO	5	33

Source: Author.

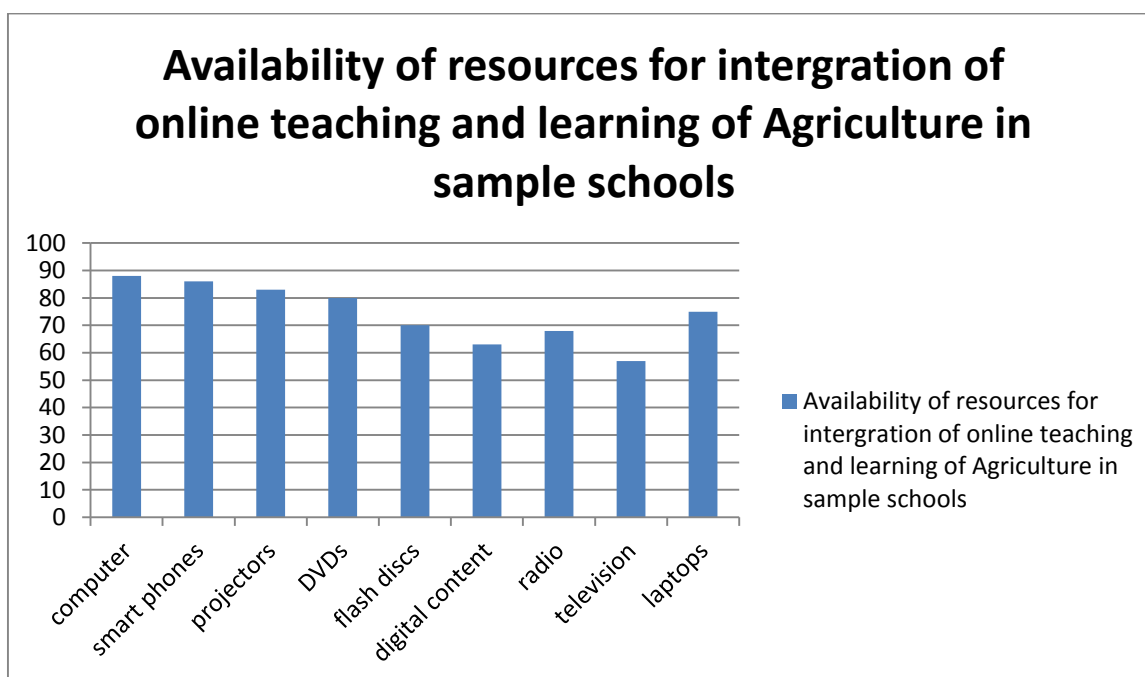
The findings showed that 67% have been trained on computer use. The others(33%) have learned how to Integration of ICT in Agriculture Curriculum Implementation on their own.

**4.3: The extent to which ICT resources are used by agriculture teachers in curriculum implementation.**

The first objective of the study sought to determine extent to which ICT resources are used by agriculture teachers in curriculum implementation. To achieve the objective, data were obtained from an interview of school principals, observation checklist and from the questionnaires of teachers.

**(a)Availability of resources for integration of ICT in Agriculture Curriculum Implementation in sample schools**

This study established the availability and working Condition of resources for integration of ICT in Agriculture Curriculum Implementation in sample schools through document analysis, interviews and questionnaires. The results obtained were recorded on the figure 4.3 below.



**Figure 4. 3: Availability of resources for integration of ICT in Agriculture Curriculum Implementation in sample schools**

From figure 4.3, All the sample schools (100%) had at least some computers Access to internet. In addition, all the schools had digital content in Agriculture that were sourced from different authors including KICD. An interview with school principals revealed that the ICT resources for integration of ICT in Agriculture Curriculum Implementation were inadequate.

**(b) Mean rating of extent to which ICT resources are used by agriculture teachers in curriculum implementation of Agriculture rated by teachers**

Agriculture Teachers (30) were expected to rate their extents to which ICT resources are used in Agriculture Curriculum implementation. Teachers had to answer strongly agree, agree, neutral, disagree and strongly Disagree. The various aspects of integration of ICT in Agriculture Curriculum Implementation were measured using five-point Likert scale where; 1= Strongly Disagree (SD), 2=Disagree (D), 3=Agree (A) and 4 =Strongly Agree (SA).

The descriptive results are presented in terms of percentages, mean scores and standard deviation According to Bilgimlas (2019), a high percentage of certain response indicates thatmajority of the respondents are in agreement to the response. On the other hand, in using a four point Likert scale, Ayres et al, (2016) asserts that a mean score of less than 2.00 indicates that on average the respondents tended to disagree whilea mean score of more than

2.50 indicates that on average the respondents tended to agree with the corresponding statement.

**Table 4.5: Mean rating of extent to which ICT resources are used by agriculture teachers in curriculum implementation rated by teachers**

Statement	Mean score Max=4	Std. Deviation
It is easy to access resources for Integration of ICT in Agriculture Curriculum Implementation.	2.68	1.02
Does 100% Transition policy by the government affect access to Integration of ICT in Agriculture Curriculum Implementation by teachers and students	3.25	0.562
The resources in this school are adequate for Integration of ICT in Agriculture Curriculum Implementation.	1.98	0.956
The ICT resources are accessible anytime they are needed for Integration of ICT in Agriculture Curriculum Implementation.	1.75	1.023
Internet in this school is accessible for Integration of ICT in Agriculture Curriculum Implementation.	2.67	1.033

In respect to the standard deviation, a standard deviation of more than 1.00 implies that the respondents were not in consensus in rating the corresponding metric and thus the large spread of the responses Clements & Sarama, (2016). A standard deviation of less than 1.00 implies that there is a small spread of responses among the respondents and thus consensus in rating the corresponding metric Clements & Sarama, (2016)

The easy to access resources for Integration of ICT in Agriculture Curriculum Implementation was rated highly with a mean of 2.68. This finding shows that most teachers have access to resources for Integration of ICT in Agriculture Curriculum Implementation.

**(c) Number of hours ICT resources are accessible to Agriculture teachers.**

This were considered important as it determines the experience being gained by the Agriculture teachers which in turn could affect the Integration of ICT in Agriculture Curriculum Implementation.

**Table 4. 2: Hours per week ICT resources are accessible to Agriculture teachers.**

Number of hours	Frequency	%
None	2	6.7
less than 1	3	10.0
1 to 2	6	20.0
3 to 4	6	20.0
more than 5	13	43.3
TOTAL	30	100

The study revealed that 43.3% of teachers had access to ICT resources for more than 5 hours per week. Thirty percent of them access to ICT resources for less than two hours per week. This time is sufficient for teachers to Integration of ICT in Agriculture Curriculum Implementation.

**4.4: Perceptions of agriculture teachers, learners and school administrators on Integration of ICT in Agriculture Curriculum Implementation.**

The first objective was to assess the perceptions of agriculture teachers, learners and school administrators towards Integration of ICT in Agriculture Curriculum Implementation. The perception of teachers, **learners** and school administrators on Integration of ICT in Agriculture Curriculum Implementation were measured in Likert scale, ranging from strongly agree, agree, neutral, disagree and strongly disagree. The respondents were expected to give their views regarding given positive statements as 5-strongly agree, 4-agree, 3-not sure, 2-disagree, 1-strongly disagree and a reverse for negative statements.

The sample size was 30 teachers, majority of Agriculture teachers strongly agree that Integration of ICT in Agriculture Curriculum Implementation and teaching enables students to understand Agriculture concepts better.

**Table 4. 3: Mean ratings for both positive and negative statements based on teachers’ responses**

	Statement	Positive(P) Or negative(N)	MEAN (MAX 5)	Std. Dev.
1	Integration of ICT in Agriculture Curriculum Implementation enables students to understand Agriculture concepts better	Positive	4.42	1.024
2.	Integration of ICT in Agriculture Curriculum Implementation learning more effective	Positive	4.43	1.036
3.	I think that Integration of ICT in Agriculture Curriculum Implementation makes to gather materials for lesson delivery	Positive	4.36	1.193
4.	Lesson planning for Integration of ICT in Agriculture Curriculum Implementation and teaching is time consuming	Negative	1.76	1.342
5.	Integration of ICT in Agriculture Curriculum Implementation may in the long run replace the teacher in the classroom	Negative	2.34	1.345
6.	Integration of ICT in Agriculture Curriculum Implementation and teaching may slow down syllabus coverage in Agriculture	Negative	2.42	1.223
7.	I think that Integration of ICT in Agriculture Curriculum Implementation increases the interest of students towards Agriculture	Positive	3.97	1.303
8.	The Integration of ICT in Agriculture Curriculum Implementation and teaching in curriculum implementation of Agriculture is time consuming	Negative	1.87	1.028
9.	I can do what the ICT resources can do equally as well	Negative	2.38	1.072

From Table 4.7, the mean ratings for all the positive statements were in the range  $3 < x \leq 5$  while those for the negative statements were in the range  $1 \leq x < 2$ . This implies that Agriculture teachers in the sample schools have positive perception.

This finding, on the other hand, is in confirmation with Eugene (2016) who explored the effect of teachers’ perception towards integration of ICT in Agriculture Curriculum Implementation in Agriculture. The study revealed that there was consistency between teachers’ perception and extent to which ICT resources are used in Agriculture Curriculum Implementation. The consistency between teachers’ perception and extent to which ICT resources are used in Agriculture Curriculum Implementation can be attributed to adequate supply of ICT resources and sufficient administrative support.

In order to determine teachers’ perception towards integration of ICT in Agriculture Curriculum Implementation, the scores were grouped into two categories: those with positive perception and those with negative perception and the effect tested using ANOVA. Analysis of variance (ANOVA) is an analysis tool used in statistics. Analysts use the ANOVA test to determine the influence that independent variables have on the dependent variable in a regression study (Alemu, 2015). Eta squared ( $\eta^2$ ) is a squared measure of association defined as the ratio of variance in an outcome variable explained by a predictor variable, after controlling for other predictors, Bingimlas, (2019). The researcher used teachers’ perception as the independent variable and extent to which ICT resources are used in Agriculture Curriculum Implementation as dependent variable. The results are presented in Table below

**Table 4. 4: ANOVA test on the relationship of Teachers perception on the extent in which ICT resources are used in Agriculture Curriculum Implementation.**

source	Sum of squares	df	Mean square	f	p	$\eta^2$
Teachers’ perception	3010.200	1	3010.200	4.676	0.001	0.26

Calculation. The formula is:  $\eta^2 = SS_{\text{effect}} / SS_{\text{total}}$ ,

Where:  $SS_{\text{effect}}$  is the sums of squares for the effect you are studying

The Eta squared value was calculated to determine the percentage effect of perception towards the extent in which ICT resources are used in Agriculture Curriculum Implementation. This was found to be 0.26 implying that 26% of the integration of ICT in Agriculture Curriculum Implementation could be predicted by teachers’ perception. In other words, a positive change of perception of the teachers towards integration of ICT in Agriculture Curriculum Implementation by 100% would increase the extent to which ICT resources are used in Agriculture Curriculum Implementation by 26%.

**4.5 Effect of Integration of ICT in Agriculture Curriculum Implementation on the performance of learners in Agriculture.**

This was the second objective. The effect of Integration of ICT in Agriculture Curriculum Implementation on the performance of learners in Agriculture examinations were of great significance to the study.

**(a) Response of school administrators**

The information were gathered from the school administrators using interview schedules and also from the Agriculture teachers using questionnaires and interview schedules .The respondents had to state how Integration of ICT in Agriculture Curriculum Implementation affects students’ performance in Agriculture examinations. Table 4.9 represents the results obtained from the responses of the school administrators

**Table 4.5:Effect of Integration of ICT in Agriculture Curriculum Implementation on the performance of learners in Agriculture as responded by school administrators.**

statement	Frequency N=15	percentage
Enhances students' understanding of concepts in Agriculture	12	80
Promotes students' interest and participation in Agriculture	14	93
Improve students' performance in Agriculture	12	80

The study showed that all the school administrators were convinced that Integration of ICT in Agriculture Curriculum Implementation definitely enhances the students understanding of concepts taught in Agriculture.

**(b) Relationship between Number of Lessons per week when Integration of ICT in Agriculture Curriculum Implementation is done and Students’ performance in Agriculture**

The Agriculture teachers were required to state the number of lessons per week in which they were integrating Integration of ICT in Agriculture Curriculum Implementation performance in Agriculture from the year 2019 to 2023. The data were used to determine the influence of Integration of ICT in Agriculture Curriculum Implementation on students’ performance in Agriculture. The teachers’ responses on frequency of integration of ICT in Agriculture Curriculum Implementation and performance in Agriculture are as in table 4.10

**Table 4.6: Number of Lessons per week when Integration of ICT in Agriculture Curriculum Implementation is done and Students’ performance in Agriculture**

Number of lessons per Week when Integration of ICT in Agriculture Curriculum Implementation is done	Agriculture teachers’ Count N=30	Average percentage (%) KCSE mean score in Agriculture from the year 2019 to the year 2023					Students’ performance [Average (%) mean]
		2019	2020	2021	2022	2023	
5	5	44.4	56.8	54.6	52.8	53.6	52.4
4	5	40.8	42.5	40.4	39.3	41.2	40.8
3	2	35.9	38.1	36.5	35.8	36.8	36.6
2	7	30.9	32.3	30.6	30.8	31.3	31.2
1	5	29.8	30.1	29.2	28.9	29.4	29.5
0	6	22.9	24.7	22.6	22.5	22.8	23.1

From the study findings, it’s now clear that teachers who have done Integration of ICT in Agriculture Curriculum Implementation recorded better performance than those who didn’t regularly use or never used ICT resources in any of the Agriculture lessons.

The teachers who have done Integration of ICT in Agriculture Curriculum Implementation in all the 5 lessons recorded an average mean score of 52.4% while those who didn’t integrate at all had an average mean score of 23.1%. Therefore the more the number of Agriculture lessons where Integration of ICT in Agriculture Curriculum Implementation was done the better the performance of the students in Agriculture examination.

A t test is a statistical test that is used to compare the means of two groups. t is simply the calculated difference represented in units of standard error. The greater the magnitude of T, the greater the evidence against the null hypothesis, Mugambi, (2015). The critical value chosen is  $\alpha = 0.05$ . This 0.05 means that, if we run the experiment 100 times, 5% of the times we will be able to reject the null hypothesis and 95% we will not. A large t-score, or t-value, indicates that the groups are different while a small t-score indicates that the groups are similar. Degrees of freedom refer to the values in a study that has the freedom to vary and are essential for assessing the importance and the validity of the null hypothesis, Samuel, (2021).The table 4.11 shows the t test for mean score

for schools.

Table 4. 7: t-test for Mean Scores for Schools KCSE performance in Agriculture subject.

YEAR OF KCSE EXAMINATION	Students' performance [Average mean points] For school that were integrating ICT in Agriculture Curriculum Implementation	Students' performance [Average mean points] for school that was NOT integrating ICT in Agriculture Curriculum Implementation of agriculture	DIFFERENCE
2019	6.5	8.5	-2
2020	5.5	7.5	-2
2021	6.7	6.7	0
2022	7.5	5.5	2
2023	8.35	7.3	1.05
Mean of differences			-0.95
Std. dev of differences			1.317

$x_{diff}$ : sample mean of the differences = -0.95

s: sample standard deviation of the differences = 1.317

n: sample size (i.e. number of pairs) = 10

Null hypothesis. There is no statistical difference between performance in agriculture and Integration of ICT in Agriculture Curriculum Implementation.

$$t = x_{diff} / (s_{diff}/\sqrt{n}) = -0.95 / (1.317/\sqrt{10}) = -3.226$$

According to the T Score to P Value Calculator, the p-value associated with  $t = -3.226$  and degrees of freedom =  $n-1 = 10-1 = 9$  is 0.00445.

Since this p-value is less than our significance level  $\alpha = 0.05$ , we reject the null hypothesis. We have sufficient evidence to say that there was a significant difference in students' performance between those schools which Integrates ICT in Agriculture Curriculum Implementation and those that do not Integrate ICT in Agriculture Curriculum Implementation.

The schools which Integrates Integration of ICT in Agriculture Curriculum Implementation recorded higher mean score compared to those that did not. This further proves that Integration of ICT in Agriculture Curriculum Implementation influence the performance of the students in agriculture subject.

#### **4.6: Challenges facing teachers and learners during Integration of ICT in Agriculture Curriculum Implementation.**

The third objective sought to examine challenges of ICT Integration in Agriculture curriculum implementation.

##### **(a) Challenges faced by teachers during Integration of ICT in Agriculture Curriculum Implementation.**

Table 4.12 shows the challenges experienced by teachers of Agriculture in integrating of ICT in Agriculture Curriculum Implementation. Majority (93 %) of teachers reported that an inadequate ICT resource was the biggest challenge affecting effective delivery.

Table 4. 8: Challenges of ICT Integration in Agriculture curriculum Implementation as Responded by Teachers.

Challenges	F (n=30)	Percent	Mean (max 5)	Std dev.
Inadequate Online resources	28	93	4.56	0.563
Shortage of power supply	26	87	4.42	0.872
Lack of Online integration skill	20	67	3.89	0.953
Large class size	18	60	3.75	0.978
An support by the school administration	17	57	3.42	0.981
Personal computer to prepare at home	15	50	3.38	1.003
Huge Workload	13	43	2.53	1.021
Shortage of time	12	40	2.21	1.046
Lack of technical support	10	33	1.87	1.053

**Descriptive findings for challenges influencing Integration of ICT in Agriculture Curriculum Implementation.**

A higher mean was achieved on inadequate ICT resources implies that on average the teachers of Agriculture tended to agree that there was inadequate ICT resources for Integration of ICT in Agriculture Curriculum Implementation. These findings agree with Drent, (2017) who identified inadequate resources for integration of ICT in Agriculture Curriculum Implementation. Regarding lack of technical support, respondents' views varied significantly (std dev. = 1.053) while in respect to shortage of power supply, the views of the teachers varied insignificantly (std dev. = 0.872).

**(b) Challenges Faced by Students in the Integration of ICT in Agriculture Curriculum implementation**

When students were asked to answer the challenges they experienced in Integration of ICT in Agriculture Curriculum Implementation, they gave many challenges. The main challenges are illustrated table 4.13.

**Table 4. 9: Challenges of ICT integration in Agriculture curriculum implementation as Responded by Students**

Challenges	F (n=400)	Percent
Lack of ICT resources (computer, internet )	311	78
Shortage of regular power supply	251	63
Poor online integration skills	173	43
Motivation by school administration and teachers	67	17
Accessing personal tablet, Smartphone in school	66	16

Source: Author

As presented in Table 4.13, majority (78%) of the students indicated a lack of ICT resources as a challenge in using ICT for learning.

**(c)Support by Government and other stakeholders.**

Information on support given by Government and other stakeholders were obtained through interviews. A total of 15 school principals were interviewed and the results are shown in Table 4.14.

**Table 4. 10: Government Support on ICT Integration in Agriculture curriculum implementation**

Statement	No. of schoolprincipals	%
Implementation of school policy on ICT integration	14	93
Employment of a Agriculture teacher	12	80
Acquisition of ICT resources	9	60
Facilitation of training of teachers on ICT integration	8	53

The study results indicated that 93% of the schools have some form of policy to support integration of ICT in Agriculture Curriculum Implementation.

**4.7: Summary**

This chapter focused on interpretation and discussions of all findings of the study on Integration of ICT in Agriculture Curriculum Implementation.

First, the study sought to find out the Extent that ICT resources are available for use in teaching Agriculture. Computers, projectors and laptops were the most commonly used ICT resources while some schools used mobile phones, TV screens, radio and the Digital content for Integration of ICT in Agriculture Curriculum Implementation. But it was also noted that someschools did not have any ICT resources for Integration of ICT in Agriculture Curriculum Implementation.

The study sought to assess the relationship of perception of teachers, learners and school on the extent to which ICT resources are used in Agriculture Curriculum Implementation. The study established that most of the teachers have a positive attitude towards integration of ICT in Agriculture Curriculum Implementation. This affects extend to which ICT resources are used in Agriculture Curriculum Implementation since such teachers with a positive attitude are willing to use ICT resources.

The study sought to examine the challenges faced by teachers in integration of ICT in Agriculture Curriculum Implementation. The key challenges faced include insufficient ICT resources due to a large number of students, followed by poor electricity supply and frequent blackouts to the school or no electricity at all, lack of skill or knowledge in ICT integration, financial constraints in acquisition of ICT resources and insufficient time for integration of ICT in Agriculture Curriculum Implementation.

Lastly, the study sought to analyze the effect of integration of ICT in Agriculture Curriculum Implementation on students' performance. The study established that when Integration of ICT in Agriculture Curriculum Implementation is done, performance in Agriculture is likely to improve and students are likely to post better results. The study concludes that integration of ICT in Agriculture Curriculum Implementation results to good performance in Agriculture examinations.

## **V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Overview of the chapter**

This chapter presents the summary of the study findings, conclusion, recommendations and suggestions for further study. The summary is organized around: Extent to which ICT resources used by Agriculture teachers in the curriculum implementation process, The perception of agriculture teachers, learners and school administrators on Integration of ICT in Agriculture Curriculum Implementation, The effect of Integration of ICT in Agriculture Curriculum Implementation on performance of Agriculture and The challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation. The final section is on the conclusion on the study findings and recommendations for further research based on the findings of the research study.

### **5.2 Summary of findings**

The research study sought to analyse integration of ICT in Agriculture Curriculum Implementation in secondary schools in Kimilili sub county Bungoma. The respondents of the study were Agriculture students, Agriculture teachers and School administrators. Questionnaires were given to the students and teachers, interview schedules were done to school administrators and observation checklists were used in data collection. The summary presented here is based on the findings of the study and it is organized as per the study objectives.

#### **Extent to which ICT resources used by Agriculture teachers in the curriculum implementation process.**

The results of this study revealed that teachers were using a wide range of ICT resources in Agriculture Curriculum Implementation. The teachers were professionally qualified, experienced, and competent in integration of ICT in Agriculture Curriculum Implementation. Teachers and students had a positive perception towards integration of ICT in Agriculture Curriculum Implementation. However, integration of ICT in Agriculture Curriculum Implementation was found to be moderate within the sample schools in Kimilili Sub County Bungoma. ICT tools especially computers, mobile phones, radios and laptops were mainly used for integration of ICT in Agriculture Curriculum Implementation.

The findings revealed that there were some ICT resources used by teachers in Agriculture Curriculum. The study noted that the main ICT resources used in curriculum implementation of Agriculture are computers, laptops and projectors, while in some schools they have access to the use of mobile phones, TV screens, radios and Digital content. The study also noted that some schools did not have any resources for integration of ICT in Agriculture Curriculum Implementation.

#### **The relationship of perception of agriculture teachers, learners and school administrators on the extent to which ICT resources are used in Agriculture Curriculum Implementation**

The first objective of the study sought to evaluate the perception of agriculture teachers, learners and school administrators on extent in which agriculture resources are used. The perception of agriculture teachers, learners and school administrators on Integration of ICT in Agriculture Curriculum Implementation was found to be positive. Agriculture teachers and students agreed that indeed Integration of ICT in Agriculture Curriculum Implementation not only makes learning more enjoyable but also enhances understanding of concepts that are abstract. From the study it were deduced that, many teachers had a positive perception towards integration of ICT in Agriculture Curriculum Implementation.

The study revealed that Agriculture students have a positive perception towards integration of ICT in Agriculture Curriculum Implementation. The positive perception towards integration of ICT in Agriculture Curriculum Implementation is expected to increase the extent to which ICT resources are used.

#### **The effect of Integration of ICT in Agriculture Curriculum Implementation on performance of Agriculture**

The second objective of the study examined the influence of Integration of ICT in Agriculture Curriculum Implementation on performance of Agriculture. The study noted that majority of the teachers have done Integration of ICT in Agriculture Curriculum Implementation on daily basis. Others had done Integration of ICT in Agriculture Curriculum Implementation in two Agriculture lessons per week while only very few used ICT resources in three to five lessons in a week. This resulted in better academic performance in Agriculture subject. In addition to this the students overwhelmingly supported the integration of Integration of ICT in Agriculture Curriculum Implementation since majority indicated that integration of ICT in Agriculture Curriculum Implementation makes them achieve good grades in Agriculture. Almost all the students concurred that integration

of ICT in Agriculture Curriculum Implementation makes learning interesting and that they easily understand Agriculture concepts.

### **The challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation**

The third objective of the study sought examine the challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation. The research study identified various challenges faced in the integration of ICT in Agriculture Curriculum Implementation. The key challenges include lack of or insufficient ICT resources due to 100% transition policy leading to a high student and low resource ratio, poor power supply, lack of skill or knowledge on the the integration of ICT in Agriculture Curriculum Implementation, Lack of enough funds in acquisition ICT resources and inadequate ICT resources compared to the number of students.

The study showed that management and technical support to teachers and students in their effort to integrate ICT in Agriculture Curriculum Implementation was minimal. This support is mainly through acquisition of resources, formulation of rules and regulations, and employment of trained Agriculture Teachers.

### **5.3 Conclusion**

The study sought to evaluate the relationship of perception of agriculture teachers, learners and school administrators on the extent to which ICT resources are used in Agriculture Curriculum Implementation, to investigate the effect of Integration of ICT in Agriculture Curriculum Implementation on performance of Agriculture and to examine the challenges faced by teachers and learners during Integration of ICT in Agriculture Curriculum Implementation, in Kimilili Sub County Bungoma.

The study revealed that the perception of agriculture teachers and learners affect the extent to which ICT resources are used. Teachers and learners who have a positive perception will be willing to use ICT resources in Agriculture Curriculum Implementation making learning meaningful.

Based on the findings of the research study it were concluded that integration of ICT in Agriculture Curriculum Implementation is not done as expected mainly due to the unavailability of the ICT resources and negative perception. This therefore affects integration of ICT in Agriculture Curriculum Implementation in the secondary schools and hence affecting the performance of students in Agriculture. Schools where integration of ICT in Agriculture Curriculum Implementation is done for at least two Agriculture lessons per week recorded a better performance in Agriculture examinations than those where integration of ICT in Agriculture Curriculum Implementation is done in only one Agriculture lesson a week or none at all.

There is also need for provision of adequate and variety of resources for integration of ICT in Agriculture Curriculum Implementation to meet all the learner's needs. Effective integration of ICT in Agriculture Curriculum Implementation occurs when there are adequate resources. The study concludes that integration of ICT in Agriculture Curriculum Implementation results to good performance in Agriculture examinations.

### **5.4 Recommendations**

The following recommendations were made based on the findings of the study;

School administrators should ensure that there is a variety of resources for integration of ICT in Agriculture Curriculum Implementation.

Teachers should Integrate ICT in Agriculture Curriculum Implementation for effective conceptual understanding in Agriculture and to improve learner's academic performance.

There is need for regular workshops and seminars for Agriculture teachers or even in-servicing of teachers on effective integration of ICT in Agriculture Curriculum Implementation.

There is need to come up with ways of improving teachers' perception towards integration of ICT in Agriculture Curriculum Implementation.

The pre-service training and INSET of teachers should include a component on how to Integrate ICT in Agriculture Curriculum Implementation.

School principals should be sensitized on the importance of having well documented policies on integration of ICT in Agriculture Curriculum Implementation which should be included into the MoEST policy in education.

Education stakeholders should identify how the curriculum can be restructured to adequately cater for an effective integration of ICT in Agriculture Curriculum Implementation.

Teachers should find out how best learners can be effectively involved in integration of ICT in Agriculture Curriculum Implementation.

Teachers should consider the need for regular assessments to find out the effectiveness of integration of ICT in Agriculture Curriculum Implementation on academic performance of Agriculture subject.

### **5.5 Suggestions for further research**

The following suggestions are deemed pertinent to the study:

Research could be carried out to determine how various resources are used for integration of ICT in Agriculture



Curriculum Implementation. This study focused more on the Extent to which ICT resources are used by Agriculture teachers in the curriculum implementation process. A similar study could also be carried out in other regions of the republic of Kenya to determine integration of ICT in Agriculture Curriculum Implementation. This will serve to strengthen the findings of this study.

A study could be carried out to investigate integration of ICT in Curriculum Implementation in other subjects.

## REFERENCES

- [1]. Abdullahi, H. (2014). The role of ICT in teaching science education in schools. *International Letters of Social and Humanities Sciences*, 19, 217–223.
- [2]. Adegbenro, J. (2017). In-Service Secondary School Teachers' Technology Integration Needs in an ICT- Enhanced Classroom. *Turkish Online Journal of Educational Technology-TOJET*, 16(3), 79–87.
- [3]. Ayres, E. (2016). Teachers' ICT Skills and ICT Integration in the Classroom: The Case of Vocational and Technical Teachers in Malaysia. *Creative Education*, 03(08), 70–76. <https://doi.org/10.4236/ce.2012.38B016>
- [4]. Alemu, B. (2015). Integrating ICT into Teaching-Learning Practices: Promise, Challenges and Future Directions of Higher Educational Institutes. *Universal Journal of Educational Research*, 3(3), 170–189.
- [5]. Bingimlas, D. (2019). The Developments of ICT and the Need for Blended Learning in Saudi Arabia. *Journal of Education and Practice*, 8(9), 79– 87.
- [6]. Buabeng, F. (2018). Doing away with books in the classroom.
- [7]. Clark, M. J. (2011). *Essentials of business research methods* (2<sup>nd</sup> Ed.). New York: M. E. Sharpe, Inc.
- [8]. David, G. (2010). *The psychology of attitudes and attitude change*. Thousand Oaks, California: Sage Publications Inc.
- [9]. Drent, T. (2017). Obstacles to integration of ICT in Education: Results from worldwide Educational Assessment. *Computers and Education*, 163-174
- [10]. Eugene, K. (2012). *An introduction to social psychology* (5<sup>th</sup> Ed.). West Sussex: John Wiley & Sons, Ltd.
- [11]. Everhart, T. (2019). Examining High School Teachers' Attitudes towards ICT Use in Education. *International Journal of Progressive Education*, 14(2), 93– 105
- [12]. Yusuf F. and I. Juliana, (2018). *Research design in counseling* (3<sup>rd</sup> Ed.). Belmont, California: Cengage Learning.
- [13]. Godwin, F. (2017). *Research methods for behavioural sciences*. Wadsworth: Cengage Learning.
- [14]. Gomez, O. (2014). Assessment of Information and Communication Technology Integration in Teaching and Learning in Institutions of Higher Learning. *International Education Studies*, 7(2), 25–36.
- [15]. Government of Kenya (2020). National ICT Policy [Draft], Ministry of Information & Communications, Nairobi: <http://www.information.go.ke/policy/policy.doc> accessed 15 September, 2023
- [16]. Ghavifekr, S. (2015). Teaching and Learning with Technology: Effectiveness of ICT Integration in Schools. *International Journal of Research in Education and Science*, 1(2), 175–191.
- [17]. Hong, J. (2016). Social studies teachers' views of ICT integration. *Review of International Geographical Education Online (RIGEO)*, 6(1), 32.
- [18]. Hismanoglu, M. (2017). The relationship between perceived preparedness for computer use and other psychological constructs among kindergarten teachers with and without computer experience in Greece. *Journal of Information Technology Impact*, 10(2), 99-110.
- [19]. Jones, K. (2019). Integration of information communication technology resources in distance learning: A case of national open university, Bauchi center, Nigeria. <http://ir-library.ku.ac.ke/handle/123456789/11348>
- [20]. Jegede, G. (2018). Promoting classroom technology use. *The Quarterly Review of Distance Education*, 6(2), 145–153.
- [21]. Makanda, J. (2020). Use of ICT in teaching physics: A case of secondary schools in Kimilili District, Bungoma County, Kenya [Thesis]. <http://ir-library.ku.ac.ke/handle/123456789/13431>.
- [22]. Mundy, N. (2017). The Challenges Facing the Integration of ICT in Teaching and Learning Activities in South African Rural Secondary Schools. *Mediterranean Journal of Social Sciences*. <https://doi.org/10.5901/mjss.2014.v5n20p1087>
- [23]. Samuel, F. (2015). Assessment Of The Availability And Utilization Of Icts For Teaching And Learning In Secondary Schools-Case Of A High School In Kwekwe, Zimbabwe. *International Journal of Scientific & Technology Research*, 4(8), 282– 288.
- [24]. Maithya, R. (2016). Influence of Teacher Competency on Integration of ICT in Teaching and Learning in Public Secondary Schools in Machakos. *Journal of Education and E-Learning Research*, 3(4), 143–14
- [25]. Mayora, Y. (2019). Teachers' Use of Information and Communications Technology in Education: Cameroon Secondary Schools Perspectives. *TOJET: The Turkish Online Journal of Educational Technology*, 16(3).
- [26]. Msila, V. (2022). Teacher Readiness and Information and Communications Technology (ICT) Use in Classrooms: A South African Case Study. *Creative Education*, <https://doi.org/10.4236/ce.2022.618202>.
- [27]. Mugambi, K. (2015). Factors hindering implementation of ICT syllabus in secondary schools in Imenti Sub-County, Kenya [Thesis]. <http://ir-library.ku.ac.ke/handle/123456789/1347>
- [28]. Mugenda, O. (2003). *Research Method: Quantitative and Qualitative approaches*. African center for Technology studies (ACTS) press Nairobi Kenya.
- [29]. Muthemia, M. (2017). Assistive Technology and Access to Quality Instruction for Blind and Visually Impaired Students: A Comparative Study of Kenyatta University, Kenya and Syracuse University, USA [Thesis]. <http://ir-library.ku.ac.ke/handle/123456789/9009>
- [30]. Newhouse, N. (2018). Obstacles to integration of ICT in Education: Results from worldwide Educational Assessment. *Computers and Education*, 163-178.
- [31]. Ndethiu, D. (2015). *ICT for Managing Student learning*: Kluwer Academic Publishers, 101 Philip Drive, Assinippi Park, Norwell, Massachusetts 02061.
- [32]. Omariba, N. (2020). Opportunities and challenges for use and integration of information communication technology in management of public secondary schools in Bungoma South District, Kenya. *International Journal of Science and Research*, 2(8)
- [33]. Odisho, D. (2014). Making the Invisible Visible and Back Again: Highlighting technology in an integrated curriculum for pre-service teachers. *Journal of Computing in Teacher Education*, 19, 73-81
- [34]. Onchwari, C. (2016). *Multimedia Interactive Physics Magic*: National Institute For science and Mathematics Education Development-University of the Philippines, Diliman, Quezon.
- [35]. Orodho, J. (2023). *Essentials of Educational and social science research methods*. Masola Publishers. Nairobi
- [36]. Pino, N. (2017). *Teaching and Learning for the Future*. Report of the Committee on MultiMedia in Teacher Training (COMMITT). The Hague, The Netherlands: SDU.

- [37]. Ratemo, T. (2019). An Evaluation of the Implementation of Safety Policy in Girls' Boarding Secondary Schools in Bungoma East District, Kenya. Unpublished M.ED Thesis, Maseno University, Kenya
- [38]. Rogers E. (2021). Diffusion of Innovations 6<sup>th</sup> edition. NY Press, New York.
- [39]. Sadegul, D. (2016). Factors affecting teachers' use of Information and Communication Technology. International Journal of Instruction, January. Vol. 2, No.1, 80-101.
- [40]. Sicilia, C. (2015). The Challenges and Benefits to Teachers' Practices in Constructivist Learning Environments Supported by Technology. Unpublished Master's Thesis, McGill University, Montreal.
- [41]. Samah, E. (2022). Teaching science: Stylus Publishing Inc., Quicksilver Drive Sterling, USA.
- [42]. Samuel, F. (2009). The challenges of using information communication technology (ICT) in school administration in Kenya. Unpublished Doctor of Philosophy Thesis. Moi University. Eldoret, Kenya.
- [43]. Sarwar ,A. (2014). ONLINE EDUCA BERLIN; a paper presented at a conference, Berlin, Germany. Published, Nairobi.
- [44]. Syrjala,K. (2014). The place of computer games in education-potential and possible repercussions: UNESCO, Education Newsletter, and 18th June 2012. Retrieved on 7<sup>th</sup> July 2012 from <http://www.2.unescobkk.org/education/ict>.
- [45]. Telecommunications Union (2019). Foundations of mixed methods research: Integrating quantitative and qualitative approaches in social and behavioral sciences. New York: Sage Publications, Inc.
- [46]. Torruam, M. (2018). Availability and Use of ICT in South-Western Nigeria Colleges of Education. International Multidisciplinary Journal, 5(5), 315-331. Retrieved
- [47]. Unkovich, H. (2014). Tools for science education. Association for the Education of Teachers in Science 1989 Yearbook, J. Ellis (Ed.) SMERIC: Columbus, OH.
- [48]. UNESCO. (2016). Transforming education: The power of ICT policies. France: UNESCO.
- [49]. UNESCO, (2017). Uses of T.V and radio in education: ICT in education Newsletter, June 12<sup>th</sup> 2007. Retrieved on June 18<sup>th</sup> 2012.
- [50]. Van Braak,B. (2019). Explaining different types of computer use among primary school teachers. European Journal of Psychology of Education, 19, 407-422.
- [51]. Vian, Z. (2015). Influence of the use of information and communication technology on teaching and learning of mathematics in secondary schools; a case of Nairobi province, Kenya. Unpublished, Master's research thesis, University of Nairobi,
- [52]. Volman, M. (2015). Significant Factors in Professional Staff Development for the Implementation of ICT Education in Secondary Schools: A Case of Schools in Bungoma District, Kenya. International Journal of Curriculum and Instruction Vol. 1(1), pp. 30 – 42.
- [53]. Watkins , W.(2019). Teaching and learning with information communication technologies (ICT) for numeracy in early childhood and primary years of schooling. Australia: Department of Education, Training and Youth Affairs.
- [54]. Yusuf, Y.(2018). Information and Communication Technology Sector paper: downloaded on 20<sup>th</sup> October 2011 from [http://info.worldbank.org/ict/ICT\\_ssp.html](http://info.worldbank.org/ict/ICT_ssp.html)
- [55]. Yassanne, S. (2014). Images of school principals' information and communication technology leadership. Technology, Pedagogy and Education, 9(3), 287- 302.

## APPENDICES

### APPENDIX 1: QUESTIONNAIRE FOR AGRICULTURE TEACHERS

#### SECTION A: DEMOGRAPHIC DETAILS

**Instructions.** Tick appropriately

**1. Gender** Male ( ) Female ( )

**2. Level of qualification**

Post graduate degree ( )

PGDE ( )

Bachelor's degree( )

Diploma ( )

**3. Teaching experience**

15 years and above ( )

5-9years ( )

10-14years ( )

Below 5years ( )

#### SECTION B: EXTENT TO WHICH ICT RESOURCES ARE USED IN AGRICULTURE CURRICULUM IMPLEMENTATION IN SECONDARY SCHOOLS IN KIMILILI SUB COUNTY, BUNGOMA.

1. The following are some of their resources necessary for proper use of ICT integration. Please indicate whether they are available in your school.

RESOURCE	NUMBER AVAILABLE	NUMBER IN GOOD WORKING CONDITION
Computer		
Smart phones		
LCD projector		
DVDs/VCDs		

Flash discs		
CD ROMS		
Internet access		

Any other (Specify.....)

3. How many students are taking Agriculture? \_\_\_\_\_ ?  
 4a) Are the computers adequate to meet the needs of all the teachers and students? Yes. ( ) No ( )  
 If no, how many more computers are needed? \_\_\_\_\_

**SECTION C: ACCESSIBILITY TO ICT RESOURCES FOR USE BY TEACHERS AND STUDENTS.**

Please indicate the extent to which you agree or disagree with the following statements.

**SA-Strongly Agree      A-Agree**  
**DA-Don't Agree SD-Strongly Disagree**

Statement	SA	A	D	SD
It is easy to access a ICT resources in this school				
Does 100% Transition policy by the government affect access to ICT resources by teachers and students				
ICT resources in this school are adequate for my teaching and learning				
The ICT resources are accessible any time they are needed for teaching and learning.				
Internet in this school is accessible				

How often do you ask your students to access academic information through use of DVDs, projectors, VCDs .CDs, flash discs or ICT resources?

Never ( )      Sometimes ( )      Rarely ( )      Often ( )

	Daily	Weekly	Monthly	Never
How often do you use a computer within the school To access academic information?				
How often do you access the internet within the School?				

**SECTION D: KNOWLEDGE AND SKILLS ON INTERGRATION OF ICT IN AGRICULTURE CURRICULUM IMPLEMENTATION BY TEACHERS.**

1. How would you rate yourself in terms of ability to us computers? Poor ( )  
 Average ( ) Good ( ) Excellent ( )

b) Give reasons for your answer

.....  
 .....

2a) Have you been trained on how to use ICT resources?      Yes ( )      No ( ) (b) What level of training did you receive?

- Computer packages ( )  
 Certificate level ( )  
 Diploma level ( )  
 Degree ( )

Others (Specify).....

3. What do you do when you experience a problem using ICT resources? (Tick as appropriate) Solve it myself  
( )

Ask a colleague ( ) Ask a computer technician ( ) Consult on line help forums ( )

4a) Do you experience any challenges as you interact with the ICT resources? Yes ( ) No ( )

(b) If yes, briefly explain the nature of the challenge

.....  
 .....  
 .....

(c) If No, briefly explain why

.....  
 .....

(d) Does the school Entry behavior policy affect how students interact with ICT resources? Yes ( ) No ( )

e) If yes, explain the nature of the challenge.....

.....  
 .....  
 .....  
 .....

f) If No, briefly explain why.....

.....

**Section E: Teachers perception on Integration of ICT in agriculture curriculum implementation**

Please consider each of the following statements and indicate the response that reflects your opinion by ticking (√) in the appropriate column.

**Key: 5-strongly agree, 4-Agree, 3- Not sure, 2-disagree, 1-strongly disagree**

	Statement	5	4	3	2	1
1	Integration of ICT in agriculture curriculum implementation enables students to understand Agriculture concepts better					
2.	Integration of ICT in agriculture curriculum implementation makes me more effective as a teacher					
3.	I think that Integration of ICT in agriculture curriculum implementation makes it easier to source for lesson delivery					
4.	Lesson planning for Integration of ICT in agriculture curriculum implementation is time consuming					
5.	Integration of ICT in agriculture curriculum implementation may in the long run replace the teacher in the classroom					
6.	Integration of ICT in agriculture curriculum implementation may slow down syllabus coverage in Agriculture					

7.	I think that Integration of ICT in agriculture curriculum implementation increases the interest of students towards Agriculture				
8.	The Integration of ICT in agriculture curriculum implementation in teaching and learning of Agriculture is time consuming				
9.	I can do what the ICT tools can do equally as well				

**Thank you for sparing your valuable time to respond to this questionnaire**

**APPENDIX 2: QUESTIONNAIRE FOR STUDENTS  
PERCEPTION OF LEARNERS TOWARDS THE USE OF ICT TOOLS**

Please indicate the extent to which you agree or disagree with each of the statements below by ticking the most appropriate box.

Strongly agree (SA) Agree (A) Disagree (D) Strongly disagree (SD)

Statement	SA	A	D	SD
ICT tools help me to find relevant information				
I believe ICT tools are important in teaching				
I don't have the appropriate skills to use ICT tools effectively				
I enjoy learning using ICT tools than chalk and board				
I expect ICT integration to help me enhance performance				
Are ICT tools time consuming				
I can never find anything relevant to my subject				
I don't feel supported by my use of ICT				

**APPENDIX 3: INTERVIEW GUIDE TO PRINCIPALS**

1a) How many Agriculture teachers does your school have...

According to you, do you think they are adequate to support use of ICT tools in the school?

Yes ( ) No ( )

Give reasons for your answer

.....  
.....

a) The school has organized courses to train teachers on use of ICT tools in schools. True ( ) False ( )

b) If true, did you participate? Yes ( ) No ( )

a) The MOEST has supported the use of ICT tools through organizing in-service training workshops for teachers. True ( ) False ( )

b) If true, did you participate? Yes ( ) No ( )

a) The private sector has organized ICT training for teachers through the school. True ( ) False ( )  
If true, did you participate? Yes ( ) No ( )

a) Is there a computer technician in your school? Yes ( ) No ( )

b) If yes, how many.....?

Are they professionally qualified? Yes ( ) No ( )

Give suggestions on how the use of ICT tools in secondary schools can be enhanced

.....

Does the Government Policy on 100% influence integration of ICT on agriculture curriculum implementation?

.....

..... Does the  
School Entry Behavior policy affect the performance of Agriculture Subject?

.....

.....

**APPENDIX 4: OBSERVATION SCHEDULE**

**Name of School:**.....**Date** .....

I. List the ICT resources in the school and record their current working conditions

RESOURCE	NUMBER AVAILABLE	NUMBER IN GOOD WORKING CONDITION
Computer		
Smart phones		
LCD projector		
DVDs/VCDs		
Flash discs		
CD ROMS		
Internet access		

II. Collect information on how many lessons in a week Agriculture teachers were integrating ICT.

.....

.....

III. How teachers engage students in the use of ICT during Agriculture lessons?

	YES	NO
By asking and answering questions		
Inviting the students to participate in ICT integration lesson		

IV. Ratio of computers to students per class in the Agriculture class?

.....

.....

V. Observe the merit list and indicate how did students begin to perform in Agriculture from when Agriculture subject was taught using ICT?

YEAR	2023	2022	2021	2020	2019
MEAN MARK IN AGRICULTURE (Max 100)					

VI. What are the challenges faced by teachers and students in integrating ICT resources in teaching and learning Agriculture? ( tick appropriately)

Challenges	YES	NO
Inadequate Online resources		
Shortage of power supply		
Lack of Online integration skill		

Large class size		
An support by the school administration		
Personal computer to prepare at home		
Huge Workload		
Shortage of time		
Lack of technical support		