INTEGRATION OF COMPUTERS IN ENHANCING CONTENT DELIVERY BY TEACHERS OF EARLY GRADE CLASSES: A STUDY OF PUBLIC SCHOOLS IN MOIBEN SUB-COUNTY, UASIN GISHU COUNTY, KENYA

BY

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented for the award of a degree at any other University. No part of this thesis may be reproduced without the prior written permission of the author and/or Moi University

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DEDICATION

I wish to dedicate this piece of work to my dearest husband who supported me financially, physically, and emotionally.

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ABSTRACT

The Government of Kenya has continued to support public primary schools in the Country through the provision of computers to promote the integration of computers in the teaching and learning process under the digital literacy program. Despite these efforts towards the program and the benefits related to computer use in teaching, there has been little empirical evidence on whether teachers in public primary schools, specifically in early grade classes were integrating the use of computers during teaching. Thus this study used teachers of early grade classes in public schools in Moiben Sub-County, Uasin Gishu County Kenya to explore the integration of computers in enhancing content delivery. Specifically, it sought to; assess the technological pedagogical knowledge of teachers on content delivery, determine the effectiveness of the in-service computer training program for teachers of early grade classes; establish the school management support mechanism for the integration of computers for content delivery by teachers in early grade classes and explore the challenges faced by early grade teachers in integrating computers for enhancing content delivery. The study was guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technological Pedagogical and Content Knowledge Model (TPACK). An exploratory research design was adopted for the study and a target of 12 early grade teachers and 4 head teachers purposively selected from 4 public schools drawn from the Chepkoilel zone that was randomly selected from amongst other zones participated in the study. Qualitative data were collected using structured interviews, document analysis, and observation checklists. The data were coded and analysed thematically using direct response quotations guided by study objectives. The findings indicated that firstly the majority of the early grade teachers minimally integrated computers due to inadequacies of requisite skills and knowledge on computer use. Secondly, the in-service training on computer integration did not impart the requisite skills that would have encouraged and motivated teachers to integrate computers when teaching, thirdly administrative support was key in facilitating computer integration during content delivery. Consequently, the study concluded that the use of computers by early grade teachers to enhance content delivery was below government expectations and thus recommends that the Kenya Institute of Curriculum Development, Teachers Service Commission, and The Ministry of Education collaborate and see into it that computer is infused in the teachers' training curriculum. And that improved mechanism of maintaining existing computers in schools as well facilitate continuous training of teachers on the use of the computer to enhance content delivery be embraced.

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ABBREVIATIONS

CBC   - Competency Based Curriculum

CBT   - Computer Based Training

CEMASTEA - Centre for Mathematics, Science, and Technology Education in Africa

CK   - Content Knowledge

DLP   - Digital Literacy Programme

ECDE   - Early Childhood Development Education

GoK   - Government of Kenya

ICT   - Information Communication Technology

LDDs   - Learner digital devices

MERLOT   - Multimedia Educational Resources for Learning and Online Teaching

NACOSTI   - National Commission for Science and Technology Innovation

P1   - Primary 1 teacher

P2   - Primary 2 teacher

P3   - Primary 3 teacher

PK   - Pedagogical Knowledge

PTE   - Primary Teacher Education

TDDs   - Teacher Digital Devices

TK   - Technological Knowledge

TPACK   - Technological, Pedagogical, Content and Knowledge framework

TPAD   -Teachers Performance and Appraisal Development

TVET   - Technical and Vocational Education and Training

UK   - United Kingdom

USA   - United States of America

UT   - Untrained Teacher

UTAUT   - Unified Theory of Acceptance and Use of Technology

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter gives a background of the study on the account of the integration of computers for enhancing content delivery by teachers in early grade classes in Moiben Sub-County, Uasin Gishu County. It highlights the research objectives, research questions, the statement of the problem, and the theories that underpinned the study. It further discusses the conceptual framework that guided the study.

1.2 Background to the Study

ICT encompasses many aspects of computers and technology. This research focused specifically on computers as an aspect of ICT in teaching and learning. Therefore ICT integration and computer integration were used as interchangeable concepts. Computer integration is the use of a computer application to support the teaching and learning process. It is an important component of early years in education. Technology provides interesting activities for young students and maintains a playful and pleasant atmosphere (Lewin, 2000). It further helps in learning and offers opportunities to experience the same topic in several different ways.

Kenya like many other developing countries is still in its initial stages of integrating computers in teaching and learning. It is a relatively new phenomenon in the education sector that many teachers have to grapple with. Kenya has made remarkable progress over time in encouraging adoption of ICTs, a case in point being the development of a National ICT Policy Framework which was promulgated in January 2006. The policy aimed at improving the livelihood of Kenyans by ensuring the availability of accessible, efficient, reliable, and affordable ICT services. The National

ICT policy has several sections which include information technology, broadcasting, telecommunication, and postal services (GoK, 2006). However, it is the section on information technology that sets out the objectives of ICT and education. Arising out of the section, the government is expected to encourage the use of ICT in schools, colleges, universities, and other educational institutions in the country, to improve the quality of teaching and learning.

In response to the 21st-century information communication and technology demands, the Government of Kenya (GoK) rolled out ICT integration in education in January 2016 at the Centre for Mathematics, Science, and Technology Education in Africa (CEMASTEA), Nairobi. The aim was to develop Kenyan teachers' skills in knowledge deepening and more specifically in applying principles of ICT in the teaching and learning process. Even though the idea of computers came up as a result of political campaigns of the 2013 general election by the government of the time, it later provided an opportunity for the adoption of computers in education.

It is hard to deny the fact that computers have taken a prominent role in modern society. From smartphones in our pockets to smart appliances at home and even smart cards in banks, computer technology is evident all around. When learners acquire these skills, they can face challenges based on the proper understanding of content (Grimus, 2000). ICT integration in teaching helps students to develop competencies needed for the current globalization (Bransford, Brown & Cocking, 2000). Baishakhi and kamal (2016) noted that although technology had revolutionized our society, in schools, teaching and learning processes were yet to embrace the use of technology. Indeed, Wartella, Flynn, Robb, and Lauricella (2010) noted that despite access to computers and newer mobile phones, the actual use of technology in classrooms

remained infrequent, especially in early childhood education. They observed that teachers of early grade classes still maintained old classroom practices when teaching like the use of chalk and blackboard to illustrate the lessons to learners. On the other hand, learners tended to use exercise books and pens to copy what their teachers had written on the board.

The National Survey (2005) of teachers based in the United States of America (USA) showed that only 54% of teachers integrated computers into their daily instructions. In the United Kingdom (UK), education stakeholders developed a national guideline to increase the use of ICT in teaching and learning in primary schools. However, Bank (1999) argued that despite the UK policies on education, integrating ICT in the classroom had been a big challenge. In 2007, the Saudi Arabian Ministry of Education supplied schools with computers. Two years later the equipment had not been used and they were broken (Alresheed, 2014). Zhao and Xu (2010) also noted that China used ICT integration in education in their early stages but it failed and resorted to the training of teachers as a solution. In Greek universities, the department of early childhood education was noted to have integrated ICT use modules in students' curriculum to develop pre-service teachers' competence in ICT use in education (Nikolopoulou & Gialamas 2009).

The situation is not different in most developing countries. The majority of African countries have lagged in computer integration in the education system (Farrell, 2007). In Nigeria for instance, the adoption of computers was first attempted in 1988. However, it failed due to numerous factors. Studies done in Zimbabwe showed that computers had been lying idle in classrooms (Kabanda, 2012). This could be attributed to many factors too. Ngeze (2017) noted that teachers in Tanzania were

willing to use computers when teaching but needed training to be able to use them effectively. This could be interpreted to mean that teachers were yet to fully use computers in the teaching and learning process. In Uganda, teachers were using computers primarily to attract students and not for the acquisition of knowledge (Newby, Hite, Hite, & Mugimu, 2012).

In Kenya, the scenario was not any different, particularly at the primary school level. Despite the government initiative and continued support, the actual statistics of computer use were not encouraging (Judson, 2010). Kombo (2013) further stated that despite the Kenyan government's effort and willingness to promote its use, ICT had fallen short of expectation. Muriuki (2017) found that some schools had attempted to introduce the use of computers in teaching at the primary school level, however they faced numerous challenges and some opted to drop their use in teaching. It was this background that encouraged further research to explore why the uptake on computer integration was way below expectations hence triggering further research in the integration of computers in teaching early grade classes in public primary schools in Moiben Sub- County, Uasin Gishu County.

1.3 Statement of the Problem

The Government of Kenya has continued to support public primary schools in Kenya with the provision of computers and related infrastructure to support digital literacy. These efforts are towards promoting the integration of computers in the teaching and learning process. Guma, Faruque, and Haolader (2013) stated that technology can effectively improve learning by increasing learners' performance. However, Judson, (2010) stated that despite the Kenyan government's effort and willingness to promote its use, ICT use had fallen short of expectation. With the provision of computers and

related infrastructure by the government to schools, teachers ought to have been motivated to integrate ICT into subject content when teaching. However, there is limited empirical data that explains why teachers' uptake of computer integration in early grade classes is low despite computers being readily available in schools and the advantages that come along with their use. Therefore, this research sought to explore the integration of computers to enhance content delivery by teachers of early grade classes in public primary schools in Moiben Sub-County, Uasin Gishu County.

1.4 Purpose of the Study

The purpose of this qualitative study was to explore if teachers of early grade classes in public schools in Moiben Sub-County, Uasin Gishu County, Kenya were integrating use of computers during their lessons so as to enhance content delivery. The qualitative approach was preferred as this would generate rich data from key informants in an area of study that had not been widely researched.

1.5 Objectives of the Study

1.5.1 General Objective of the Study

To explore the integration of computers in enhancing content delivery by teachers of early grade classes in public primary schools in Moiben Sub-County, Uasin Gishu County.

1.5.2 Specific Objectives of the Study

1. To assess the technological pedagogical knowledge that the teachers possess in enhancing content delivery in early grade classes.
2. To determine the effectiveness of the computer training program for teachers of early grade classes.

3. To establish the school management support mechanism in the integration of computers in enhancing content delivery of teachers in early grade classes.

4. To explore the challenges faced by the teachers when integrating computers for enhancing the content delivery.

1.6 Research Questions

i. What technological pedagogical knowledge do teachers possess for enhancing content delivery in early grade classes?

ii. How effective was the computer training program for teachers of early grade classes?

iii. How does the school management provide support to teachers when integrating computers in enhancing content delivery in early grade classes?

iv. What challenges do the teachers face when integrating computers in enhancing content delivery in early grade classes?

1.7 Significance of the Study

The study sought to explore computer integration in enhancing content delivery by teachers of early grade classes in public schools in Moiben Sub-County, Uasin Gishu County. The findings will contribute to the body of knowledge as regards the integration of computers in enhancing content delivery by teachers of early grade classes in Moiben Sub- County and generally in Kenya.

The information generated by this study provides vital data to respective stakeholders in the education sector; the Ministry of Education and Kenya Institute of Curriculum Development on whether computers are being integrated when teaching to promote learner performance and achievement, enhance instructional skills of teachers, and look for better ways to eliminate the challenges faced by teachers when using

computers. Hence proper measures can be taken to enable the stakeholders to achieve their intended objectives. Furthermore, researchers and other scholars will use this study for further research.

1.8 Justification of the Study

The study was conducted in Moiben Sub- County, Uasin Gishu County. Schools in Moiben Sub-County just like any other part of the country were provided with computers for early grade classes for instruction by the Government of Kenya. Therefore this made it feasible to undertake a study within the Moiben Sub-County in order to explore whether computers were being integrated by teachers when teaching in early grade classes.

The study targeted teachers of early grade classes because the digital literacy program by the Government of Kenya was being undertaken at these levels. The study was purely qualitative and only a few schools within the Sub-County were involved to allow for the collection of in-depth information from the participants. It is hoped the findings of this study will guide curriculum developers on how to make informed decisions to assist teachers to integrate computers for effective teaching and also guide in incorporating aspects ICT in the curriculum of teacher training colleges.

1.9 Scope of the Study

In seeking to explore the integration of computers in enhancing content delivery by teachers of early grade classes, the study was carried out in Moiben Sub-County, Uasin Gishu County. Moiben Sub-County was chosen because its public primary schools had benefitted under the GoK digital literacy program (DLP) and early grade teachers had been targeted for computer training.

Specifically, the study focused on technological pedagogical knowledge of early grade teachers, computer training of early grade teachers, and administrative support towards integration of computers and how each affected the extent of integration of computers by early grade teachers during delivery of content to learners in class during lessons. To obtain data, early grade teachers and head teachers were subjected to structured interviews. The interviewees were drawn from public schools within Moiben Sub-County. The study was carried out between August 2019 and January 2020.

1.10 Limitation of the Study

Since the study was purely qualitative, the generalization of the findings was not possible. The data collected entirely depended on the willingness of the respondents to give information that was accurate to the study. A likely limitation in the study was the possibility withholding of information by some participants on the pretext that the information was sensitive, confidential, and the fear of their names being quoted in the study hence victimization by the employer (Teachers Service Commission). To overcome this limitation, the researcher assured the respondents that the information they provided was purely for research purposes and was to be treated with the utmost confidentiality.

1.11 Assumptions of the Study

The teachers in the sampled schools were willing to participate and gave accurate information related to research. Also, the sampled teachers were those who had undergone the computer training and were teaching early grade classes.

1.12 Theoretical Framework

The study was informed by:-

i   The Unified Theory of Acceptance and Use of Technology (Venkatesh *et al*.2003)

ii The Technological Pedagogical Content Knowledge (TPACK) Model (Mishra, & Koehler, 2006).

The study was guided by The Unified Theory of Acceptance and Use of Technology by (Venkatesh *et al* 2003). This theory explains what encourages people to accept and use technology at the workplace. The theory has four major constructs that influence acceptance and use of technology; Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions (figure1.1). The four constructs of the UTAUT Theory were used to explain the factors that motivate the teachers to integrate computers when teaching to enhance their content delivery.
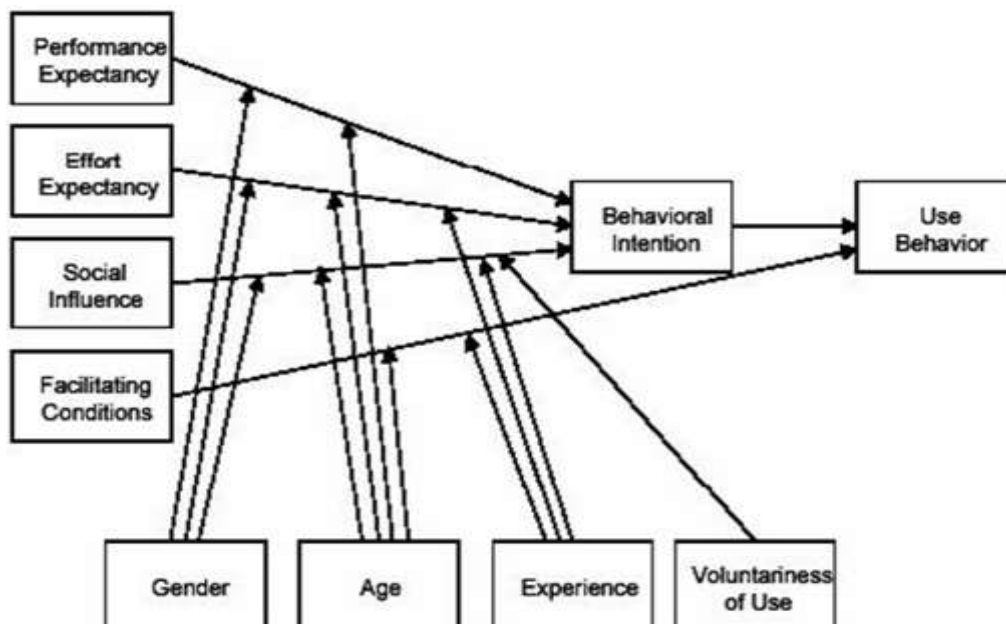
Figure 1.1: The UTAUT Theory
Source: Venkatesh *et al.,* (2003)

Venkatesh (2003) states that Performance expectancy refers to how much users believe the technology will aid them in their work. While, Effort expectancy refers to perceived ease when using technology. Social influence refers to subjective norms relating to technology use within the social environment and facilitating conditions on the other hand refers to structural features of the environment such as training, support, and access to technology. The four constructs of UTAUT Theory were applied in the study to understand what factors encouraged the integration of computers in enhancing content delivery by teachers in early grade classes in Moiben Sub-County.

Performance expectancy aimed to explain how much teachers believed that the computers would help them deliver their content to their learners in a more ideal manner. Effort expectancy sought to explain how comfortable teachers were when using computers. While social influence was to assist understand teachers' belief in the use of computers with the ideologies of the society. Facilitating conditions like training, support, and access to computers were necessary for the teachers to use computers when teaching. The theory explains that once the first three constructs have been achieved that is performance expectancy, effort expectancy and social influence and the facilitating conditions have been met then there will be some kind of behavior change in teachers towards the use of computers when teaching.

The study adopted the TPACK model to show the relationship between research variables. The TPACK model construct on Technological pedagogical knowledge which explains the knowledge of teachers as regards the various instructional practices that support learning was related to performance expectancy and effort expectancy in the theory. It sought to explain how technological pedagogical

knowledge of teachers was dependent on whether teachers believed computers would help improve their work.

Secondly, computer training of teachers and administrative support mechanism was linked to facilitating conditions in the theory. The study was guided by the Technological Pedagogical Content Knowledge framework (TPACK) which emphasized the connections among teachers' understanding of the content, pedagogy, and technology and how they interact with one another to produce effective teaching. Shulman (1986) proposed that effective teaching requires a special type of knowledge, pedagogical content knowledge (PCK) that represents the blending of content and pedagogy into an understanding of how particular topics, problems are organised and adapted to the diverse interests of learners.

Mishra *et al* (2006) TPACK framework extended Shulman (1986) characterization of teacher knowledge to explicitly consider the role that technology knowledge can play in effective teaching. The TPACK framework is anchored under the three knowledge components:

i. Technology knowledge (TK) refers to teacher knowledge of and ability to use various technologies and related resources. An understanding of when technology will promote or impede learning.

ii. Pedagogical knowledge (PK) refers to teacher knowledge about a variety of instructional practices, strategies, and methods to promote students learning. It encompasses understanding of student learning styles, classroom management skills, lesson planning, and assessment.

iii.   Content knowledge (CK) refers to any subject-matter knowledge that a teacher is responsible for teaching.

Therefore TPACK is a model that assists teachers to consider how their knowledge domains overlap to teach effectively and engage their students with technology.

1.13 Conceptual Framework

The study was conceptualized around technological pedagogical knowledge, the effectiveness of computer training of teachers, and school administrative support mechanism as independent variables and computer integration as a dependent variable. Technological Pedagogical knowledge is the knowledge that enables an individual to use and manipulate computers. This knowledge can only be acquired through the training of teachers. Above all, administrative support was important for the integration of computers when teaching to enable the participants to acquire knowledge by attending the training.
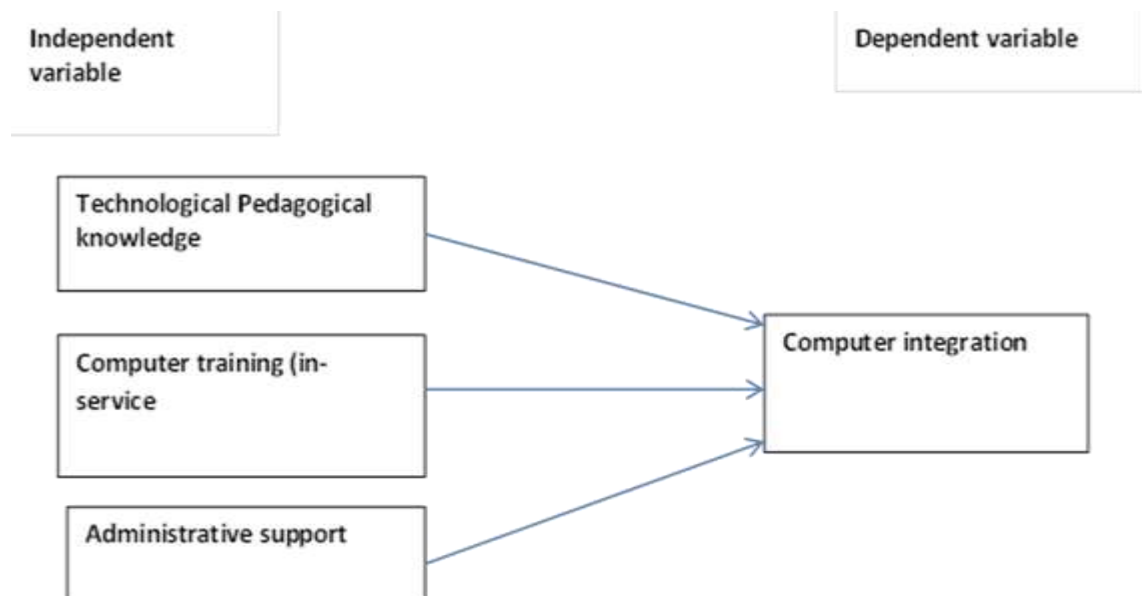
Figure 1.2 Conceptual Framework

1.14 Operational Definition of Terms

Computer integration- The use of computers when teaching as a resource

Computer- refers to digital devices supplied by the Kenyan government to public schools to aid in the teaching and learning processes at early grade level. They include teacher digital devices and learner digital devices.

Computer Training program- refers to the government sponsored training programme that targeted equipping of teachers with necessary computer technological and pedagogical skills to enable them integrate the use of computers while delivering content in early grade classes.

Content delivery- Ability to give information to learners in a more appropriate manner

Early grade-Refers to learners in class one, two and three of primary education.

In-service teachers-Teachers who are already in teaching job employed by the Teachers service commission

Management support- refers to the assistance given by school management and administrators towards teachers to ensure they use computers while teaching.

Technological pedagogical knowledge- Knowledge by the teacher on how to link computers with content

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

This chapter consists of a review of related literature that informed the study. The chapter focused on factors like Technological pedagogical knowledge of teachers for enhancing content delivery in early grade classes, the effectiveness of computer training programs for teachers of early grade classes, school management support mechanisms, and challenges faced by teachers when using computers

2.2 Technological Pedagogical Knowledge of Teachers and Computer Integration

Through the Kenyan government policy, teachers were trained under three different levels; Certificate, Diploma, and Degree level. The teacher's preparation in the primary school level teaching colleges took two years while for secondary school teachers it took four years for those training at the University for Degree Course and three years for those in diploma colleges (Katitia, 2015).

There were several levels of teacher certification in Kenya; Primary 1 teacher (P1), Primary 2 teacher (P2), and Primary 3 teacher (P3). And because of increased demand for teachers, some would teach without certification but pursue certification as they actively taught hence the untrained teachers (UTs). For a P3 teacher to be promoted to P2, they were expected to pass the Kenya Junior Secondary Examination (KJSE). In universities, student teachers would be taught all their teaching subjects and ICT would be offered as a unit.

According to Katitia, (2015), the Primary Teacher Education curriculum provided for a two-year residential certificate course. The syllabus entailed core subjects

compulsory for all students; English, Kiswahili, Professional studies and Physical education and Information communication and technology (ICT) and two options A and B. Option A, comprised of Science, Home science, Agriculture, and Mathematics while option B had Music, Art and Craft, Social studies and Religious education. In the first year, students were to study nine subjects, Mathematics, English, Kiswahili, Science, Home science, Social studies, Creative arts, Physical education, and ICT while in the second year students were expected to take five core subjects (English, Kiswahili, Physical education, Professional studies, and ICT) and four subjects drawn from either option A or option B. The teacher trainees were also expected to undertake three sessions of teaching practice.

Before the implementation of the new PTE curriculum in Kenya, the ICT component in the pre-service teacher training course was largely ignored, hence the majority of P1 teachers who were currently the teachers in service were not appropriately equipped with the skills to integrate computers when teaching. To utilize computers as a teaching resource requires special skills and knowledge on the part of the teacher. In the absence of these requisite ICT skills, the teacher may not effectively integrate computers during the lesson as they may not be able to create a seamless link between pedagogy, content, and technological resources. The knowledge on how to teach by blending aspects of computers as a resource is referred to as technological pedagogical knowledge (Mishra, *et al,* 2006). It shows how technological tools can be used when teaching in ways that are appropriate to the discipline and the development of the lesson at hand.

Technological pedagogical knowledge (TPK) entails an understanding of how teaching and learning change when particular technologies are used. It enables

teachers to blend their subject content knowledge with knowledge on technology use in a variety of instructional practices. Developing TPK requires teachers to build an understanding of the benefits and limitations of a given technology and how they can be applied within a particular type of learning activity. According to Mishra *et al* (2006), teachers must possess the three knowledge types (technological knowledge, pedagogical knowledge, and content knowledge) for them to be able to effectively integrate computers in their teaching. TPK influences how content is taught, for instance, when teachers use an instructional video clip for a given topic that they would have otherwise modeled on the blackboard. This kind of innovative teaching enhances the teaching and guides students towards a more robust understanding of the subject matter.

Darling-Hammond (1996) stated that teachers' preparation needed to encourage the teaching of skills in using different arrays of teaching strategies like cooperative learning, classroom management, and technologies as this would increase the effectiveness in working with students from diverse backgrounds. However, that was not the case with most teachers training colleges. Zhou and Zhu (2007) noted that although a great number of teachers in China had attained the required educational level, some of them still lacked certain critical skills including those required for the 21st-century educational attainment in China.

Competent teachers can pioneer in technological development for instruction. This happens when a teacher has a real mastery of the subject together with a suitable strategy to deliver the content for effective teaching. Therefore, the teachers must make a connection between the content they wish to teach and the best way to deliver (Shulman, 1986). This includes understanding information technology broadly

enough to apply it productively at work and in everyday life, being able to recognize when information technology can assist or impede the achievement of a goal, and being able to adapt to changes (Mishra *et al*, 2006). It is therefore important to note that the integration of computers when teaching is dependent on the teacher's TPACK knowledge.

A study by Voogt and McKenney, (2017) examined if and how teacher education institutes were helping students to develop the technological pedagogical content knowledge needed to effectively use technology for early literacy. The findings indicated that not much attention was given to the knowledge that teachers needed to nurture early literacy through the use of technology. This was attributed to many factors including that many technologies were not used in schools. It further noted that teacher educators themselves were still struggling with the effective use of technology in their courses.

Kumar and Gangmei (2018) in a study to assess technological pedagogical content knowledge of teacher educators teaching in secondary teacher educational colleges found out that their TPACK knowledge was low. They also found that 90% of teachers used smartphones but were not able to use them in the classroom for the teaching and learning process. Xiaojun and Jiri (2017) in their study analysing the integration of ICT in education from the perspective of teachers' attitudes found out that many schools and universities classroom teaching was dominated by traditional education characterized by textbooks, blackboard, chalk, and talk, making it teacher dominated. The low technological pedagogical knowledge of in-service teachers was attributed to the finding.

Heitink, Voogt, and Braak (2017) in their study on eliciting teacher's technological pedagogical knowledge showed that the use of pedagogical strategies that fostered students involvement were effective although, from the empirical evidence adduced from previous studies, it was evident that more ICT technology training ought to be offered. This implied that though teachers may possess pedagogical knowledge they still needed more training to effectively link technology to use and content to be delivered.

Tondeur, Roblin, Braak, Fisser, and Voogt (2013) wanted to explore how teachers' education institutions prepared pre-service teachers for integrating information and communication technology in their classroom practices. The results showed that institutions were moving from offering ICT as an independent course towards embedding it across the curriculum. This shows that most institutions had not been offering the knowledge required to the pre-service teachers to enable them to teach with computers.

Roig-vila, Menguel, and Medrano (2015) found out that teachers were more knowledgeable in pedagogical and content knowledge than in technology. Indeed, a study conducted by Mtebe and Raphael (2018) on eliciting in-service teachers, Technological Pedagogical Content Knowledge for the 21st-century skills in Tanzania found out that many teachers had moderate self-reported confidence in all TPACK elements of technology.

Maina, Ogola, and Mwai (2016) found that teachers still lacked the pedagogical skills and knowledge needed to be able to teach with ICT technology successfully. To many, computers were seen as not having activities related to the subject matter being

taught. However for those teachers who possessed technological pedagogical skills, they could access sites that provided activities, video clips, and games that were relevant to their teaching hence creating interactive lessons. For instance, Mwaruma (2015) study on integration of ICT in teaching and learning of science in secondary schools indicated that teachers downloaded videos from YouTube sites like Multimedia Educational Resources for Learning and Online Teaching (MERLOT).

From the reviewed studies it can be observed that computer integration in teacher training colleges and universities was still low due to minimal emphasis of equipping teacher trainees with technological pedagogical skills. Hence drawing a basis on the studies reviewed this study explored the extent of technological pedagogical knowledge that the teachers possessed and were able to use in enhancing content delivery in early grade classes in Moiben Sub-County, Uasin Gishu County, Kenya.

2.3 In-Service Teacher Training for Computer Integration

Inservice teacher training refers to all kind of activities and set of training that is required for quality improvement and professional development of teachers (Saiti & Saitis, 2006). Akhter, Alishah, and Nasee (2011) define in-service training as all the activities which are designed for professional development and skill-building of school teachers. Inservice training equips teachers with the necessary skills to improve their job efficiency which is a key component in the facilitation of computer integration in schools. Inservice training offers one of the most promising avenues to the improvement of instruction (Kalogiannakis 2004). Kalogiannakis (2004) further states that in-service training enhances teachers' professionalism that relates to teachers' vision to improve the quality of their work. Jahangir, Saheen and Kazm,(2012) further stated that in-service training plays a major role to improve the

teachers' performance in schools. It is through training that teachers are enabled to be more systematic and logical in their teaching styles.

Inservice training is an important strategy in influencing the professional development of teachers and it plays a positive role in enhancing their knowledge and teaching quality. Through training, the confidence of teachers is boosted and their motivation increased. Their competency levels are improved consequently unlocking their potential in the organisation for maximum output. Indeed, through training, employees have been known to learn new work concepts, refresh their skills, improve their work attitude, and boost their productivity (Cole, 2002). Indeed this was illustrated by Madukoma, Akpa, and Okafor (2014) in their study on the effect of training and motivation on job performance of library personnel at the University of Lagos when they found that training enhanced the performance of library personnel on the job.

The vision of the Ministry of Education in Kenya under the National Information Communication Technology policy was to facilitate ICT as a universal tool for education and training. To achieve this, every education institution was to be equipped with appropriate ICT infrastructure while teachers and learners were to be assisted develop their ICT competencies. The National ICT policy also expected to facilitate the transformation of teaching and learning by incorporating new pedagogies that were appropriate for the 21st century. This could only be achievable through in-service teacher training on the use of computers in instruction.

It was and remains standard practice for employers to have predetermined goals for any training programs they initiate. It is also the expectation of the employers that

once training is conducted it will be effective. For training to be considered effective, it should be able to meet the objectives that have been set out for it to achieve (Descy & Westphalen, 1998). Punia and Kant (2013) observed that the degree to which training attained the desired objective or results was referred to as training effectiveness. While Harvey, Coulson & McMaugh (2016) defined it as the extent to which the training activity fulfilled its intended purpose.

For inservice teachers, effective training is important because it offers them an ideal road map to update their skills, knowledge and improve their instructional methods hence leading to better performance. With the introduction of computers for instruction in schools under the Digital Literacy Programme (DLP) in Kenya, the early grade teachers needed to be equipped with appropriate skills through training to facilitate the use of Teacher digital devices(TDDs) and learner digital devices(LDDs). This was in response to the thinking that the implementation of technology in the classroom was inadequate due to lack of professional development and training (Ertmer *et al*, 2012).

To mitigate the inadequacies of technology use in early grade classrooms, solution was seen as conducting effective in-service training programs for teachers. The effectiveness of a training program has been known to be affected by various factors namely; the need for training, duration of the training, training venue, modes of training, materials and facilities, motivation, among other factors (Punia & Kant, 2013). In addition, Kaburu (2011) identified teacher factor, school factor, and factors emanating from the Ministry of Education as factors that were likely to affect the effectiveness of training. This study focused on factors such as needs of training, duration of the training, training venue, facilities and materials, and training modes as

those that were likely to affect the effectiveness of the inservice computer training of early grade teachers.

Cimer, Çakır & Çimer, (2010) state that an effective training program should be planned carefully based on an accurate needs assessment. It is important for training to match the needs of teachers otherwise, it will be of little value if the learned characteristics are not generalised to the job and maintained over time. During training, it is important for the trainers to understand that professional development courses on ICT should consider the fact that teachers are of divergent needs regarding their knowledge and skills about computer use (Bradshaw, 2002).

Previous studies have shown that continuous training yields better results than training undertaken over a shorter period of time. Gerard, Varma, Corliss, and Linn (2011) noted that ongoing training courses of more than a year brought about significant improvement in the achievement of the teacher-student. Matthew, Devin, Soto, and Johnson, (2016) further stated it was important that the training of teachers was to be continous for them to keep their skills current due to the countless new technologies that were being developed along with their teaching careers. Higgin and Moseley (2011) noted that the continued professional development of teachers could help to successfully implement ICT in schools.

Mbulankende (2007) also noted that continuous training provided the requisite support for teachers to remain updated with ICT and its application to subject pedagogy to enhance their teaching. Computer skills require time during training because of their complexity for teachers to be able to understand the concepts well.

Murphy and Huffcutt, (2005) found that if the skills to be trained are complex then the duration of training must be long enough to make it effective.

The Government of Kenya in 2010 reported that the majority of teachers who attended the training during school holidays through in-service courses were given a short period of time to practice with the computers and only a few of them developed the required skills. The duration was considered inadequate for the early grade teachers most of whom were handling computers for the first time and thus were not well acquainted with the technology. Pelgrum (2001) identifies time allocated for training as a hindrance to ICT adoption in curriculum implementation. This was further supported by Omanga (2018) who noted that the training on DLP in Kenya turned out disastrous when the government embarked on the training of teachers for only three days.

Inservice training can be conducted from different places such as classrooms, halls, or Teacher Advisory Centres (TAC). The ideal training room should be equipped with extensive audiovisual facilities and interactive tools like ceiling mounted projectors with a large screens, speakers, and many more. The room should be spacious to allow trainees to leave and enter the room without distracting the lesson. Omar, (2014) suggested that in-service training programs should be conducted in the schools because teachers get involved in the planning and implementation of the training from the start to the end. According to him, by getting involved, teachers were likely to see and appreciate the value of training.

Training materials are a factor to consider during training. The training materials should be compelling and useful otherwise the training will be ineffective. The most

commonly used materials for computer training are video projectors, projection screens, good internet connection, electrical outlets, training manuals, computers, audio-visual aids, interactive whiteboards, flip charts, among others. However, most of these resources and facilities for ICT integration lacked in schools (Nzwili, 2016) hence bringing a discrepancy between training materials and resources found in schools. The main objective of using training materials is to involve the participants during the activity and promote active interaction among them during training sessions.

Inservice training can take different modes namely;instructor-led training, interactive method, hands-on training, computer-based training, and video conferencing. Instructor-led training is a kind of training that occurs in a training room, classroom, or conference room. In this kind of training one or more instructors are involved in conducting the training. The instructor may enhance his or her presentation through the use of audio-visual media such as overheads, video PowerPoint, and many others (Myre, 2000). During such trainings, participants get a chance to engage in interactive conversations with instructors and get their questions answered unlike in other forums.

Interactive training on its part, is a type of training method that takes classroom-style lectures to a higher level. Activities can be done in small group discussions, quizzes, question, and answer session (Glorgdze & Dgebuadze, 2017.) Interactive sessions keep trainees engaged in the training, which allows them to be receptive to new information.

Hand on training is a type of training whereby trainees learn a certain task by getting their hands directly on whatever they are learning. This type of training is more practical than theoretical. In this type of training, trainees learn through several techniques such as cross-training, demonstration, coaching, drill, and apprenticeship. Ogundele, Akingbade, & Akinlabi (2012) defined apprenticeship as a method in which trainees learn through working with a skilled worker in the profession.

Computer-based training (CBT) is a kind of instruction whose main means of delivery is a computer. CBT courses can be delivered over the internet. CBT is also known as *e*-learning. It is believed that the retention rate in CBT is higher than in face-face training modes. CBT provides an engaging and immersive content which can also be accessed through the phone. Each training method or mode has its advantages and disadvantages and its serves to satisfy different kinds of objectives. Therefore none of the above listed methods is complete in itself towards helping in-service teachers to learn skills and knowledge.

Omar (2014) in the analysis of the effectiveness of in-service training in Malaysian schools found that in-service training was very important to enable the teachers to apply the knowledge acquired in teaching and learning. The study also observed that factors like administrators, teacher attitude, training needs, and strategies in conducting in-service training contributed to the effectiveness of training. Consequently, to realise the effective integration of computers, education administrators had to identify training needs and provide ongoing training (Matthew *et al*, 2016).

From the literature reviewed it was clearly noted that, training as a process is important for the acquisition of necessary skills but more so if done continuously it enables the teachers to master the skills learnt for continued integration of computers in teaching. From the above literature, it can be deduced that the most commonly cited reason for lack of technology implementation in the classroom is due to inadequate professional development and training (Ertmer *et al* 2012).

Kalogiannakis (2010), in his exploratory study on in-service teacher training in the use of ICT in Education in Greece, found out that teachers were prepared to use ICT in the daily school practice but expressed their wish for a further training program. The study found out that it was important for the teachers to be trained on how students learn and on how to address student's needs and learning styles.

Atef (2011) conducted a study on the effectiveness of ICT training courses within the Jordanian education system and collected data through questionnaires, direct classroom observation, and field notes. The findings indicated ICT professional development courses for teachers were essential in improving their skills and knowledge. However, noted that the conduct and nature of these courses in terms of timing and mode of training had an impact on the effectiveness of the training.

Nassira (2016), conducted a study to discuss the importance of teacher training and professional development in improving the quality of education in the Algerian context. The study found out that teachers at all levels; primary, middle school, high school, or university needed to be trained in their related fields and subject matter regularly if they were to change their beliefs.

Sedega, Mishiwo, Seddoh, and Darkenoo (2019) were investigating the perception of teachers on the effectiveness of in-service education and training at basic schools in the Akatsi District of Ghana. The study used a descriptive cross-sectional survey. Respondents were selected using stratified random sampling and purposive sampling techniques. Data was collected using questionnaires and interviews. The findings of the study revealed that the majority of the teachers perceived INSET Programmes organised for them as being adequate and very effective. However, they stated that most teachers who attended in-service training did not perform effectively in their work and therefore recommended that organizers of in-service training programs to look for qualified instructors who understand the needs of teachers to handle the various subject areas during INSET Programmes and place more emphasis on the professional skill development aspect of the teacher.

In Uganda, Ali, Faruque and Khushi (2013) investigated factors influencing the use of ICT to make the teaching-learning process effective in higher institutions of learning. The study used a quantitative approach. A descriptive research design was employed whereby teachers and administrators were selected using stratified random sampling. Data was collected using questionnaires. The results showed that both teaching staff and administrators had a strong desire to integrate ICT into the teaching-learning process however needed to increase training on pedagogical skills.

Muriuki (2017) sought to establish how the teacher's level of training affected the implementation of ICT education at Primary schools in Kajiado North Sub-County. A descriptive survey research design was used and schools that participated were selected using random sampling technique. Data was collected using questionnaires and analysed using SPSS. The findings indicated that more than 53.9% of teachers

stated that it was important for the training and the skills to be learnt to match for ICT implementation in schools to be supported.

Finally, Mauta and Margaret (2014) investigated the preparedness and attitude of ECDE teachers in Pre-schools in Kenya.They used a descriptive design where questionnaires were administered and data was analysed using SPSS. The findings indicated that Kenya as a country was not ready to integrate ICT in the pre-school curriculum since the trained personnel, physical facilities, electricity, poverty, and teacher's attitude needed to be addressed first. It is therefore evident that pre-service and in-service training on the use of computers during teaching is very important.

2.4 School Administrative Support and Computer Integration

Administrative support refers to the help and guidelines given out by administrators in basic education institutions to aid in computer training and integration of ICT into the curriculum (Muriuki, 2017). Moses, Bakar, Mahmud, and Wong (2012) define administrative support with regards to ICT as the presence of encouraging ICT using role models by the principal and the presence of incentives for teachers to use technology. Administrative support is very important for the successful integration of ICTs into the teaching and learning process (Sife, Lwoga, & Sanga, 2007). The success of any program in an institution is dependent on the support and involvement of the administrators or managers. There is a link between school manager support and the success of an initiated program in an institution (Khemthong & Roberts, 2006). Indeed, administrators in school act as mediators to integrate ICT into the educational system by playing a key role in encouraging, supporting, and helping the teachers to use computers in their teaching and learning process (Twinomujuni, 2011).

Kariuki (2004) noted that teachers who received adequate ICT support from their administrators were more likely to use ICT than those who didn't get support as they would be less passionate about integrating computers in their teaching. Merireng (2013) in a case of secondary schools in West Pokot found out that most principals enhanced staff training and development and mobilised resources necessary and encouraged staff to embrace computers. The study further observed that administrative support can be in form of incentives, financial support, and training opportunities on the use of computers. And that in-service training in schools requires strong leadership, support, and commitment.

When teachers get administrative support they develop a sense of ownership and purpose in the way they handle their jobs. This, therefore, implies that teachers' level of commitment and ownership with regards to the use of computers when teaching depends on the kind of support administrators give. Afshari, Abu and Wong (2010) Stated that principals needed to understand the value of ICT and its benefits for them to be at the forefront to champion its implementation.

Fullan (1991) noted that the easiest means of putting forward the adoption of ICT platform in the school was the democratization of the change process that involves and encourages the contribution of all the school members to participate in the change process at the planning level, own the change, perceive the project as theirs and thereafter support any teacher who wished to adopt ICT in gaining further knowledge and skills. This could be done through in-service training.

Bangkok (2004) noted that Failure by school managers to support the digital literacy programs serves as a serious setback to the success of the digital implementation

process. Administrators can fail to support the digital literacy programs in institutions by not monitoring, supervising, and providing financial and technical support to their teachers. Indeed, Sife, Lwoga, and Sanga (2007) found out that lack of technical, administrative, and financial support were problems that hindered teachers from making use of computers in their institutions.

Mbulankende (2007) in his study, assessment of teacher training in ICT in selected universities in Uganda reported that ICT like most innovations would not work without administrative support. Computer success requires the school managers mobilize further resources from the Ministry of Education, parents, and even Non-governmental organisations to support, sustain the program and also provide their expertise. School heads specifically need to have a vision of how ICT can be integrated into the school curriculum and how it could be used to support learning depending on the individual needs of teachers and learners.

To champion the use of ICT in schools, head teachers need to be seen to be providing support and encouragement to their teachers (Anderson & Dexter, 2005). This is further supported by a study on assessing the influence of the Primary Teacher Training College Principals competency in ICT on the teachers' integration in teaching Science in the Nyanza Region (Omwenga, Nyabero, & Okioma, 2015) whose results indicated that the principals who were competent in information communication Technology favoured the tutors' integration of ICT in teaching Science. The study also noted that, teachers found it more compelling to use technology in their teaching if their administrators were doing so in their day to day activities.

Most programs initiated by governments fail to pick up for lack of support and commitment. For instance, the integration of computers in teaching requires the stakeholders to monitor and assess their performance. Otherwise, these programs may die on arrival. This agrees with Damoah, Akwei, & Mouzaghi, (2015) who indicated monitoring, corruption, political interference among others to be the topmost causes of failure of government projects.

Previous studies have indicated that teachers are yet to embrace the integration of computers in teaching despite the support provided to them by their administrators. This could be attributed to other factors beyond administrative support just as was observed by Sithulisiwe and Maphosa (2016) who found out that ICT was not fully utilised in teaching and learning owing to a multiplicity of reasons. It is in this light that this study sought to explore the extent to which administrative support was affecting the integration of computer in the delivery of content in early grade classes in Moiben Sub-County, Uasin Gishu County

2.5 Related Studies

The integration of computers in enhancing content delivery by teachers is important because it aids in the teaching and learning process and increases student achievement. Previous scholars have used the term ICT to cover or make reference to any product that is used to store, retrieve, transmit, or receive information electronically. And these include digital televisions, computers among others. This study focused on use of computers specifically the GoK supplied LDDs and TDDs as an aspect of ICT.

Higgins (2003) Stated that the goal of integrating ICT in education was to enhance teaching and learning so as to improve the quality of instruction and consequently the

education standards. Computer and technology are therefore not supposed to act as a replacing tool for quality teachers but instead, they are considered as supplements needed for better teaching and learning (Ghavifekr & Rosdy, 2015).

In Kenya, the newly introduced Competency Based Curriculum (CBC) requires teachers to integrate computers in all learning areas. This is done by providing learning activities that are related to the content being taught with an aim of making learning more interesting. Ghavifekr and Rosdy (2015) stated that it was appropriate to state that almost all ranges of subjects from mathematics, science, languages, arts, and humanities can be learned more effectively through technology-based tools. However, this was to be dependent on how well the teacher did it (Thompson, 2003). ICT has the potential to enhance the teaching and learning process if properly integrated by the teachers. Computers have also been known to foster more interest in learning on the part of students and for the teachers, hence making instructions easier, more challenging, and motivating (Vikashumar, 2005).

Gharifekr, Razak, Ghani, Ran, Meixi, and Tengyue (2014) sought to identify the levels of computer skills and knowledge of primary school teachers in the teaching and learning process. Teachers were selected randomly and data collected quantitatively using questionnaires. The results revealed that most of the teachers were normal users of ICT in the teachers' rooms for their work rather than for teaching and learning.

Petronella (2017) in a study on integrating computers into mathematics education in South African Schools showed 73.9% of South African teachers of mathematics were still not integrating computers into mathematics education and 35.5% were using

computers for the preparation of professional documents. This showed that quite a big percentage of teachers were not integrating computers for instruction but instead used them for the preparation of professional records.

Mercedes and Sanga (2016) sought to analyze what happens at schools regarding the integration and use of ICT. An exploratory research design was employed. The results indicated a higher improvement in the teaching and learning process in schools that had integrated ICT as an innovation factor. Rashedul and Abu (2016) in seeking to identify the effectiveness of using ICT to promote teaching and learning in polytechnics used clustered sampling to select the participants for the study. Data was obtained using structured questionnaires and analysed through inferential statistics. The findings indicated that integration of ICT made teaching and learning very easy, interesting, and time-saving than traditional ways of teaching and learning.

Simeo, Michael and Said (2014) sought to find out the extent of application of Information and Communication Technologies in the teaching and learning process by tutors in teachers colleges in Mara Regions in Tanzania. A simple random approach was used to select schools that were involved in the study. Data was collected using questionnaires, interviews, observation, and documentary review. The data was then analysed descriptively using frequencies and standard deviation. The results indicated that tutors applied ICT in teaching but its application was not efficiently done despite the role ICT played in Education.

Kairo (2013) conducted a study on the use of ICT in improving teaching and learning in public primary schools. The study employed a descriptive survey design and data was collected using questionnaires and analyzed qualitatively. The findings indicated

that teacher's preparedness affected the use of ICT in teaching and learning as they had basic skills in the use of computers. Mbithe, Maithya, and Cheloti (2016) in their study on the influence of teacher competency on the integration of ICT in teaching and learning in public secondary schools in Machakos, Kenya established that majority of the head teachers and teachers had basic ICT literacy however, only a few integrated it in teaching and learning

2.6 Chapter Summary

Most of the above reviewed literature on computer integration was done in polytechnics, teachers' colleges, high schools, and a few primary schools. Most of the studies were quantitative with only a few being qualitative in nature, descriptive survey design was predominantly used and most data was collected and analyzed quantitatively. None of the above studies explored the integration of computers in primary schools and more specifically in early grade classes. This study used the exploratory design wherein data was collected through structured interviews, document analysis, and observation checklists and later analyzed qualitatively. It is in this light that the study sought to explore the integration of computers in enhancing content delivery by teachers of early grade classes in public schools in Moiben Sub-County, Uasin Gishu County, Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design and methodology of the study. Generally, it consists of; research methods, design, target population, sampling procedures and techniques, sample size, research instruments, piloting, testing reliability and validity of research instruments, data collection procedures, and data analysis techniques and ethical consideration.

3.2 Research Design

The study used exploratory research design. The exploratory design gives an understanding of what is happening by trying to seek new insights, ask questions, and assess phenomena. It tackles new problems on which little or no previous research has been done. Exploratory research design was deemed suitable for the study because ICT in education was a new phenomenon especially for the early grade classes. Therefore the design enabled the researcher to find out why teachers uptake of computer integration when teaching was low in Moiben Sub-County and it also allowed for inquiry into the reasons behind the level of intergration of computers in content delivery by early grade teachers.

3.3 Study Area

Moiben Sub-County is one of the Sub-Counties in Uasin Gishu County. Moiben Sub County has education zones namely; Karuna, Kimumu, Moiben, Sergoit, and Tembelio. It is located about 40km North East of Eldoret town. It has a population of approximately 157,032 people and an area of 777.1 square kilometers. Moiben Sub-

County just like any other Sub-Counties in the country was provided with computers for teaching and learning hence making it feasible for the study.

3.4 The Population

A population is the entire group of individual, events, or objects having a common observable characteristic.

3.4.1 Target Population

The target population also known as the theoretical population refers to the entire group of individuals that researchers are interested in drawing generalisations or conclusions about. For this study, the target population was all early grade teachers in Kenya

3.4.2 Accessible Population

Accessible population also known as the study population is the population in research to which the researcher can apply their conclusions. The study was undertaken in Moiben Sub County therefore the accessible population was all 35 head teachers and 1120 early grade teachers in the 35 public primary schools within Moiben Sub-County.

3.5 Sample Size and Sampling Technique

Sampling is the process of selecting a subset of cases to draw conclusions about the entire set (Cohen, Manion & Morrison 2003). A sample is a small part of a large population, which is thought to be representative of a larger population. For this study which was purely qualitative and employed exploratory research design, it was not a requirement to give equal chance for all members of the accessible population to participate in the study however simple random sampling was used to select

Chepkoilel Zone out of the five zones (Karuna,Moiben,Kimumu,Sergoit and Chepkoilel) in the Sub-County.

Chepkoilel zone had eight public primary schools with a population of 27 teachers who were teaching in early grade classes. From the list given by the Moiben Sub-County Director of Education serving as the sampling frame, the study picked on four schools from within Chepkoilel zone through simple random sampling. Three of the schools had a single stream from grades one to three while the remaining school had two streams in grade one but a single stream in grades two and three. This gave a total of thirteen teachers and four head teachers who participated in the study. Those targeted were school administrators/ headteachers and the teachers who had undergone government sponsored computer training. All the schools from which the study participants were drawn had benefitted from government donated computers to aid in early grade teaching.

Overally, the accessible population was 13 early grade teachers i.e. three schools (schools A, B &C) had one teacher per class (grade 1, 2, and 3) bringing the total number of teachers in these schools to 9. While the other school (school D) had 1 teacher in grade one, 1 teacher in grade two and 2 teachers in Grade three because of the two streams bring the total number of teachers teaching early grade classes to 4 hence the overall total of 13. In addition, a total of 4 head teachers also formed part of the accessible population. During the study, one of the grade three teachers drawn from school D did not turn up for the interview. Therefore, those who participated in the study were 4 head teachers and 12 early grade teachers.

3.6 Data Collection Instruments

The instruments used for data collection for the study were interview schedules for teachers and head teachers, checklists for teachers' professional documents, and observation schedules to see how teachers integrated computers when teaching. The selection of these tools was guided by the nature of data to be collected and the objectives of the study.

3.6.1 Interview Schedule

An interview schedule is a set of questions to be answered by the subjects of the study orally (Fraenkel & Wallen 2006). Kothari (2007) observed that interview schedules are particularly suitable for intensive investigation. The study used interviews since they are flexible and they take care of sensitive comments and provide in-depth responses. The interview schedules were structured to ensure uniformity of questions asked during the interview process. Separate interview schedules were used for the head teachers and for the teachers.

The researcher visited the four primary schools and sought permission from the respective head teachers before commencement of the interviews with the teachers who participated in the study. Generally, the interviews were conducted outside classroom teaching hours, this was mainly in the evenings after classes when learners were out for games.

The interviews were to solicit data to address all the three study objectives by seeking to answer the research questions; What technological pedagogical knowledge do teachers possess for enhancing content delivery in early grade classes?, How effective was the computer training program for teachers of early grade classes?, How does the school management provide support to teachers when integrating computers in

enhancing content delivery in early grade classes? and lastly, What challenges do the teachers face when integrating computers in enhancing content delivery in early grade classes?.

3.6.2 Observation Checklist

According to Fraenkel and Wallen (2006), certain kinds of research questions can best be answered by observing how things look. An observational checklist is a list of questions written down by the researcher so as to guide on the issues at hand to be observed during the interview. Therefore, an observational checklist was used to observe the necessary things related to the study the researcher intended to note and to counter check with the information provided by the participants during the interview on the integration of computers when teaching in early grade classes. The research remained pensive during the process of observation in class and noted pertinent issues related to the objectives and recorded by putting a tick where necessary. The researcher sought permission from respective teachers of grades one, two, and three to be observed during the teaching of their lessons prior to the interviews. The majority of them were hesitant but later agreed after explaining and assuring them that the information was going to be treated with the utmost confidentiality. Generally, for the study, observation of lessons was important for triangulation purposes.

3.6.3 Document Analysis

Document analysis is a form of qualitative research technique that uses a systematic procedure to analyze documentary evidence and answer specific research questions. The researcher analyzed the professional documents i.e. the curriculum designs for grades one, two, and three, schemes of work and lesson plans of the teachers who participated in the study to ascertain if they had included the aspects of computer

integration in their lessons. This was important because it enabled the researcher to counter check the information given by the teachers during the interview and the information in these documents.

3.7 Reliability and Validity of Research Instruments

The researcher piloted the research instruments in 2 schools drawn from Kapseret Sub-County before the main study to determine the validity and reliability of the research instruments. The interview schedule was used on both head teachers and teachers but at different intervals. The participants included the head teachers of the schools and 3 teachers per school one drawn from each of the levels i.e. grades one, two, and three. Kapseret Sub-County was chosen because it neighbors Moiben Sub-County and the school within it were each provided with computers by the government to aid in ICT integration when teaching.

After the initial administering of the instruments to the 1st school i.e. to the head teacher and the 3 early grade teachers, the research tools were discussed with the supervisors and review of some interview questions was undertaken to avoid ambiguity, vagueness and unnecessary repetition. After one week the modified instruments were again administered to the second set of participants to obtain a second set of responses. After which, the responses got were compared to the first set of responses and the results gotten from different tools were compared and found to elicit the desired outcomes to the satisfaction of the researcher and the supervisors. Thus it was agreed that the data collection instruments be approved and used for the main study.

3.8 Data Collection Procedure

Before collecting data, the researcher got an introductory letter from Moi University, School of Education, this facilitated obtaining of a research permit and an authorization letter to carry out the research from the National Commission for Science and Technology Innovation (NACOSTI). The permit was presented to the County Director of Education, Uasin Gishu County who gave the researcher authority to collect data in the respective area of jurisdiction. The authorization letters were presented to the respective school heads to facilitate permission that allowed the researcher interact with the study participants and ultimately collected data using the approved data collection instruments.

3.9 Data Analysis

Data collected for this study was analyzed qualitatively. The first stage was transcribing the information that had been recorded by writing it down. Thereafter a comparison was made to confirm that all the information written had been captured and that none was missed out. After all the information had been printed out, the researcher edited out any information that had been repeated and seemed unnecessary for the study. The next step involved ensuring the rest of the data was grouped as per the research objectives; pedagogical technological knowledge of teachers, training of teachers, school management support mechanism, and the challenges experienced. Finally, in the production of the research report, the researcher narrated through giving an interpretation of the data provided, gave meaning to the phrases uttered by the participants in a manner that made sense. The voices of participants who took part in the study were quoted directly or by rephrasing.

3.9.1 Validity

Validity has been defined as the extent to which the study investigates what it claims to investigate (Yin, 2003). To ensure the validity of the research findings, the researcher used triangulation and member checking whereby data was collected through different sources like interviews, observation of participants in class, and analysis of vital documents to facilitate corroboration of the findings. This enabled the researcher to curb against biasness. An analysis of vital documents to facilitate corroboration of the findings was also conducted.

3.9.2 Dependability

In qualitative research, reliability is termed as dependability. Dependability has been defined as the extent to which the research procedure is clear to enable other researchers to replicate the study and get similar results (Yin, 2003). The researcher ensured dependability through multiple uses of data collection and data analysis strategies to corroborate the findings. This was done through the use interview schedule, observation checklist, and document analysis.

3.10 Ethical Considerations

Ethics in research guides the conduct and behavior of the researcher (Saunders, Lewis & Thornhill, 2016). Good ethical practices ensure a balance is maintained between the need to generate new knowledge and preservation of the dignity and interests of the participants. This study took into consideration informed consent, respect of anonymity and confidentiality as key issues of note while engaging the participants (Fouka & Mantzorou, 2011).

Before going to the field to collect data, the researcher got an introductory letter from the School of Education of Moi University and sought for a research permit and an

authorization letter to carry out the research. The permit and the authorization letter to carry out research were issued by the National Commission for Science and Technology Innovation. The permit was presented to the County director of Education, Uasin Gishu County who gave the researcher authority to collect data in their area of jurisdiction. The researcher sought permission from the Head teachers to collect data from their schools.

Informed consent was assured by informing the participants of their right to willfully participate in the study and in addition upfront full disclosure of the purpose of the study was done hence protecting the liberties of the respondents. Further, the potential benefits of the study were explained to the respondents which also served as an encouragement for them to participate besides the assurance that all they share was to be handled in confidence and their anonymity was guaranteed through assigning of labels in text.

For every interview conducted, the researcher began by assuring the respondent by reading the rubrics outlining the aspects of confidentiality of information obtained and the fact that the data collected was for academic purposes. The interviewer did not request for the respondent's identities but only took note of the school and class to help assign labels hence protecting against any leakage of identities to third parties. This approach was reassuring to the respondents who freely responded to the interview question hence availing rich data for analysis

CHAPTER FOUR

DATA PRESENTATION, INTERPRETATION AND ANALYSIS

4.1 Introduction

This chapter drew upon the main themes and presented the findings which arose out of the interview process, documents analysed and subsequent data analysed. First, a brief profile of each of the participants involved was presented under demographic information. Thereafter the key themes that emerged following data analysis as a result of integrating computers to enhance content delivery by teachers of early grade classes were highlighted too**.**

The research questions that guided the study were: (a) What technological pedagogical knowledge do the teachers possess in enhancing content delivery in early grade classes? (b) How effective was the computer training that teachers attended? (c) How does the school management support the integration of computers in enhancing the content delivery of teachers in early grade classes? (d) What are the levels of challenges faced by the teachers when integrating computers for enhancing content delivery in early grade classes?

In addition, the theory that guided this study was the Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh (2003). The theory was adopted by the study to explain what would encourage early grade teachers to accept and use technology in the delivery of content while teaching.

4.2 Data Presentation

This section presents the demographic information of the respondents, followed by data based on the objectives of the study; Technological pedagogical knowledge of

teachers, Effectiveness of computer training attended by teachers, and Administrative support mechanism provided to teachers when integrating computers in teaching.

4.2.1 Demographic Information

The participants in this study comprised of teachers teaching early grade classes and head teachers of the respective primary schools. All the teachers who participated in the interview were female. Thus it could be deduced that early grade classes were predominately being taught by female teachers agreeing with Skelton (2003) who found that teaching at the elementary level was largely seen as feminine. Studies have also shown that female teachers are regarded to be a better gender when it comes to teaching elementary level because they are believed to be more passionate and committed to teaching than their male counterparts (Saban 2003). However, of interest to this study, is some studies have shown that it is male teachers who were likely to use ICT tools more than the female teachers (Gilbert, 2015). Unfortunately, the absence of male participants in the study was noted making it difficult to draw a comparison.

The ages of participants (early grade teachers) ranged from 25 years to 45years. Of the four head teachers who participated in the interview, three were male and one was female. Their ages ranged between 46 years to 55 years. Most of the teachers who participated in the research had a working experience of more than fifteen years. This indicated that most had enough experience in teaching to understand better ways to improve their instruction. All participants in the study were drawn from day schools which seemed to be the predominant ones in the Sub-County.

Participants coded 1, were the teachers teaching grade one in the schools that the interviews were conducted. Participants coded 2, were the teachers teaching grade

two in the schools that interviews were conducted. Participants coded 3, were the teachers teaching grade three in the schools selected to participate in the interviews and finally, participants coded 4 were the head teachers in the schools that the interviews were conducted. The participating schools were coded as A, B, C, and D (see table 4.1). Hence the final coding of participants took into account teacher's teaching levels and the head teacher's responsibilities.

Table 4.1 Participant codes

SCHOOL		A	B	C	D	TOTAL PARTICIPANTS
	GRADE 1	1A	1B	1C	1D	4
TEACHERS	GRADE 2	2A	2B	2C	2D	4
	GRADE 3	3A	3B	3C	3D	4
HEAD TEACHERS		4A	4B	4C	4D	4
						16

4.3 Study Findings

Data for the study was collected using two data collection tools. These were interview schedules and observation checklists. Document analysis was also conducted to facilitate triangulation of the data collected.

4.3.1 Findings on Technological Pedagogical Knowledge of Teachers

4.3.1.1 Frequency in the use of computers

When the participants were asked on how often they used computers while teaching, eight teachers said that, they used computers once a week, while four stated that, they used them once a month. When probed further as to why they were not using them more often, five of them said they lacked the skills and knowledge that would enable them use computers more frequently when teaching. Three of them said it was due to

lack of power connectivity in their respective classes while, three participants stated that they had a strict timetable that controlled which classes would use the computers at given time and one participant said the use of computers when teaching was an added workload.

When the researcher went through the syllabus it was noted that computers were to be integrated daily in all the learning areas. It was also noted that from the teachers' schemes of work they had indicated areas where computers would be integrated when teaching, however most were not integrating computers.

4.3.1.2 Access and Use of Educative Sites

When participants were asked about which educative sites they were using to access their content, six participants reported accessing content solely from the Kenya Institute of Curriculum Development (KICD) site while six other participants reported accessing content from the KICD site and *i*-mlango site (a non-governmental organization supported site). The six participants who were fully dependent on the KICD site for content said they were only using the already installed content on the computers. When participants were probed further about the efficiency of the sites in availing content, those who depended on the KICD site reported connectivity challenges while those drawn from schools that had access to the *i*-mlango site reported ready access to online content. It was observed that of the four schools that participated in the study, two schools had both computers supplied by the government and computers donated by a non -governmental organization (*i*- mlango), while the other two had only computers supplied by government.

4.3.1.3 Ability to Integrate Computers when Teaching

Seven participants said they were not able to integrate computers when teaching, while five of the participants said they could comfortably integrate computers when teaching. When further probed on how they integrated computers when teaching they said they sourced for relevant information from the internet that was related to what they intended to teach and tried to edit it to fit the levels of the learners. Then they would download the content or activities, save and use it when teaching through a projector.

Of the five participants who said they could integrate computers comfortably when teaching, it was observed that only three were indeed integrating computers when teaching while the two did not actually integrate computers in their lesson but instead gave learners computers to read content as they waited for the respective lessons to end.

4.3.1.4 Benefits of Integrating Computers

When participants were asked of the kind of benefits they had realized as a result of using computers in teaching, seven participants reported that computers had enhanced their teaching while two participants said computers provided for learner independence and three of the participants felt computers brought a paradigm shift from traditional methods of teaching to modern ways.

4.3.1.5 Areas where Computers were more Effectively Used

Computers can be effective in all learning areas depending on how the teacher integrates them in teaching. When participants were asked to state the learning areas they found computers to be more effective when teaching, seven participants reported that computers were more effective when teaching science, four participants said

computers were more effective when teaching social studies while one felt computers were effective in teaching languages.

When the participants were observed during teaching, it was noted that three integrated computers when teaching science and social studies as a resource while nine of the participants gave computers to the learners after they had finished teaching for them to read short stories.

4.3.1.6 Opinion on the Use of Computers when Teaching Early Grade Classes

When participants were asked their opinion on the use of computers when teaching early grade learners, participants gave varied opinions. Seven participants said that computers allowed both the teachers and learners to acquire 21st Century skills, while three participants felt the integration of computers when teaching did not bring much on board. The seven participants who felt computers helped in the acquisition of 21st-century skills stated that more training was needed, while three felt computers would not improve teaching and learning and two participants said computers helped in breaking the monotony of always teaching using traditional methods of chalk and blackboard.

4.3.2 Findings on In-Service computer Training of Teachers

The majority of the participants agreed to have attended some training on computer use before coming to service or after. However, the training mode reported varied from one participant to another. While some went for short computer courses that lasted for a period of three months to six months, others went for government-sponsored training that lasted for three days and other participants learnt the use of computers from friends and colleagues. Seven participants said to have acquired the skills and knowledge through government-sponsored training, five participants

reported to have gone for short computer courses and one participant said she learnt from friends and colleagues. Those who gained knowledge of computer use through government training were the majority.

4.3.2.1 Mode of Training Used

All twelve participants stated to have been trained using computers. However, some added that during training different concepts were explained using the demonstration method then afterward they would be left to form groups to try out the learnt skills.

4.3.2.2 Materials Used During Training

All twelve participants stated to have been trained using computers. They also said they were given notebooks to jot anything they found to be important during the training for future reference. They were of the opinion if they would be given a training manual or modules on computer application to use and refer to after training. However, that was never the case and because of that, they have ended up forgetting most of the skills learnt during training.

4.3.2.3 Effectiveness of the Computer Training Attended

When the participants were asked what their opinion was on the effectiveness of the training they had attended, five of them said it was effective while seven said it was not effective. From the findings, it could be depicted that the majority of the participants who attended a government-sponsored training believed the training was not effective due to various reasons. When the researcher observed some of the participants in class while teaching, it was noted that they were able to perform basic skills like to boot and shut down the computers.

4.3.2.4 Skills Acquired Through Training

When participants were asked about the skills they had acquired through training, they said they had been trained on how to download information from the internet, use spreadsheets (Excel), Word, typesetting, printing of documents, saving of documents, and sending emails. Of the skills stated above, downloading documents and the use of PowerPoint were the skills the nine participants had acquired and could perform them. While three participants said they had not acquired any of the skills taught during training, it was discovered that the participants had not mastered the right vocabulary that went with the skills acquired hence were unable to articulate accurately.

4.3.2.5 Ability to Manipulate Computers

When participants were asked to state their competence when using computers in teaching, seven participants said that they were not competent enough to use the computers when teaching while five affirmed their competence in the use of computers when teaching. When probed further as to what they meant when they said they were competent, the participants said they could boot (switch on) and shut down (switch off) the computer, source for right content from the internet, download, and save the information.

When the participants were observed it was confirmed that, three participants could execute the skills they had mentioned comfortably; use of a spreadsheet, sourcing for content from the internet, downloading, and saving the information. Two participants could boot and shut down the computer but sought assistance to perform other operations. Besides they used terms like switch on and off to mean booting and shutting down of the computer.

4.3.2.6 Challenges Experienced when Using Computers

When participants were asked about the challenges they experienced when integrating computers in teaching, the following challenges were mentioned; poor maintenance of computers, limited knowledge on the use of computers, lack of power connectivity in early grade classes, and internet connectivity. Six participants attested to poor maintenance of computers by the government while seven participants said they had limited knowledge on the use of computers and this discouraged them from using computers when teaching and four stated lack of power connectivity in early grade classes posed as a challenge.

During the observation, it was noted that in two schools, early grade classes were not connected to power. And the teachers could not access the internet for more information because their computer servers were not working and their head teachers were not providing them with internet bundles.

4.3.3 Findings on Administrative Support

4.3.3.1 Number of Computers Available in Schools

When the administrators were asked about the number of computers they had in their schools, one administrator said the school had 20 computers. Another administrator said the school had 25 computers. The third administrator said the school had 30 computers sponsored by the government and 10 computers from the *i*-mlango organization. And the fourth administrator said they had 20 computers sponsored by the government and 5 computers from *i*-mlango. It was therefore evident every school has at least more than 20 computers for the teaching and learning process.

From observation it was noted that schools had the exact number of computers recorded but the number of computers at learners' disposal were less than the stated

numbers. On probing, some administrators said some of the computers had stalled. For instance, in one of the schools out of 25 computers, only 10 computers were serviceable. And in another school out of 30 computers 15 had stalled.

4.3.3.2 Available Computers Verses the Number of Learners in Early Grade Classes

When the administrators were asked their opinion on the number of computers versus the number of learners, their responses were varied. Three administrators stated that the computers available in relation to the number of learners were not adequate. However, one administrator said the computers were adequate but it was later discovered that some of these computers had stalled. When observed it was noted that learners were sharing computers in class. For instance, one computer was being shared by 5 learners.

4.3.3.3 Computer Skills Possessed by Administrators

When administrators were asked about the skills they possessed, most of them said they we able to boot, login and out, keyboarding, go to the internet, sending emails, Excel, and use PowerPoint. Further probing revealed that some administrators sought for assistance when using computers for administrative purposes.

4.3.3.4 How Computers were used by Administrators in School

When administrators were asked how they used computers in school, three administrators said they used computers for registration of candidates, two administrators said they used computers for emailing official documents and two administrators said they used computers for personal reading.

4.3.3.5 Support Provided to Teachers

The administrators stated different kinds of support that they offered to their teachers to encourage them to integrate computers when teaching. Maintenance of computers, in-service training on computer use, and financial support in form of transport to enable teachers to attend training were among those mentioned. Three administrators stated to be allowing their teachers to attend computer training, two administrators mentioned to be offering financial support to enable their teachers to attend training and one administrator ensured that computers were checked and repaired to support the teachers in their content delivery.

4.3.3.6 Opinion on the Use of Computers in Teaching Early Grade learners

When participants were asked of their opinion on the use of computers in early grade classes, two administrators felt that when computers were used well they promoted a friendly environment that promoted learning, one administrator said computers would help both teachers and learners acquire skills that would enable them fit in the global village, one administrator said computers would bring a shift from the traditional way of teaching to modern ways of teaching and another administrator said computers were a good pass time and source of fun to the learners. When the administrator was probed further to understand why he thought computers were for fun and not teaching /learning, he said the learners were still young to use computers for acquisition of knowledge.

4.3.4 Challenges Faced by Administrators when Enforcing the Policy on Computer use when Teaching

The administrators reported to be facing the following challenges when enforcing the policy of integrating computers when teaching. Two administrators said their teachers

had not embraced the use of computers when teaching because they had limited knowledge, one administrator said repair and maintenance of the computers was a challenge, another administrator said early grade classes were not connected to a source of power.

4.4 Data Interpretation and Analysis

4.4.1 Technological Pedagogical Knowledge of Teachers

4.4.1.1 Frequency in the Use of Computers

When participants were asked how frequent they integrated computers when teaching majority of them said they were using computers in teaching once a week. And this was attributed to limited knowledge on how to use computers. These sentiments were captured by the responses given by participant 3A.

> *"I have only used them once. And that was when our head teacher told us some people from the ministry were coming to check if they were being used. Our head teacher understands that we still do not know how to use them when teaching, but always tells us to give learners a chance once in a while to manipulate (for learners to familiarize with) (3A)*

The same sentiments were captured from participants 2A and 2B

> *"I use the computer once a week. I normally teach through my normal way, which is board and chalk. Then I give my learners work to do from the textbook. It is much easier this way. I am not conversant with computers. I can start or switch it off. In fact some of learners are more knowledgeable than me and this is embarrassing. so I avoid such embarrassments. (2A)*

> *"I am not computer literate. So I don't use them when teaching but I can give them computers to read anything of their choice (2B)*

However, there are some participants who said they did not use computers when teaching as often as expected because early grade classes were not connected to power. They said that the only classes connected to power were class seven and class

eight, the administrative block, and the computer rooms that also served as a stores in some cases. This was captured from the responses presented below.

> *"I use computers once a week or month. Imagine our classes are not connected to power, so anytime you want to use the internet or project something for the learners you have to move to the computer room with chairs sometimes you find the lab is so dusty." (2C)*

The theme that emerged was that teachers were not using computers frequently as expected because they had limited knowledge on how to integrate computers when teaching. Some avoided the use computers because of fear of being embarrassed before their learners for not knowing how to operate the gadgets. However, some teachers tried to integrate computers when teaching but the manner in which integration was being done was dependant on the individual skills of the teacher.

It did emerge that a few of the teachers would integrate computers while teaching, others would teach then after the lesson they would guide their learners on what to read from the computers and some would teach using traditional approaches then give learners computers (laptops) towards the end of the lesson to read anything of their choice with minimal or no guidance. It was therefore evident that participants had difficulties on how to link their pedagogical content with technology while teaching mainly because they had not been trained on how to integrate aspects of technology while attending their teacher training courses at the various teacher training colleges and besides they also acknowledged the fact that they did not acquire much during the inservice computer training they had attended recently.

According to Reid, (2002) integration of ICT not only changes the traditional ways of teaching but requires teachers to be creative to adapt and customize their teaching materials and strategies. As earlier stated teachers need to understand how to link their

technological, pedagogical and content knowledge for effective integration of computers when teaching. This can only be possible if the teacher education programs teach pre-service teachers not only how to use hardware and software but also how to incorporate computers into their teaching strategies and activities (Jo, 2013). Indeed, Voogt and McKenney, (2017) indicated that very little attention was given to the kind of knowledge teachers needed to foster early literacy through the use of technology in teacher training colleges. This was further supported by Maina, Ogola, and Mwai (2016) who found out that teachers still lacked the pedagogical skills and knowledge needed to be able to teach with ICT technology successfully .

It could be further deduced that since most of the study's participants had inadequate knowledge on computer use when teaching they prefered their traditional ways of teaching whereby they taught from the text books and wrote assignments on the blackboard for the learners to copy. This agreed with Xiaojun and Jiri (2017), who found that in many schools and universities, classroom teaching was still dominated by traditional education which was characterized by textbooks, blackboards, chalk and talk. However, these findings disagreed with Rashedul and Abu (2016) who found out that integration of ICT made teaching and learning very easy, interesting and time saving as compared to the traditional ways of teaching and learning.

4.4.1.2 Educative Sites when Teaching

When participants were asked to state the sites they found educative, six participants said they did not visit any education sites, but used content that was already installed in the computers by the Kenya Institute of Curriculum Development (KICD) while the other six participants drawn from the two schools that had both government and non-governmental organization (*i*-mlango) computers reported to accessing additional

content from the *i*-mlango site. It thus emerged that participants used content from

KICD and *i*-mlango sites.

Participants from those schools that had computers sponsored by the government

could not use the internet because the servers had failed and teachers said the

administrators were not willing to provide them with finances to purchase bundles.

They further stated that their early grade classes were not connected to power which

limited their use of computers. They could only use computers offline and at times the

computers would lose battery before the lesson ended. However, the other two

schools that had computers from *i*-mlango would log into their site with minimum

trouble because they had been provided for internet access. The following were the

responses from the participants.

> *"We have computers provided by the government and those*
> *sponsored by an NGO called i-mlango. The content in government*
> *sponsored computers is provided by KICD. For i-mlango computers*
> *we visit their site that provides a variety of learning activities for*
> *teaching." (1C)*

 Another participant said that,

> *"I only use the content in the computers. We do not have internet*
> *because the server does not work and the school is not ready to*
> *support us get the bundles. In fact, the head teacher once said a*
> *good teacher should go out of her way to make learning possible. I*
> *find that to be too demanding."* (2B)

It was true to state that the servers that were meant to assist the participants browse

the internet were not working. This was contrary to Tinio (2008) who stated that

primary school institutions were working towards overcoming infrastructural

challenges as demonstrated by the presence of internet connectivity in schools.

4.4.1.3 Benefits Realized when Using Computers

When participants were asked about the benefits they had realized as a result of using computers when teaching, most of the participants said that computers had enhanced their teaching. This was captured by the responses below.

> *"Integrating computers when teaching has improved the way I present content to my learners. My learners are gifted differently. Some understand fast, some need time to understand what has been taught. When I use computers during the lesson, I vary the teaching activities that I use to cater for all the learners. Depending on their ability, I give them different tasks but on the same content. Computers also draw the attention of the learners especially those who had switched off because of teaching using a common style each day." (1A)*

This was supported by another participant who observed that; -

> *"I like using computers because they help in bringing in activities that cannot be found in books. For instance, when I was teaching my learners parts of the body. I grouped them then one group drew a person and named the parts, another group had a puzzle of the parts of the body to fill and the last group was searching for the names in a pool of words. Afterwards I would give them an opportunity to share what they have learnt from the computers with their fellow learners."*

It emerged that the common theme as expressed by the responses was that computers enhanced teaching. The participants said computers enabled them to vary their activities during teaching to cater for every individual learner. They also affirmed the fact that computers drew the attention of those learners who may have switched off from learning may be because of using one mode of teaching hence monotony and boredom. They also further stated that computers gave learners a chance to think critically on how to solve certain tasks on their own but under guidance, in so doing they learnt from each other.

This, therefore, meant that computers played a fundamental role in improving the way teachers delivered their content to learners. This agrees with Janice, Woodrow, Jolie,

Mayer-smith, and Pedretti (1996) who found that technology enhanced teaching and learning practices for both teachers and learners in secondary schools when teaching science. This was further supported by Mercedes and Sanga (2016) whose results indicated a higher improvement in teaching and learning process in schools that had integrated ICT as an innovation factor.

4.4.1.4 Areas where Computers Were Effectively Used

When participants were asked to state learning areas where they found computers to be more effective when teaching, the majority of them said that computers were effective when teaching science. This was captured as stated below;

> "*Computers are good when teaching science. This is because some drawings need some form of accuracy for the picture to be understood by the learners not just sketching. For instance, you want to show your learners a frowning face, sad face, smiling face and many more. Computers can help bring this out very well.*" (2A)

This was further supported by another participant who stated that,

> "*Computers can really assist when teaching hygiene and nutrition (science). They help capture progressive processes like germination of a seed. This is something that cannot be shown by use of chalk and board. It also gives learners an opportunity to see how seeds germinate instead of imagining.*" (3A)

However, there are those who felt computers were more effective when teaching social studies. This was the response from one of the participants.

> "*When teaching social studies, some of the educative sites like museums, historical sites that are far from learners reach can be brought nearer by the use of technology.*" (2B)

The theme that emerged from the responses given by the participants was that they found computers more effective when teaching science because computers can assist capture simulation processes like the germination of seeds, demonstration of certain actions that may be hard to explain verbally or show literary. This finding implies that computers are effective because they help in showing scientific processes that cannot

be demonstrated well by the use of chalk and board. By using computers learners are relieved from the burden of imagining but instead are allowed to see things in their natural set up which may enhance their understanding. Another participant said computers gave their learners a chance to see historical sites that learners would not have got an opportunity to visit because of distance. Thus computer reduce the cost of education especially by providing cheaper options to fieldwork or trips.

These findings concur with a study by Janice, Woodrow, Jolie, Mayer-smith, and Pedretti (1996) who found out that implementation of technology-enhanced secondary science instruction resulted in significant improvement in the teaching and learning practices of teachers and learners. However, Ghavifekr and Rosdy, (2015) found out that computers were appropriate when teaching all ranges of subjects from mathematics, languages, science, art, and humanities but the effectiveness was dependent on how well the teacher does it.

4.4.1.5 Opinion on the Use of Computers when Teaching Early Grade

Most of the participants stated that computers would help in the acquisition of 21st-century skills however they were of the opinion that computers would be more effective when teaching older learners. They appreciated that the use of emails and smartphones were some of the 21st-century skills.

> *"Our learners need the computer knowledge to be able to fit in this 21st century world. Everything is done using computers. Imagine during our time when sending letters, we used to go to the post office to buy stamps and the letters would get to its destination after two weeks and today it is done through email and the response is immediate. So computers are good but at a certain level or age. These early grade learners are still young and using computers when teaching may have little effect as compared to using them for recreation or fun."*

Another participant said that,

> "*The world has changed from analogue to digital era. Learners have also learnt some of these 21st century skills like use of smart phones to assess information in the internet. For instance, my learners look for bible stories. They operate their parent's phones very well, unfortunately some sites are not good for our young learners and they end up practicing what they see. A lot of guidance and supervision is needed. Therefore, teachers should tap this knowledge and bring it into the classroom. However, the government needs to do more training to teachers to understand how to effectively use computers when teaching.*" (3A)

> "*I think it is good for our learners to know how to use computers to help them fit in the future world but our young children have learnt a lot of bad practices related to sex through these computers.*" (3C)

The theme that emerged from the participant's responses was that computers would enable learners to acquire 21st century skills. 21st century skills varied from one participant to the other, some participants defined the skills as being able to use smartphones, sending emails while others defined the 21st century skills as the use of computers in teaching and learning through sourcing for information from the internet. Despite the benefits noted, the reservation expressed by participant 3C concurred with a study by Dick, Cherly, Vivienne, Daniela, and Denise (2016) that found teachers at the university were skeptical of utilizing computers for instructional purposes despite the fact that technology had infiltrated most of the sectors.

4.4.1.6 Challenges Experienced when Using Computers

When participants were asked of the challenges they experienced when using computers, the following challenges were mentioned; poor maintenance of the computers, limited skills and knowledge on the use of computers, lack of internet connectivity and power connectivity in early grade classes. Majority of the participants stated limited skills and knowledge on the use of computers as the

greatest challenges they experienced when teaching. For instance, one of the participants said,

> *"The knowledge that I have on how to use the computer is still basic. I wish more training on how to teach with computers will assist us so much. Because as of now I don't know how to link my lesson with the computer, so I prefer giving my learners computers after have finished teaching" (2B)*

This was further reiterated by another participant.

> *"I use the computer when teaching but it is because I get help from one of our teachers hired by board of management. He is good in computers. So I ask him to operate the computer as I guide my learners" (3C)*

From the responses presented the most common theme that emerged was that majority of the participants were not integrating computers when teaching because they had limited knowledge and skills. Some of the participants were willing to integrate computers when teaching but they still lacked the expertise and had to seek help from colleagues. They were of the opinion that if more training opportunities would be given especially on how to teach using computers to avoid the challenges they were facing. Some participants also stated that some of their computers had stalled and their general performance was slow. Some did not boot and some did not shut down when given the instruction suggesting infestation by virus arising out of poor maintenance and servicing practices. This greatly comprised the available serviceable computers for teaching.

The participants expressed their frustrations by stating that the people in the County in charge of repairing and maintaining the computers visited schools but they did not repair the computers, instead they took the serial number of the computers that were not working and promised to return never to show up again. They said because of this

kind of limitation they found the whole process of using computers when teaching to be frustrating and time-consuming.

Generally, the emergent themes agreed with Maina, Ogola, and Mwai (2016) who found out that teachers still lacked adequate pedagogical knowledge needed to be able to teach with technology successfully. The themes also buttressed the findings by Mauta and Margaret (2014) who found that Kenya as a Country was not ready to integrate ICT in the pre-school curriculum since the trained personnel, physical facilities, electricity, poverty, and teachers' attitude needed to be addressed. Kalogiannakis (2010) also found out that teachers were prepared to use ICT in their daily school practices but expressed their wish for a further training program to acquire the necessary knowledge and skills.

4.4.2 In-Service Training of Teachers

4.4.2.1 The Knowledge on the Use of Computers

The study found out that most of the participants acquired the skills on the use of computers through in-service training that had been organized by the government, some however had undertaken short computer courses before getting into teaching service while a few had learnt from friends and colleagues. Some of the responses from the participants who attended in-service training on computers use are captured as below; -

> "*I was asked by my head teacher to attend computer training that was to be done for three days during holiday.*" (1B)

This was supported by another participant.

> "*All early grade teachers we were to go for computer training that had been organized by the government for three days. Our head teacher told us that after training we were expected to use computers when teaching.*" (2D)

However, some participants indicated to have learnt from friends, for instance participant 3D responded as follows when asked about computer training.

> "*I have never attended any class or training to be taught on how to use the computer. I developed the interest and brought a laptop. I would go to my friend's house every evening to seek for help on how to operate the computer. But as time passed by I learnt some other things through discovery.*"

From the responses given the theme that emerged was that most of the participants gained the knowledge on how to use computers through government in-service training they had attended. Some of the participants confirmed to have had no prior knowledge on computer use in aiding teaching. With the new and ever-changing global demands in education, teachers are forced to evolve from traditional ways of delivering content to modern ways. Therefore, it was important for the government to equip the participants with the necessary skills that would enable them to use these computers in a more productive way when teaching. This was in line with Mbulankende, (2007) who recommended that continuous training would provide the necessary foundation and support from which teachers would continue to keep updated with ICT and its application to subject pedagogy to enhance their teaching.

4.4.2.2 Mode of Training

The common theme that emerged as relates to mode of training was computer-based training. The entire group of study participants reported to have been trained using computers. Demonstration, interactive discussions in groups, practical training were also mentioned as other ways that trainers had used to pass content. Demonstration is a technique under instructor-led training under which participants are shown how to operate computers by their trainers before they are put in groups to interact and discuss what they had learnt. Group discussion is also a technique in interactive

method of training where in groups, participants discuss what they had learnt, the technique gives an opportunity to those participants who have not mastered certain concepts and skills to understand them better. Hands-on training on the other hand is a technique where participants are allowed to try out or practice the skills attained by getting their hands on to the computers. It is also referred to as practical training. Below are some of the responses captured from the different participants.

> "*The trainers demonstrated to us what they expected us to do, and then in groups we were given tasks to attempt. But the trainers were three and the groups were ten. By the time the trainer comes back to give more direction the time is over.*" (3A)

Another participant said that

> "*The facilitators used computers to train us. After explaining and demonstrating certain skills to be learnt, they would allow us to be in groups to try the skills using the computer. Much of what we learnt was how to operate the computer.*" (2C)

> "*We used computers. The trainer would demonstrate to us steps to follow then in our groups we would practice. For example, we would be asked to enter individual marks of pupils and get total marks. Then the trainer would go round checking which group managed the task. However, what we learnt was not how to teach with computers but how to use the computer to perform certain tasks.*" (2B)

This implies that trainers incorporated different modes of training to explain concepts to participants. The strategies used by the trainers were effective to meet the needs of every individual participant. Sedega *et al* (2019) found out that majority of the teachers who attended the INSET program stated it to be effective, However, they thought if organizers of in-service training programs would ask for trainers to focus on the needs of teachers in various subjects, the trainings would have been better. The reason behind this argument was that even after the training, teachers were still unable to perform as expected of them at their workplace. This could be related to the apparent discrepancy between the training and training needs of the participants.

The trainers were also few and this brought a challenge when instructing the participants. This had been observed by Wambugu, Ogenga, Shikali and Muliaro (2017) who noted that the inadequate number of trainers in modern technology, mismatch of skills learnt, and demands of the labour market were weaknesses that impeded the use of computers as identified in the e-Government strategy.

4.4.2.3 Material Used During Training.

All the twelve participants stated to have been trained using computers. They also said they were given notebooks to jot anything they found to be of importance during the training for future reference. The theme that seemed common among the participants as regards materials was that computers were used during training. It, therefore, meant training was computer-based. Computer-based training requires adequate provision of computers for the trainees to have an equal chance to practice. Otherwise, some may leave the training without having learnt much. Based on the responses from the participants as captured below, it emerged that computers availed during the training were too few to accommodate and allow all the participants to practice the skills thoroughly.

> *"Apart from the computers we were also given notebooks to jot anything we found important during training. But it would have been better if they gave us modules to refer to after the training is over."* *(1A)*

> *"Trainers gave us small notebooks to write on. In our groups we had desktop computers to practice with although the computers were few in relation to the number of participant in every given group. For instance, in my group we were seven participants. Not all of us got the opportunity to practice with the computer. Besides the trainers were three. So one trainer would move from one group to another guiding, by the time they get back to us time has gone"* *(1D)*

From the responses given it is true to say that some participants may have left the training without having got the opportunity to interact with the computers because of

their limited number or got an opportunity to ask questions related to computer use and get appropriate feedback. This is in line with Nwana, Ofoegbu, and Egbe (2017) who found that many of the ICT resources required for the teaching of computer education were not available in schools. This indeed remained a constant challenge to the participants when they got back to their respective schools more especially when it came to integrating computers when teaching.

4.4.2.4 The Effectiveness of the Computer Training Attended

Most of the participants who had attended the in-service computer training sponsored by the government said that it was not effective. These sentiments were presented as captured in the responses below.

> "*It was during holiday when my head teacher called to let me know that I was to attend a computer training that was to be done for three days. I went for those three days but I feel I didn't learn much, the only thing I can remember from that training is how to switch on and off the computer, and we were also taught on how to use computers to enter learners' marks. I don't know how it is called. We were so many and the computers were few. I did not even get a chance to try what I had learnt practically.*" (1B)

This was reiterated by another participants who stated that,

> "*I attended a training on digital literacy for three days.We were taught on how to use the computer basically.I think I now know how to start the computer and switch it off. I did not get much on how to teach using the computer. Three days were not enough especially for those of us who were coming into contact with computers for the first time.They should have given us more time.*"(2A)

However, there are those who felt the training they had attended was effective from the responses given.

> "*Had it not been for the short computer course that I took some time back, I would not be able to use the computers .Although I have started to forget some things because I don't use the computer so much and more especially when teaching.*"

The common theme that emerged from the responses above, was that the government training was not effective because of factors like the duration of the training, the needs of training, and the number of computers used during the training. The participants said the training was done for three days and most of them had no prior knowledge of computers. Therefore, they felt the days allocated for the training were not enough for them to grasp the concepts of computer integration when teaching.

Participants also admitted that most of what they were being taught was basically on computer applications and not on how to link these skills to daily teaching. They reported to have been trained on the following skills; how to boot and shut down the computer, excel, word processing, information storage, and web browsing. They also said they were many during the training and the computers were not enough to allow them to practice the skills taught.

For any training to meet its objectives, it has to meet the needs of the training, provide ample time for the participants to learn and practice the skills learnt among other factors. Otherwise, the entire process would be of little value to both the teachers and the learners. After training it was important for the teachers to exude confidence in the use of computers and also improve on the related vocabulary. However, From the responses given during the interview, it would be rightly deduced that the participants had not learnt the necessary skills and the right terminologies related to computers. For instance, most of them were saying, switching-on to refer to booting, switching-off to refer to shutting down the computer, and how to enter learners marks in reference to the use of excel as a package.

These findings agreed with Atef (2011) who indicated that ICT professional development courses for teachers were essential in improving their skills and knowledge. However, noted that the conduct and nature of these courses in terms of timing and mode of training had an impact on the effectiveness of the training. Muriuki (2017) also established that training was important if the skills to be learnt matched the ICT needs of schools. Omar (2014) also indicated that in-service training was very important in assisting the teachers to be able to apply the knowledge acquired in teaching and learning. However, the same study observed that factors like administrators, teachers' attitude, training needs, and strategies in conducting in-service training contributed to the effectiveness of training.

4.4.2.5 Skills Acquired Through Training

When the participants were asked about some of the skills they had acquired through training, nine of them stated they were able to download and save the documents, use the key board, word processing, printing of documents, and use of excel and power point. Three participants said they did not acquire any of the skills taught during training. Some of the views were as captured by the responses given below.

> "*I learnt how to use the key board; word processing; printing, Use of projector; web browsing and how to use excel (1C)*

Another participant said that;

> "*We were taught on how to download documents from the internet and information storage, and on the use of the projector. (2C)*

However, some participants agreed to have been trained on certain skills but they had forgotten.

> "*I remember we were trained on how to download documents from the internet, save the document and print it. But I have forgotten the steps to follow. I always seek for help from colleagues when am teaching.*" *(2B)*

The themes that were common across the majority of the participants involved in the study were web browsing, downloading documents, printing, saving of documents, and the use of a projector. These skills are important when integrating ICTs to enhance teaching. For instance, if a teacher knows how to download documents from the internet then the same knowledge can be used to download documents or activities that are related to teaching and learning, save the document and use the projector to present the content to learner

4.4.2.6 Ability to Manipulate the Computer after Training

From the findings most of the participants said that, they were not competent enough to integrate computers when teaching. They attributed their inability to manipulate computers well to the training they had attended. For instance, participant 1A observed,

> *"My opinion is lack of practice or use when teaching has led to low competence in the use of computer. I cannot operate the computer well because I have forgotten most of things that we learnt during training." (1A)*

This was reiterated by another participant who stated that;

> *"My ability to use computer is below average for lack of practice and regular use."(2A)*

However, some participants said they are able to use the computer.

> "*I can use the computer well when teaching or doing my personal work.In fact I am the ICT champion(ICT guru) in the school. Whenever there is anything related to computers or any question am the person responsible.(1D)*

> "*I can operate the computer but there are a few area I still have a challenge..what am not able to do, I seek for assistance from my colleague hired by BOM to assist us with computer related issues.In fact you can not give an excuse for not using computer when teaching."(3D)*

The common theme that emerged was that participants had limited knowledge in the use of computers even after attending an in-service training on computer integration. From the responses given, some participants had forgotten most of what they learnt during training due to lack of practice while some tried to integrate computers in teaching through seeking assistance from a colleague who had been hired by the BOM to assist on matters related to computers.

It can be further stated that the school policy on the integration of computers when teaching played a major role. Administrators who made computer integration a policy in their institution and provided any necessary help to their teachers encouraged the use of computers more than those administrators who did not make any effort. This agrees with Becter (2007) who found that the successful implementation of ICT programs in schools that had vision, expertise, infrastructure, and digital content and application depended on sound school leadership.

4.4.3 School Administration Support

4.4.3.1 Number of Computers Available in Schools

Most of the administrators reported to be having more than 20 computers in their schools. For instance, participant 4 A reported having 20 computers in the school.

> *"We have 20 computers to serve a class of between 40 to 50 learners (4A)*

Another administrator confirmed availability when he said;

> *"We have 30 computers sponsored by the government, 10 computers from I-mlango NGO and 1 computer in my office donated by alumni from United States of America. From grade one to three we have sixty learners per class. The computers available are enough because teachers use the computer room in shifts" (4C)*

From the findings, it is obvious that all the schools that participated in the study had computers. This was in line with the initial objective of the Kenyan government to

ensure every public primary school be supplied with computers as an initiative to support and encourage the use of computers in teaching and acquisition of 21st-century skills. The finding affirmed Rosen and Weil (1995) assertion that computers were available in schools, however they were not being used by many teachers due to factors like most teachers being technophobic more especially elementary teachers and secondary humanities teachers

4.4.3.2 Available Computers Verses the Number of learners in Early Grade

From the findings the theme that emerged was that as much as the computers were available in schools, they were inadequate due to poor maintenance practices. Participant 4C observed as much,

> *"The computers that were given by the government most of them are not working. And the ten that were sponsored by i-mlango are not enough for a class of 84 pupils." (4C)*

These sentiments were echoed by another administrator.

> *"I think the computers are inadequate to cater for a class of 61 learners. Most of them have stalled. We have made several calls to get somebody from the education office to come and check on them but our efforts have been futile." (4D)*

It is therefore evident from the responses given by the administrators to conclude that the government may have provided computers to schools for purpose of teaching and learning but it had neglected its major duty of repairing and maintaining them. This tended to reduce the rate of computer integration by the teachers because of the inadequate number of computers. This was also likely to lead to scrambling by learners for the gadget before and during the lessons. This finding agrees with a study by Damoah, Akwei, and Mouzaghi (2015) on causes of government project failure in developing countries that established that monitoring, corruption, political interference, bureaucracy, and change in government were among the causes of

failure of government projects. For this study, follow up through regular maintenance was a factor that most administrators felt had contributed to the failure of the computer integration initiative.

4.4.3.3 Computer Skills Possessed by Administrators

When the participants were asked to describe their computer skills most of them said they were able to boot, shut down, keyboarding, word processing, and browse the internet for personal reading. Occasionally, one of the participants would seek assistance from the teachers hired by the Board of Management (BOM). They stated these skills were important to enable them use the computers for administrative purposes like registration of candidates and communicating with parents on matters related to school among other things. This meant that the administrators had embraced the use of computers in schools regardless of their basic skills. For computer integration as a program to be adopted and sustained in schools, the administrators must be competent and have a broad understanding of technical pedagogical, administrative, and social dimensions of technology in education (Sife, Lwoga, & Sanga, 2007). Mbithe, Maithya, and Cheloti (2016) also established that majority of the head teachers and teachers had basic ICT literacy while only a few integrated it in teaching and learning as exhibited in responses below.

> *"I can switch on and switch off the computer, type using the key board and go to the internet for personal reading or communicating with parents. But in certain instances I use the teacher hired by BOM to help me with some operations like registration of candidates." (4C)*

Another participant said,

> *"I can do most of the things using the computer. I can boot, shut down the computer, check my emails, and make official communications with parents and registration of learners NEMIS" (4D)*

4.4.3.4 How Computers are used while in School

When the administrators were asked how they used computers, most of them said they used them for registration of candidates for national examinations. This was captured as presented below.

> "*I use computers for registration of candidates, emailing teachers information regarding TPAD to the employer and personal reading from the internet. Rarely do I use computers when teaching. (4A)*"

This was further supported by another administrator who said that;

> "*I go to the internet to look for information whether related to learning or for self-development, registration of candidates and typing official letters for parents' meetings in school. I may source for information from the internet that will boost my content but I do not use the computers for teaching.*" (4B)

The theme that emerged across for all the administrators was they used computers for registration of candidates and writing invitation letters to parents to attend meetings in school. From the findings, it was clear that majority of the administrators were using computers for administrative purposes and not for teaching. This is contrary to Biegon (2017) who found that public secondary principals were not keen to implement the use of ICT in management but instead used it in teaching.

4.4.3.5 Support Provided to Teachers

The administrators stated different kinds of support that they offered to their teachers to motivate them integrate computers when teaching. These included maintenance of computers, in-service training on computer use and financial support to the teachers inform of transport to attend trainings as reported by participant 4C.

> "*I ensure that they attend the trainings when asked by the Ministry of Education. We have had two training on computer use and as a head teacher I made sure one teacher from early grade class attended the training. I also gave them money to cater for their transport and meals for those the days they were there.*" (4C)

Another administrator stated that;

> *"I make sure my teachers attend the trainings whether on computer use or training on Competence Based Curriculum. I also make an effort to call the people in charge of computers (i-mlango) to come and give more insight on their site and how to use when teaching."* (4D)

The common theme was early grade teachers were supported through the provision of training opportunities and financial support to cater for their transport and meals during the training period. The administrators affirmed that computer training programs had been conducted twice since the program started. Training especially on newly initiated programs like the integration of computers requires time and more training sessions for the teachers to be able to master the skills (Murphy & Huffcutt, 2005). The findings however contradicted the responses given by some participants (teachers) who stated that the administrators did not provide them with sufficient transport and on many occasions, to the extent they ended up financing themselves.

Kariuki (2004) argued that teachers who got adequate ICT support from their administrators got encouraged to use computers when teaching unlike those who did not get such support. Sife, Lwoga, and Sanga (2007) suggested that the lack of technical, administrative, and financial support as some of the challenges that hindered teachers from integrating computers when teaching. The training opportunities and financial support offered by administrators are meant to develop teachers' efficiency and effectiveness in the integration of computers when teaching. Administrative support can be in form of incentives, financial support, and training opportunities on the use of computer.

4.4.3.6 Opinion on Integration of Computers by Teachers of Early Grade Classes

When administrators were asked to give their opinion on the use of computers when teaching early grade learners, they said it enhanced teaching; it assisted in the acquisition of 21st-century skills; and facilitated a shift from the traditional way of teaching whereby the teacher stands in front of the class to teach and give assignments to the learners. This was captured by the sentiments from the administrator 4D,

> *"Computers give my teachers an opportunity to use different styles in teaching certain topics. Teachers can put learners in groups of ten and ask them to discuss pictures related to what they are being taught. Computers also offer a variety of activities from those provided in the books." (4D)*

The same sentiments were captured from another administrator.

> *"Computers provide teachers with so many activities to work with on the same concepts. It also gives the teachers a chance to vary their teaching methods, to break the monotony of always writing on the board and reading from the textbooks. I once attended art and craft lesson and saw learners in grade one drawing pictures, images and erasing using an eraser from the computer. As they were doing all these the teacher was going round in their groups guiding them. It was fun for those young ones." (4B)*

However, one administrator stated that early grade teachers found it difficult to teach using computers because the learners were still young to understand the value of integrating computers in their teaching. He further stated that computers at that level (early grade classes) were not for the acquisition of knowledge but as gadgets for entertaining the learners and passing time. This, therefore, meant that some administrators did not see the value of integrating computers in teaching despite the efforts made by the government in ensuring the integration was a success.

The common theme that emerged from the responses was that computers enhanced content delivery by the teachers. Some administrators were convinced that computers improved teaching but only if done well. They acknowledged that computers played a

great role for both the teacher and the learner. They admitted that teachers who were so accustomed to traditional ways of teaching which involved the use of chalk and board had also realized that computers enabled them to deliver the same content in a more refined manner and it allowed them to cater for every individual learner. Generally, the findings agree with Mercedes & Sanga (2016) who in analyzing what was happening at schools regarding the integration and use of ICT, noted a higher improvement in the teaching and learning process in schools that had integrated ICT as an innovation factor.

4.4.3.7 Challenges Faced by Administrators when Enforcing the Policy on Computer Use

The administrators highlighted some of the challenges that they faced when enforcing the policy on integrating of computers when teaching. They stated the following challenges; limited knowledge by the teachers on how to use computers when teaching, lack of repair and maintenance of computers by the government and negative attitude by the teachers towards the use of computers when teaching.

> "*I have teachers who integrate computers when teaching and there those who do not because they have not mastered the skills of using the computers. In fact, the teacher hired by the BOM assists the teachers so much in the use of computers. At times during games time he gives them lessons on how to use computers (4C)*

Another participant acknowledged that most of the teachers had limited knowledge of computer use. And because of this deficiency, the teachers would give numerous reasons against the integration of computers when teaching. However, another administrator stated that the integration of computers when teaching was far from realization in early grade level because the government had not taken maintenance and repair of computers seriously.

> "*Most of the teachers are not using these computers when teaching as expected because the computers frustrate their efforts. Most of them have stalled. And the government or the people in charge of these computers have never sent any personnel to come and repair those that have stalled. As an administrator I have made several efforts to call but no one has ever come.*" (4D)

The greatest challenge that seemed to be shared among the administrators as they enforced the policy on the integration of computers in teaching was limited knowledge among the early grade teachers. It was apparent that most of the teachers may have attended computer training to equip themselves with the necessary skills that would boost their competence in the use of a computer when teaching but the skills obtained were still inadequate. It could also be presumed that because of limited knowledge a few of the teachers preferred using computers as an amusement gadget for their learners instead of a tool for knowledge acquisition.

This was supported by Maina, Ogola, and Mwai (2016) who found out that teachers still lacked the pedagogical skills and knowledge needed to be able to teach with ICT technology successfully. Owing to this Newby *et al* (2012) established that in Uganda teachers were using computers primarily to attract students and not for the acquisition of knowledge. Muriuki (2017) also found that most of the schools that had attempted to introduce computers in teaching at the primary school level had faced numerous challenges that some opted to drop their use in teaching. And finally, Mauta and Margaret (2014) indicated that Kenya as a country was not ready to integrate ICT in the pre-school curriculum since the trained personnel, physical facilities, electricity, poverty, and teacher's attitude needed to be addressed first.

4.5 Summary of the Chapter

This chapter gives a presentation of data collected, its interpretation and analysis based on the four study objectives namely; Technological pedagogical knowledge of

teachers, the effectiveness of computer training, administrative support mechanism, and the challenges experienced in integrating computers when teaching. In the chapter it was indicated that integration of computers was still low because of minimal knowledge by the teachers on the integration of computers when teaching. It was also deduced from the responses by the participants that the in-service training was not effective and finally the support provided by the administrators was minimal hence not fully appreciated by the teachers.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study findings, conclusion, and recommendations in relation to the findings and literature reviewed. The study sought to explore the integration of computers by teachers in enhancing content delivery in early grade classes in public schools in Moiben Sub- County, Uasin-Gishu County. Specifically it was to; Assess the technological pedagogical knowledge that the teachers possessed in enhancing content delivery in early grade classes, Assess the effectiveness of computer training for teachers for instructional purposes in early grade classes, Establish the school management support mechanism in the integration of computers in enhancing content delivery of teachers in early grade classes and Explore the levels of challenges faced by the teachers when integrating computers to enhance content delivery. The study was guided by the Unified Theory of Acceptance and Use of Technology by Venkatesh *et al* (2003). The data was collected qualitatively through interviews, observation checklist, and document analysis and analyzed thematically. A summary of the findings is made based on the objectives of the study as presented.

5.2 Summary of Findings

5.2.1 Technological Pedagogical Knowledge in Enhancing Content Delivery

The study assessed the technological pedagogical knowledge that the teachers possessed to enhance content delivery in early grade classes. From the findings, majority of the teachers reported to be solely using the content provided on the computers by the Kenya Institute of Curriculum Development for teaching. They

admitted to be lacking the understanding and knowledge on how to source for relevant and appropriate content and activities from the internet in various learning areas. They confessed to not knowing the best way to integrate ICTs within given lessons during teaching. It was however noted that integrating computers when teaching was being done at different levels and manner depending on the technological pedagogical knowledge of the participants.

There were those teachers who would teach and integrate computers during the lesson hence enhancing the way they delivered content to their learners. Others would teach and complete the lesson then give learners computers to read further on their own on what had been taught and finally those who would give learners computers to read anything of their choice after teaching and leave them unsupervised. From the aforementioned, it could be concluded that a few of the participants/teachers were integrating computers but at different levels and manner depending on the TPACK knowledge that each participant possessed. From the findings, it can be deduced that teachers who participated in the study had minimal Technological pedagogical knowledge which deterred them from integrating computers when teaching. This finding agreed with Maina, Ogola, & Mwai (2016) who found that teachers still lacked the pedagogical skills.

5.2.2 Effectiveness of In-service computer training for computer integration.

The study sought to establish the effectiveness of computer training for in-service teachers for instruction in early grade classes. From the findings, the majority of the participants stated to have acquired the skills on how to use computers through the government sponsored training. The training was conducted over the holiday for a

period of three days, however, the participants felt the training was not effective because of varied reasons as discussed below.

The participants said three days were not enough to allow them to learn the requisite skills that would enable them to integrate computers comfortably and with ease when teaching. They further stated that they did not get ample time to practice and familiarize themselves with the computers. Consequently, they reported to still face numerous challenges when using computers because most of them had no prior knowledge. They further stated that the training needs were on how to integrate computers when teaching but instead, the training focused on elementary skills like how to operate the computer such as booting, shutting down the computer, word processing, excel among others. Thus at the end of training, the training needs of the teachers and the school as a whole were not met.

Besides, the computers were few in relation to the number of participants who attended the training. Therefore, not all the participants got the chance to manipulate the computers and familiarize themselves with the gadgets during the training session. The participants were of the view that if the trainers had given them computer modules after training to use as reference documents, attainment of the training objectives would have been enhanced. Overall the participants stated that the in-service training on computer integration did not help them acquire the requisite skills that would have encouraged and motivated them to integrate computers when teaching. This finding made sense of Mbulankende, (2007) recommendation for continuous training of teachers for them to obtain the necessary foundations.

5.2.3 School Administration Support

The researcher wanted to establish the administrative support mechanism offered to teachers to promote the integration of computers when teaching. As discussed earlier for the success of any program in an institution there is a need for administrative support and involvement. From the findings, the administrators stated to have provided both financial support and computer training opportunities to their teachers to acquire the requisite skills needed to promote the integration of computers when teaching. However, the financial support provided was minimal as stated by the participants in the study.

The administrators stated that in-service training on computer integration was done once. For some, they ensured the policy of integrating computers when teaching was upheld within their schools hence they hired an expert on computers to assist the teachers with more learning opportunities. The administrators further stated that most of the computers had stalled and the people in charge of repair and maintenance within the County had not taken any lead as expected. Most of the participants stated that early grade classes had not been connected to power and had no electrical outlets such as sockets and plugs to enable them to charge the computers in case they run out of power during the lesson. Besides teachers were not provided with bundles to enable them to browse the internet since the servers that were meant to provide internet connectivity were not working.

The study drew the conclusion that administrators should provide a supervisory and supportive role to their teachers to encourage the integration of computers when teaching. They should ensure that early grade classes are connected to power and have electrical outlets to motivate and encourage the teachers to teach with minimal

worries of computers running out of power. The participants admitted that these factors contributed greatly to the minimal integration of computers when teaching. This finding agreed with Kariuki (2004) that indeed administrative was key for teachers to integrate computers when teaching.

5.2.4 Challenges

The study findings evidently showed that computers did not work in isolation but were aided by infrastructure that supported their functions. This infrastructure includes power connectivity and working internet connectivity. From the study findings, power connectivity emerged as a challenge that teachers experienced when using computers in teaching. The findings further revealed that the only structures that were connected to power, in some of the schools where the interview was conducted were the administration block, grades seven and eight classes, and the computer room which on many occasions was used as a store. Most of the grades one, two, and three were not connected to power and had no electricity outlets like sockets and plugs.

Another challenge that was mentioned to have hindered the integration of computers in teaching early grade classes was poor internet connectivity. Some teachers said they only used the content provided for in the computers instead of sourcing for more relevant content from the internet because the servers that were meant to provide the internet were not working. The identified challenges seemed to reflect those identified by Sife, Lwoga, and Sanga (2007) who identified lack of technical, administrative, and financial support as challenges that hindered teachers from integrating computers when teaching.

5.3 Conclusions

The study sought to; assess the Technological pedagogical knowledge of teachers for teaching by early grade teachers, determine the effectiveness of in-service computer training of the early grade teachers, establish the administrative support mechanism provided to early grade teachers to enhance computer integration during their lessons, and determine the challenges faced in the integration of computers for enhanced teaching in early grade classes in public primary schools in Moiben Sub-County, Uasin Gishu County.

Technological pedagogical knowledge in enhancing content delivery

The teachers were integrating computers when teaching at a minimal level and manner due to the minimal technological pedagogical knowledge they possessed There are those who would teach and give learners computers to learn more on what had been taught. While, there are those who would teach and give learners computers to read anything of their choice. Finally, there are those teachers who would teach and give learners computers to read anything of their choice unattended to.

Effectiveness of In-service computer training for computer integration

From the findings, the in-service computer training provided to the teachers was ineffective because of the training duration. The participants stated three days for training was not enough to allow them learn the requisite skills that would have enabled them to integrate computers when teaching owing to the fact that some of them were computer illiterate. Hence computer integration posed a great challenge.

School administrative support

Finally, the administrators stated to have provided both financial support and computer training opportunities to their teachers to acquire the requisite skills needed to promote the integration of computers when teaching. However, the financial support provided was minimal as stated by the participants in the study.

Overall, the study findings confirmed the assertions as advanced by Vankatesh *et al* 2003 in the Unified theory of acceptance and use of technology (UTAUT) to the extent that some teachers felt use of ICT was an additional work load and that it was difficult to learn coupled with supervisors who were not fully conversant with ICT hence compromising its integration in the teaching and learning process.

5.4 Recommendations for Further Research

Most of the teachers were not integrating computers in teaching because of minimal technological pedagogical knowledge. The study, therefore, recommends that the Kenya Institute of Curriculum Development, Teachers Service Commission, and The Ministry of Education collaborate and see into it that computer is infused in the teachers' training curriculum.

The computer training that was meant to equip teachers with requisite skills to enable them to integrate computers when teaching was not effective owing to the days it was carried out, therefore the study recommends continuous computer training for the early grade teachers.

Most of the administrators acknowledged having given early grade teachers opportunities to attend computer training although it was done twice. They also admitted that most of the computers had stalled, the servers that were meant to

provide internet connectivity were not working and no efforts had been made by the ICT personnel within the County to repair them. The study, therefore, recommends that policy be put in place on the maintenance and repair of computers in schools and more specifically in public primary schools.

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APPENDICES

Appendix I: Interview schedule for teachers

INTERVIEW SCHEDULE FOR TEACHERS ON COMPUTER UTILIZATION TO ENHANCE INSTRUCTIONAL SKILLS OF TEACHERS EARLY GRADE IN MOIBEN SUB COUNTY UASIN GISHU COUNTY

Dear Respondent,

I am a student at Moi University, currently undertaking a master degree in Early childhood and primary education. I wish to collect data to determine the use of computers in teaching by early grade teachers. The information given will be strictly confidential and for academic purposes. Your co-operation will be highly appreciated.

Thank you.

PART ONE: DEMOGRAPHIC INFORMATION

1. SCHOOL TYPE

 (a)Day   (b) Boarding

2. GENDER

(a) Male (b) Female

3. AGE

25-35

36-45

46-55

55+

4. YEARS OF TEACHING IN EARLY GRADE

0-5

6-10

11-15

 20+

5. CLASS SIZE

20-30

40-50-

50+

Interview questions on pedagogical knowledge and technological skills of teachers

1. How did you come to gain the knowledge on the use of computer?
   (a) Short computer courses
   (b) Government sponsored training
   (c)Through friends and relatives
   (d)Others

2. What was the mode of training?

3. What materials were used during training?

4. What is your opinion on the effectiveness of the computer training course that you attended?
   (a)Effective
   why_____

   (b)Not effective
   why_____

5. What are some of the areas you were trained on in the use of computers?

6. Describe your ability to manipulate the computer after the training?
   _____
   _____

7. Are you able to use a computer when teaching?

_____

8. How often do you use computers in teaching? Probe

_____

9. What are some of the sites that you find educative during teaching?

_____

10. In your opinion what are some of the benefits you have realized in teaching using computers?_____

11. Which are some of the learning areas where computers are effectively used? Probe (why)_____

12. What is your opinion on the use of computers when teaching early grade?

_____

13. What are the challenges you experience when using computer

_____

Appendix II: Interview schedule for head teachers

INTERVIEW SCHEDULE FOR HEAD TEACHERS ON COMPUTER UTILIZATION TO ENHANCE INSTRUCTIONAL SKILLS OF TEACHERS EARLY GRADE IN MOIBEN SUB COUNTY UASIN GISHU COUNTY

Dear Respondent,

I am a student at Moi University, currently undertaking a master degree in Early childhood and primary education. I wish to collect data to determine the use of computers in teaching by early grade teachers. The information given will be strictly confidential and for academic purposes. Your co-operation will be highly appreciated.

Thank you.

PART ONE: DEMOGRAPHIC INFORMATION

1. SCHOOL TYPE

 (a)Day (b) Boarding

2. GENDER

(a)Male (b) Female

3. AGE

25-35

36-45

46-55

55+

4. YEARS OF SERVING AS A HEAD TEACHER

0-5

 6-10

11-15

 20+

5. CLASS SIZES

20-30

40-50-

50+

Interview questions on school management support on computers utilization

1. How many computers does your school have?

    _____

2. What is your opinion on the available computers verses the number of learners?

3. How did you gain knowledge on the use of computer?

4. Describe your computer skills in general?

(a)Booting

(b)Key boarding

(c)Programs-

_Word

_Excel

_Power point

_Internet

_Storage and retrieval of documents

_ Printing

5. How do you use computers in school?

_____

7. What are some of the ways in which you provide support to your teachers with regards to the use of computers in school?

8. What is your opinion on the integration of computers when teaching early grade learners?

9. What are some of the benefits that your teachers have gained from the use of computers in their teaching?

10. What are the challenges that you are facing as an administrator in enforcing the policy of computer use in early grade classes?

Appendix III: Observation checklist

1. Are computers available in schools?

2. Are the computers adequate?

3. Do early grade classes have power?

4. Do teachers integrate computers when teaching?

5. Are teachers able to manipulate computers?

Appendix IV: Research authorization letters

MOI UNIVERSITY

Office of the Dean School of Education

Tel: (053) 43001-8
      (053) 43555
Fax: (053) 43555

P.O. Box 3900
Eldoret, Kenya

An ISO 9001: 2008 CERTIFIED INSTITUTION

REF: EDU/EDH/PG/1011/16   DATE: 2nd May , 2019

The Executive Secretary
National Council for Science and Technology
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: **RESEARCH PERMIT IN RESPECT OF BEATRICE
        ANYANGO YUYA – (EDU/PG/EDH/1011/16**

The above named is a 2nd year Master of Education (M.Ed) student at Moi University, School of Education, Department of Curriculum , Instruction and Educational Media.

It is a requirement of her M.Ed Studies that she conducts research and produce a thesis. Her research is entitled:

"EXPLORE THE UTILISATION OF COMPUTERS IN ENHANCING INSTRUCTIONAL SKILLS OF TEACHERS IN EARLY GRADE CLASSES IN PUBLIC SCHOOLS IN MOIBEN SUB-COUNTY, UASIN-GISHU COUNTY, KENYA.."

Any assistance given to enable her conduct research successfully will be highly appreciated.

Yours faithfully,

PROF. J. K. CHANG'ACH
DEAN, SCHOOL OF EDUCATION

**NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION**

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When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref No. **NACOSTI/P/19/78527/30233**

Date **27ᵗʰ May, 2019**

Beatrice Anyango Yuya
Moi University
P.O. Box 3900-30100
ELDORET.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *"Explore the utilisation of computers in enhancing instructional skills of teachers in early grade classes in Public Schools in Moiben Sub County, Uasin Gishu County, Kenya"* I am pleased to inform you that you have been authorized to undertake research in **Uasin Gishu County** for the period ending **27ᵗʰ May, 2020.**

You are advised to report to **the County Commissioner and the County Director of Education, Uasin Gishu County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Uasin Gishu County.

The County Director of Education
Uasin Gishu County.

National Commission for Science, Technology and Innovation is ISO9001: 2008 Certified

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
7. The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.

National Commission for Science, Technology and innovation
P.O. Box 30623 – 00100, Nairobi, Kenya
TEL: 020 400 7000, 0713 788787, 0735 404245
Email: dg@nacosti.go.ke, registry@nacosti.go.ke
Website: www.nacosti.go.ke

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH LICENSE

Serial No.A 24883

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. BEATRICE ANYANGO YUYA
of MOI UNIVERSITY, 0-30100
ELDORET,has been permitted to conduct
research in *Uasin-Gishu County*

on the topic: *EXPLORE THE UTILISATION OF COMPUTERS IN ENHANCING INSTRUCTIONAL SKILLS OF TEACHERS IN EARLY GRADE CLASSES IN PUBLIC SCHOOLS IN MOIBEN SUBCOUNTY, UASIN GISHU COUNTY, KENYA*

for the period ending:
23rd May,2020

....
Applicant's Signature

Permit No : NACOSTI/P/19/78527/30233
Date Of Issue : 27th May,2019
Fee Recieved :Ksh 1000

....
Director General
National Commission for Science, Technology & Innovation

REPUBLIC OF KENYA
MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING & BASIC EDUCATION

Mobile   : 0721820731
Email: cdeuasingishucounty@yahoo.com
         : cdeuasingishucounty@gmail.com
When replying please quote:

County Director of Education,
Uasin Gishu County,
P.O. Box 9843-30100,
ELDORET.

Ref: No. MOEST/UGC/TRN/9/VOL III/141

8TH OCTOBER, 2019

Beatrice Anyango Yuya
Moi University
P.O Box 3900-30100
ELDORET

RE: RESEARCH AUTHORIZATION

This office has received a request from your Institution to authorize you to carry out research on *"Explore the utilization of computers in enhancing instructional skills of teachers in early grade classes in public schools in Moiben sub-county,"* Uasin Gishu County.

We wish to inform you that the request has been granted for the period ending 27th May, 2020.

The authorities concerned are therefore requested to give you maximum support.

We take this opportunity to wish you well during this data collection.

Psinen Michael
For: County Director of Education
UASIN GISHU