TEACHERS’ PREPAREDNESS IN INTEGRATING INFORMATION COMMUNICATION TECHNOLOGY IN TRAINING TEACHERS IN PUBLIC PRIMARY TEACHER TRAINING COLLEGES IN CENTRAL REGION KENYA

ALICE OMARIBA
E83/24904/2012

A RESEARCH THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (EDUCATIONAL TECHNOLOGY) IN THE SCHOOL OF EDUCATION OF KENYATTA UNIVERSITY

FEBRUARY, 2016
DECLARATION

I confirm that this thesis is my original work and has not been presented for a degree in any other University/Institution for certification. The thesis has been complemented by referenced works duly acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works – including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

Signature: [Signature] Date: 2/3/2016

Omariba, Alice (E83/24904/2012)
Department of Educational Communication and Technology
Kenyatta University

SUPERVISORS:

We confirm that the work reported in this thesis was carried out by the candidate under our supervision as University Supervisors.

Signature: [Signature] Date: March 2, 2016

Prof. Henry Okello Ayot
Department of Educational Communication and Technology
Kenyatta University

Signature: [Signature] Date: March 2, 2016

Prof. Samson Rosana Ondigi
Department of Educational Communication and Technology
Kenyatta University
DEDICATION

To my children

Faith, Melody and Isaac

for the inspiration that you are in my life.
ACKNOWLEDGEMENT

The task of writing this thesis was made possible by the indispensable assistance of individuals and institutions whose contributions I wish to acknowledge. I wish to express my sincere appreciation to Prof. Henry Okello Ayot and Prof. Samson Rosana Ondigi for their meticulous insights that made my academic dream come true. I indeed acknowledge my indebtedness to these supervisors for their expert guidance, patience and attention that made the completion of this study possible. You are indeed the cornerstone of this academic milestone. You will always have a special place in my academic endeavor. Thank you.

I wish to thank all the research respondents; the principals, teaching staff, student teacher trainees and deans of curriculum of the sampled colleges for this study for their generous contribution and cooperation during the data collection exercise.

Finally I thank all the lecturers and the support staff in the department of Educational Communication and Technology, Prof. Moses Ochanji of California State University San Marcos, my children, my friends and all those who always motivated, encouraged and gave both material and moral support throughout the study.

Glory and Honour be to God.
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### ABBREVIATIONS AND ACRONYMS

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>BBC</td>
<td>British Broadcasting Cooperation</td>
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<tr>
<td>EFA</td>
<td>Education for All</td>
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<tr>
<td>EMIS</td>
<td>Education Management Information Systems</td>
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<td>ERS</td>
<td>Economic Recovery Strategy</td>
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<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
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<td>IJEDICT</td>
<td>International Journal of Education and Development Using Information Communication Technology</td>
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<tr>
<td>ISTE</td>
<td>International Society for Technology in Education</td>
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<tr>
<td>KICD</td>
<td>Kenya Institute of Curriculum Development</td>
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<tr>
<td>MDG</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
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<td>MOEST</td>
<td>Ministry of Education Science and Technology</td>
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<td>NEPAD</td>
<td>New Partnership for African Development</td>
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<td>NICT</td>
<td>New Information and Communications Technologies</td>
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<td>PTTC</td>
<td>Primary Teacher Training Colleges</td>
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<tr>
<td>PCK</td>
<td>Pedagogical Content Knowledge</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>SMASSE</td>
<td>Strengthening of Mathematics and Science in Secondary Education</td>
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<tr>
<td>TEAMS</td>
<td>Technology Education Administration And Management Systems</td>
</tr>
<tr>
<td>TESSA</td>
<td>Teacher Education for Sub-Saharan Africa</td>
</tr>
<tr>
<td>TPCK</td>
<td>Technological Pedagogical Content Knowledge</td>
</tr>
<tr>
<td>UPE</td>
<td>Universal Primary Education</td>
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<td>USDE</td>
<td>United States Department of Education</td>
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ABSTRACT

Integration of ICT in education is embraced all over the world and Kenya is not exceptional. This study was therefore concerned with teachers’ preparedness in integrating ICT in training teachers in public teacher training colleges. The rationale was based on the view that properly designed, learning materials inspired by integration of ICT and delivered by technology add value to a teaching environment in which contact hours are limited. The curriculum needs academic standards and the development of digital age skill for the 21st century learners if vision 2030 and beyond education goals have to be realized. The literature review focused on the meaning of ICT, Global ranking on integration of ICT, Global overview of ICT use in education, Integration of ICT in Africa, Status of integration of ICT in education in Africa, Readiness in the integration of ICT in Kenya, Integrating ICT and education in Kenya, the rationale for integrating ICT in education, and challenges of integrating technology in the primary teacher curriculum. A descriptive survey research design was used in the study which was conducted in four (4) public primary teacher training colleges in Central region of Kenya. These provided an ideal population for the study. The target populations were tutors, second year student teacher trainees, College principals and Kenya Institute of Curriculum Development (KICD) e-learning Officers. The major research instruments were questionnaires for tutors and student teacher trainees, interview schedule for the principals and Kenya Institute of Curriculum Development e-learning developers, and observation schedule. The obtained data were analyzed systematically using descriptive statistics and presented with the help of frequency tables, figures and percentages. The study findings revealed that the types of ICTs available were inadequate; access to the computers was poor with limited internet connectivity. There was lack of proper training in the use of ICTs and that preparedness in integration of ICT was at an infant stage. Adoption of integrating ICT by tutors into their instructional process was not significantly related to their years of teaching experience. Further, there was no significant relationship between the tutors’ attitude towards integrating ICT. Finally, tutors faced several challenges in an attempt to integrate ICTs into the curriculum such as inadequate facilities, lack of competence, knowledge and skills, lack of support from the college administration and the government and lack of ICT policies on integration of ICT in PTTCs. In view of these findings, key recommendations were made: PPTTCs have a revised syllabus to include ICT, KICD develop and supply e-content to PPTTCs and the ministry of education together with other stakeholders needs to come-up with clear guidelines on integration of ICTs in PTTCs.
CHAPTER ONE

INTRODUCTION

1.1 Background of the Study
The rapid growth in Information Communication technology (ICT) has brought remarkable changes in the twenty-first century especially in the education system. This is because Education in the world over has been recognized as an important means for promoting economic and social development both at individual and national levels. The growth of the global economy and the information based society has pressured education systems around the world to use technology to teach students the knowledge and skills they need (UNESCO, 2012; Morawacynski & Ngwenyama, 2007). According to Ogange (2011), integration of ICT has brought about profound changes in education and other fields whereas Bitter & Pierson (2005) observe that “technology literacy is a given order in our society” which is an age where the ability to read, write and account is not enough as technology is being widely adopted.

The fast development of ICT therefore necessitates a growing demand on educational institutions to use ICT to teach the skills and knowledge learners need in the 21st century era to fit in the global job market. Realizing the effect of ICT on the workplace and everyday life, today’s educational institutions try to restructure their educational curricula and classroom facilities in order to bridge the existing technology gap in teaching and learning. This restructuring process requires effective integration of technologies into the existing environment in order to provide learners with knowledge
in specific subject areas to promote meaningful learning and to enhance productivity (Tomei, 2005). Teachers therefore need to embrace the integration of ICT to empower learners to robust into the global world (UNESCO, 2002). This is because teachers in many countries in the world are working with learners who are growing up with ICT as a non-remarkable feature of their world (Facer, Furlong & Sutherland, 2003; Haddad & Draxler, 2002) as many of the fundamental assumptions that guided and shaped past thinking about modes of learning are inappropriate in the 21st century. Global investment in ICT to improve teaching and learning in schools have been initiated by many governments. For instance, in the United Kingdom, the government spending on Educational ICT in 2008-09 was 2.5 billion pounds, United States expenditure on K-12 schools and higher education institutions was $6 billion and $4.7 billion respectively (Nut, 2010) and in New Zealand, the government spends over $410 million every year on schools ICT infrastructure (Johnson, Calvert and Raggert, 2009). Despite all these investment on ICT infrastructure, equipment and professional development to improve education in many countries Gulbahar (2007) observe that huge educational investments have placed little evidence of ICT integration and use in teaching and learning in Turkey. Evidence suggests that education sector is investing heavily on ICT but its integration is yet to impact on teaching and learning which has lagged behind the business sector (Stensaker, 2007) which is a similar case to the Kenyan scenario. Several surveys have been carried out to investigate factors that are related to the use of computer technology in teaching and learning by teachers (Baek, Jong & Kim, 2008; Goktas, Yildirim, & Yildirim, 2009) however, this is not on teachers’ preparedness in
integrating information communication technology in training teachers in public teacher training colleges which the current study sought to investigate.

According to UNESCO (2012), a wide range of educational ICT interventions initiated at institutional, provincial, national, regional and global level focuses on the enabling role of ICT in improving the quality of teaching and learning, expanding access to learning opportunities, promoting social equity in education and building inclusive “Knowledge Societies” across Africa and Middle East region. Moreover, the Teacher Education for Sub-Saharan African (TESSA) is a programme that creates open multimedia resources for Sub-Saharan African teachers and teacher educators. To date TESSA has introduces a BBC radio programme that debates the role of teachers in improving quality primary education and produced a tool kit for educators and planners on designing open and distance learning for teachers in Sub-Sahara Africa.

Integration of ICT brings revolutionary changes in teaching methodologies. The innovation lies not per se in the introduction and use of ICT, but in its role as a contributor towards students-centered form of teaching and learning (Smaldino, Lowther, & Russell, 2012; Ogange, 2011). In addition, it provides the tool needed by the”’ information knowledge society’’. Thus, teachers are inevitably presented with the demand to integrate ICT into teaching and learning to empower learners in this digital era. ICT allows us to collaborate, create, collect, store and disseminate, knowledge and resources all over the world (Ogange, 2011; Vrasidas, Zemblyas and Glass, 2009; Traxler, 2007 and Shih and Mills, 2007). With skills in ICT becoming a necessity,
educational institutions are left with the burden to provide a conducive environment to help the learners in the pivotal roles they are going to play in the knowledge and digital economy (Zindi & Aucion, 2005).

By integrating ICT during regular classroom instruction, tutors demonstrate to the teacher trainees the innovative ways of teaching and learning (Steketee, 2006). Countries like United States, Australia, Japan, Malaysia and Philippines have ongoing initiatives on ICT integration in education (Nut, 2010). Some have even created competency standards for technological use as observed by Bitter & Pierson (2005). However, integrating ICT in education is a complex process of educational change and the extent of integration in many countries, Kenya inclusive; is extremely varied and in most cases very limited (Goktas et al. 2009; Orlando, 2009; Stensaker, 2007; Warwick and Swaffield, 2006). More and more critical voices are raised in the West and recently two observations were notably made; first there has been a disappointingly slow uptake of ICT in education even though heavy investments has taken place in improving access to technologies and improving skills of teachers and learners; secondly there doesn’t seem to have taken place an educational revolution in teaching and learning (Selwyn, 2007).

Gutterman, Rahman, Supelano, Laura, & Mai, (2009) who explored practitioners’ views from 26 countries on the main obstacles in implementation of ICT in schools highlighted ICT infrastructure as among the main barriers. Out of the ten barriers mentioned four were related to accessibility. These were insufficient numbers of computers, insufficient peripherals, insufficient numbers of copies of software, and
insufficient simultaneous internet access. The other related problem with ICT infrastructure has been the slowness of ICT systems, and scarcity of educational software in schools. Even in institutions where ICT facilities are available, poor choices of hardware and software and lack of consideration of what is suitable for classroom teaching are problems that still trouble many teachers (Newhouse, 2005 & Cox, Webb, Abbott, Blakeley, Beauchamp, & Rhodes, 2003).

The other noted challenge in integration of ICT in teaching and learning has been the lack of technical support (Gode, 2013). The availability of technical support in institutions means the use of ICT in teaching without losing time especially in having to fix software and hardware problems. Computer breakdowns leads to learning interruptions and without computer technicians who can give technical assistance, it is likely that the regular repairs of the computer will not be carried out which discourages teachers to integrate computers. Other than equipment breakdown, sometimes teachers’ fear of equipment failure restricts their integration. Thus, without technical support for teachers, they become frustrated resulting in their unwillingness to integrate ICT to teach (Condie, Munro, Seagraves, & Kenesson, 2007; Gode, 2013; Muyaka, 2012).

In most parts of Africa, the purpose has been to catalyze a pattern shift towards “21st century learning” and support Education for All goals at various levels throughout the regions education system (UNESCO, 2012). However, there is no basic infrastructure to enable the integration of ICTs even to provide basic access to digital information (Ogange, 2011 & Maruti, 2010). In the present scenario, Africa is excluded from
integration of ICT revolution except for a few financial and international business nodes that are in any case directly linked to global networks and completely bypass African economies and societies (Unwin, 2005). This has led to what is generally referred in ICT as the “digital divide” especially in education; a term used to denote the discrepancy between countries and people who can benefit from the progress of integrating ICT in order to develop their socio-economic structures and on the other hand those who are excluded from the process (UNESCO, 2012).

Several International agencies are now focusing their attention on the issue of the digital divide in education (UNESCO, 2005). African governments, non-governmental and corporate organizations have also started initiating projects dealing with inclusion of ICT in primary and secondary curriculum but not integrating ICT in primary teacher training curriculum. Although countries are at the beginning of using new technology, its future use in education cannot be understood (Canoy & Rhoten, 2002, Muriithi, 2005). This includes New Partnership for Africa Development (NEPAD) which focuses on ICT for e-colleges as one of its projects. Norris (2001) observes that:

For many years, the focus of this investment was on making successive waves of new technology work in resource-poor education environments. This emphasis tended to promote a techno-centric approach to education reform. The emphases were viewed as layering new technology on top of social problems at the college level but not in pre-service primary teacher training colleges p.234.

The dominant view seemed to be that ICT itself would catalyze the much needed changes in the education system. Its aim is to impact ICT skills to learners in primary, secondary and tertiary institutions, harness ICT technology to improve and expand
education in African countries but not in teachers training colleges (NEPAD African Commission, 2007). So far computers have not transformed teaching practices (Becker, 2000). M’umontaz (2000) urges that lack of computers and software can seriously limit what teachers can do in classroom work with regards to integration of ICT.

Research evidence shows that the present educational systems are ill-equipped for meeting the challenges to meet the demands for conventional education by the populace. This necessitates alternative solutions such as seizing opportunities in education and such catalyst for change lies in the integration of ICTs as a force that will change primary teacher training and the education system (Kennedy and McNaught, 1997). Further, the absence of large-scale roll-outs following the NEPAD e-college demonstration project and the decline of the Khanya project, Egypt’s Smart College network, the JEl, College Net Namibia, World links and College Net Africa, illustrates how many ICT in education initiatives were unsustainable in spite of significant investments (Kennedy and McNaught, 1997).

Teachers in the 21st century are faced with the challenge of having to update their knowledge to make appropriate integration of ICT as a tool to be used in the classroom. In order to function in the new world economy, students and teachers have to navigate large amounts of information, analyze and make decisions in order to master new knowledge and accomplish complex tasks collaboratively by integrating ICT (Anouk, Bart & Nyaga, 2007). In Kenya, learning institutions are under increasing pressure to integrate ICT in teaching and learning given the knowledge and skills needed in the 21st century (MOEST Policy Draft, 2012). In spite of this, the challenge
confronting our educational system is how to transform the curriculum, teaching and learning process to provide student teacher trainees with the skills to function effectively in this digital era (Jones, 2004). Even if after the teachers’ initial anxiety of getting involved with technology has been overcome, serious challenges still remain in terms of providing enough technical support. However, teachers will not be discouraged by equipment failure that they do not understand (Tong & Trinidad, 2005).

The field of education has tried to exploit the web as a communication channel to connect distant learners with instructors (Moore & Kearsley, 2005). Young (2002) has argued that through e-learning, learning has become an activity that is no longer set within programmed schedules and slots. It is embedded because the education systems in Africa region face endemic crises under the influence of widespread poverty, inequality, political regimes that range from dictatorships to democracies all of which toll on national education system (UNESCO, 2012). According to Omwenga (2008), Integration of ICT will assist tutors to provide a variety whereas Muriithi (2005) observes that in Kenya, integration of ICT in education is still at limited stage and the NEPAD initiated pilot projects on ICT usage in Kenya is only in primary and secondary schools. Oredo (2008) studied the framework of evaluating ICT use in primary teacher education in Kenya with a focus on computer use. The study established that the quantity of computer use was still very low and that there was a wide rhetoric-reality gap. This implied that student teacher trainees in PPTCs learnt basic computer skills but not integration of ICTs which this study sought to investigate.
This is evident that researchers have noted that Kenyan government is keen in rolling out integration of ICT into institutions (MOE, 2005; TIVET, 2011 and Hennessy, Onguko, Harrison, & Wamakote, 2010). At the Ministry level, the government adopted its implementation framework on ICT integration in education which was categorized into two portions. First, efforts of ICT policy review at a cost of Kshs 6.3 billion and provision of ICT infrastructure to institutions at a cost of Kshs 7.8 billion (MOEST, 2006).

Integration of ICTs has seen the government look at the various levels of education in the country differently in terms of policy formulation and implementation. Consequently, there has been a commitment by the MOE to provide the necessary ICT infrastructure to Primary Teachers Colleges (PTCs). Strategies and initiatives to realize the commitment are many even though not harmonized into a one unified government document. Most of these can be found in a number of documents including; National ICT Policy of 2006, the National ICT Strategy for Education and Training document, Kenya Educational Sector Support Programme document, Kenya ICT Trust Fund and the 2007 revised Primary Teacher Education (PTE) ICT syllabus prepared by Kenya Institute of Education (KIE). In appreciation of the need for Public Private Partnerships (PPPs) in equipping the PTCs with ICT infrastructure, the Government has had a number of collaborations such as the New Partnership for Africa Development (NEPAD) e-schools programme and the World Summit on the Information Society (WSIS) whose objective was to integrate ICT in the delivery of education curriculum (MOE, 2006). Specific targets that were to be achieved by 2015 were linking colleges
with ICTs and adapting curricula to meet the challenges of the information society (MOE, 2006). An important step is an agreement to digitalize the curriculum under the KICD and NEPAD implementing connectivity to institutions (MOE, 2005). In addition, Farrell (2007) outlines specific e-learning resources that are to address the educational needs of primary and tertiary institutions. The Kenya ICT Trust Fund was established to mobilize and provide ICT resources to facilitate education and training through integration and innovation. Its general objective is to facilitate Public Private Partnerships to mobilize and provide ICT resources to Kenyan public schools, community resource and learning centers. Integration of ICT is well captured in Kenya’s Visio 2030 (Republic of Kenya, 2007). Kenya Vision 2030 wishes to see Kenya embrace technology and produce citizens who have skills and levels which are globally competitive (Rotich, 2013). The same is highlighted in the Kenya Constitution 2010 article numbers 43, 53, 54, 55 and 56. The Kenya Institute of Curriculum Development (KICD) have developed an online teacher orientation courses using Elimika Learning Management Systems (ELMS) whose main aim is to increase access to information on issues relating to the curriculum and curriculum delivery (Kenya Institute of Education, 2011).

The SMASSE programme for primary, secondary and teachers training colleges focuses enhancing teachers’ capacity through In-service Education and Training for Mathematics and Science subjects (Njuguna, 1999) whereas National ICT Innovation and Integration Centre (NI3C) launched as a facility spotlight for effective use of ICT in education and training to demonstrate aspects of integration in primary and secondary
level in order to improve the quality of education in the country and not PTTCs (www.ni3c.net). In spite of all these initiatives, there are no clear guides on how integration should be done and whether teachers are prepared to integrate ICTs in primary teacher training colleges and to roll out the same in Kenya primary schools. Although these initiatives were set up as early as the year 2000, they have not addressed teachers’ preparedness to integrate ICTs in the Kenyan PTTCs. The pertinent question one would ask at this point is; “is integration of ICT benefiting both the tutors and student teacher trainees in PTTCs in Kenya”? This is because teachers are implored to integrate ICT into teaching and learning activities, but teachers’ preparedness to integrate technologies into teaching determines the effectiveness of the technology and not by its sheer existence in the classroom (Kinuthia, 2009; Wong and Li, 2008) whereas Momanyi, L.; Norby, R. & Strand, S. (2006) noted that there is a gap in the ability to integrate ICT effectively in teaching and learning process in primary schools. Therefore, this study sought to establish teachers’ preparedness in integrating information communication technology in training teachers in teaching and learning in public primary teacher training colleges in Kenya.

1.2 Statement of the Problem
Integration of ICT has been recognized as a key strategy in improving efficiency, effectiveness and relevance in education sector as it improves the quality of education and its success hinges in teachers’ preparedness (Gomes, 2005). All over the world today, Kenya inclusive, education systems are tailored towards achieving Millennium Development goals which embrace integration of ICT in daily operations in all sectors.
The Kenya National ICT policy of January 2006 emphasized incorporation of ICTs in education as part of a long-term quality improvement strategy. Studies have revealed that lack of attention to integration of ICTs in teacher preparation programmes limits its use. Despite numerous advantages inherent in integration of ICT, many teachers put more emphasis on theory rather than practice. Newly qualified teachers lack competency to address the challenges of needy children. (UNESCO, 2014; Piper, Jepkemoi, Kwayumba & Kibukho, 2015). As a result, teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and much of it is available to learners as well as teachers. New concepts of learning have evolved where teachers are expected to facilitate learning and make it meaningful rather than just provide knowledge and skills. These challenges require teachers to continuously retrain and acquire new knowledge and skills.

To fully integrate ICT, the education policy in Kenya must address ICT as an instrument of teaching and learning rather than simply include ICT as an examined subject in the curriculum. Further, there must be an enabling environment, facilities and skills. However, when these are not there, then integration will not be effective yet primary teacher training colleges in Kenya are expected to produce competent teachers by ensuring that all Student teacher trainees acquire good understanding of integration of ICTs in the subjects they will be teaching throughout their professional carrier.

The transformation power of education is the key to desire learning development hence the desire for academic excellence. The various forms of ICTs both locally available
and the modern ones are noted to support, facilitate and make teaching and learning process easier and facilitates acquisition of appropriate and relevant skills for handling complex problems. Limited integration of ICT denies students exposure to technology which in turn leads to digital divide in education. Despite the strong emphasis given to ICT in education, little has been done to evaluate how teachers are prepared in primary teacher training colleges in Kenya on integration. It is in this context that this study sought to investigate the question: how prepared are public teacher training colleges in integrating ICT and producing teachers who will integrate these technology in schools?

1.3 Purpose of the study

The study investigated the extent to which student teacher trainees in public primary teacher training colleges in Kenya were prepared to integrate information communication technologies as part of efforts to institutionalize ICT in education provision and how this would impact positively on the education system. As the rest of the world is geared towards technology, teachers are needed to be prepared on how to integrate ICT so that in their professional carrier, they integrate ICTs in teaching and learning for meaningful and effective instruction.

1.4 Objectives of the study.

Specific objectives for this study were to:

a) establish the types of ICT available in primary teacher training colleges for instructional purposes.
b) investigate the preparedness of tutors in integrating ICT in teaching and learning process.

c) establish the relationship between the tutors’ teaching experience and their adoption of integrating ICT into their instructional process.

d) investigate the tutors’ attitudes towards integrating ICT in teaching and learning process.

e) explore the challenges faced by tutors while integrating ICT into the curriculum.

1.5 Research Questions

a). What technologies are available in primary teacher training colleges that are adequate, ideal, and able to support the training of student teachers?

b). Are tutors adequately prepared and competent to successfully integrate ICT into teaching and learning process?

c). Are differences in tutors’ teaching experiences a significant factor in their adoption of integrating ICT into their instructional process?

d). Do tutors hold positive attitudes towards integrating ICT to teaching and learning?

e). What are the challenges faced by tutors while integrating ICT into the curriculum?

1.6 Significance of the study

Teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and much of it is available to students as well as
teachers (Perration, H.; Robinson, B. & Creed, C. 2001). According to Isaac, (2006) survey on towards a GeSCI on teacher development established that there is a challenge of severe shortages of qualified teachers. ICT education in these challenge teachers to continuously retrain themselves and acquire new knowledge and skills while maintaining their jobs (Carlson & Gadio, 2002). Today’s technologies are essential tools for teaching and learning (Hung & Khine, 2006; Smaldino et al. 2012). To integrate these technologies efficiently and effectively, teachers need vision of the technologies potential, opportunities to apply them, training and just-in-time support and time to experiment. Only then can teachers be informed and confident in the use of new technologies (Bowes, 2003; Smaldino et al. 2012).

Modern development of innovative technologies has provided new possibilities to the teaching profession, but at the same time placed more demands on teachers to learn how to use these new technologies. (Robinson & Latchem, 2003; Smaldino et al. 2012). The findings of the study would be helpful in the following ways:

a) Serve as useful reference material to the Ministry of Education and Teachers Service Commission in assessing the impact of continued investment in ICT and inform policy formulation that would be helpful in successful integration of ICT in teacher training colleges in Kenya.

b) That this study would arouse interest and stimulate further research in the area of education in the integration of ICT as a tool in the process of teaching and learning to realize vision 2030 and beyond. In addition, the study would provide information
on the extent to which integration of ICT prepares the tutors and the student teacher trainees for the world of ICT.

1.7 Basic Assumptions of the Study

This study was based on the following assumptions:

a) That there was integration of ICT to prepare student teacher trainees during their pre-service teacher training in Kenya.

b) That the need for integration of ICT in teaching and learning would continue to necessitate the demand for total integration of ICT in education.

c) That tutors in public primary teacher training colleges were well grounded in content and pedagogical skills to make integration of ICT a reality.

1.8 Scope of the Study

The study was confined to primary teacher training colleges in Central region of Kenya and according to Gay (1992); a research may cover any geographical area. Essentially, both tutors and student teachers trainees are the interpreters, implementers and beneficiaries of integrating ICT in teaching and learning. The study aimed at establishing how prepared teacher education programmes ensured that student teacher trainees acquired good understanding of subjects they will be teaching by integrating ICTs and which integration procedures were needed by both tutors and student teacher trainees on integration of ICTs for meaningful instruction in classroom setting.
1.9 Limitations of the Study

The study was limited by the sample size drawn from primary teacher training colleges in central region which gives only a generalization of teachers’ preparedness in integrating ICT in teaching and learning (Weisma & Jurs, 2005). The study focused on primary teacher education tutors who are the implementers of the primary teacher education curriculum and students’ teacher trainees who are the beneficiaries. Thus the study was treated as a trend but not a definite conclusion just as noted by (Weisma& Jurs, 2005; Meredith et al. 1996).

1.10 Theoretical Framework

This study adopted TPACK Model for Technology Integration by Mishra & Koehler (2008) for teaching – Technological Pedagogical Content Knowledge. TPACK is “a way of thinking about the knowledge teachers need to understand to integrate technology effectively into their classrooms (Mishra & Koehler, 2008).” Teachers who exhibit best practices with ICTs are “creative, flexible, and adapt ways in which they navigate the constraints, affordances, and interactions within TPACK framework. While we often talk about the integration of ICT into learning, this simple diagram clearly illustrates the complexity and consideration that is required to do so.
TPACK is a framework that introduces the relationships and the complexities between all three basic components of knowledge (technology, pedagogy, and content) (Koehler & Mishra, 2008; Mishra & Koehler, 2006). At the intersection of these three knowledge types is an intuitive understanding of teaching content with appropriate pedagogical methods and technologies. Seven components are included in the TPACK framework. They are defined as:

i) Technology knowledge (TK): Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the internet, digital video, interactive whiteboards, and software programs.

ii) Content knowledge (CK): Content knowledge is the “knowledge about actual subject matter that is to be learned or taught” (Mishra & Koehler, 2006).
Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas.

iii) Pedagogical knowledge (PK): Pedagogical knowledge refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning.

iv) Pedagogical content knowledge (PCK): Pedagogical content knowledge refers to the content knowledge that deals with the teaching process (Shulman, 1986). Pedagogical content knowledge is different for various content areas, as it blends both content and pedagogy with the goal being to develop better teaching practices in the content areas.

v) Technological content knowledge (TCK): Technological content knowledge refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area.

vi) Technological pedagogical knowledge (TPK): Technological pedagogical knowledge refers to the knowledge of how various technologies can be used in teaching, and to understanding that using technology may change teaching.

vii) Technological pedagogical content knowledge (TPACK): Technological pedagogical content knowledge refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic
components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies.

Integration in this study is the adoption, inclusion and use of resource materials/equipment to aid the process of teaching and learning for meaningful instruction. This study therefore intended to establish how both tutors and student teacher trainees can develop and apply technological pedagogical content knowledge (TPACK) in their teacher preparation program. The framework focuses on designing and evaluating teacher knowledge that is focused on effective student learning in various content areas (AACTE Committee on Innovation and Technology, 2008). Thus, TPACK is a useful frame for planning what knowledge teachers must have to integrate technology into teaching and how they might develop this knowledge. Using TPACK as a framework for measuring teaching could potentially have an impact on the type of training and professional experiences that are designed for primary teacher training in Kenya. There is a continual need to rethink on our preparation practices in the teacher education field and propose new strategies that better prepare primary teachers to effectively integrate ICT in their teaching.

The idea of when, where, and how ICT can be integrated to improve teaching and learning form some of the teacher’s biggest challenge. The framework targets to propose a technology integration model. It aims to provide teachers with a model for integrating ICT into teaching (Koehler & Mishra, 2008). Even if education and technology providers avail any technology and support integration, it remains the
teachers’ responsibility to create an environment in which ICTs can be integrated effectively to enhance meaningful instruction. Teacher trainees can benefit from the integration if tutors incorporate them into their teaching and learning in various content areas.

Koehler & Mishra model, therefore is envisaged to assist teachers to understand the necessary steps to follow in deciding when, where and how to integrate ICT in their teaching. To empower teaching and learning through guided inquiry, teachers need to integrate ICTs in teaching and learning process (Linns, 1997) while Mishra & Koehler (2008) argue that there is only one way for teachers to determine with continuity whether innovative approaches adopted by them are working; they must apply technological pedagogical content knowledge and improve instructional processes.

1.11. Conceptual Framework

The conceptual framework Figure 1.2 explains how the independent and intervening variables will influence the dependent variable in this study. Figure 1.2 explains the relationship.
Figure 1.2 Conceptual Framework on integration of technology in teacher preparation.
1.12. Operational Definition of Terms

**Adoption:** Is the decision of an individual to make use of technology as the best course of action available.

**Digital Divide:** The discrepancy between those people benefitting from the knowledge and use of ICT and those who are not using them.

**ICT integration:** Refers to use technology in communication, data processing and data storage to impart knowledge on learners.

**Information Communication Technology:** The term ICT encompasses the range of hardware (desktop and portable computers, projection technology, calculators, data-logging, and digital-recording equipment), software applications (generic software, multimedia resources), and information systems (Intranet, Internet) available in colleges.

**Information Society:** A situation in society where ICT is regularly and widely used to generate, disseminate and receive information.

**Integration:** This is the adoption, inclusion and use of resource materials/equipment to aid the process of teaching and learning.

**Knowledge Society:** A situation in society where ICT is regularly and widely used to generate, imparts, disseminate and receive knowledge and creativity.
**Pedagogy:** Refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning.

**Preparedness:** Training in readiness to fully integrate technology in teaching and learning.

**Pre-service training institution:** Institutions for students’ training to be professional teachers.

**Technology:** It encompasses materials, objects and equipment of use to humanity, Such as machines or hardware and also systems, methods of organization, and techniques.
2.1 Introduction

While information and communication technology (ICT) is not a panacea for all educational problems, today’s technologies are essential tools for teaching and learning. To use these effectively and efficiently, teachers need visions of the technologies’ potential, opportunities to apply them, training and just-in-time support, and time to experiment only then can teachers be informed and confident in their use of new technologies (Bowes, 2003). Changes in education continue to require the employment of suitable and current innovations. This is imperative in order to achieve both short and long term educational goals (Traxler, 2007).

Instructions need to be properly designed and sufficiently mediated if meaningful and effective learning has to achieve the intended impact on learners (Moore and Kearsely, 2005). New teaching and learning strategies and media have continued to evolve, many of which favour small group or individualized learning (UNESCO, 2012). The teacher is no longer the source of knowledge but rather a facilitator of teaching and learning processes (Facer et al.2003). In the year 2000, at a World Education Forum held in Dakar, Senegal, 1100 government representatives, the private sectors and civil society established EFA goals one of which is “improving the quality of education for all learners” to be reached by 2015. To realize this and to empower learning through guided inquiry, students must have access to sophisticated information devices in
schools (Ogange, 2011). Moreover, the recent EFA Global Monitoring Report (2011) states that: “of the 1.9 million qualified teachers needed to achieve EFA goals by 2015, more than half will be needed in the South of Sahara Africa (SSA) where Kenya is inclusive (UNESCO, 2011)”. A snapshot of EFA progress in Africa reveals a region in the throes of a systematic crisis in education, characterized by significant numbers of children who do not have access to UPE, severe shortages of motivated and qualified teachers. There is also a dire lack of educational media and the absence of basic infrastructure such as toilets and clean running water in many educational institutions (UNESCO, 2011). Constraints in the region’s education system has been exacerbated by the onset of a global economic crisis in 2008 as well as continuing wars, conflicts and natural disasters have added enormous pressure. This study aims at investigating teachers’ preparedness in integrating ICT in public primary teacher training institutions in Kenya. The literature review will highlight on the meaning of ICT, global ranking on integration of ICT, global overview of ICT use in education, integration of ICT in Africa, status of integration of ICT in education in Africa, readiness in the integration of ICT in Kenya, integrating ICT and education in Kenya, the rationale for integrating ICT in education, and challenges of integrating technology in the primary teacher training curriculum.

2.2 The meaning of ICT

In the last two decades, the value of ICT has been widely recognized in society in general and education in particular. Today, schools, teacher education institutions and higher education establishments in both developed and developing countries regard ICT
as a key component in their work. The knowledge-based economy and the post-
industrial knowledge society require new skills regarding learning and knowledge
processing, and ICT is generally appreciated as a tool for fostering these skills in
learners. Many countries now regard understanding ICT and mastering basic ICT skills
as part of the core of education, equal in importance to literacy and numeric skills
(UNESCO, 2002a). In this search for relevant literature in this area, the researcher did
not encounter many sources that gave a particularly Kenyan or African understanding of
ICT. Therefore the study had to draw largely from the literature from non-African
contexts to come up with an appropriate construction of various concepts in ICT. Since
the study is about teachers’ preparedness in integrating Information and
Communications Technologies (ICTs) in teacher education, the definition attempts to
capture the technological tools, and the teaching-learning processes that they are likely
to support. For the purposes of this study therefore, the researcher has adopted the
following definition of ICT from Ogange (2011):

**ICT is the combination of tools and processes that variously support teaching and
learning. The tools refer to the technological innovations including old analogue
and new digital technologies, while the processes define the communicative and
interactive capabilities enabled by these technologies, especially through the
Internet and other networked technologies. ICT is also defined as those devices,
converged or otherwise, used in addressing educational needs and problems, and
facilitated by both old technologies like the radio, telephone, television and audio
tapes; and the newer digitized forms including computers, Internet, mobile phone
and other handheld devices p.16.**

This definition is drawn from and informed by the wide range of interpretations of
aspects of ICT that exist in the literature, which range from the generic that classify
ICTs into broad categories, to those that isolate specific elements of ICT and attempt to discuss these elements in the context of education (Ogange, 2011).

Some definitions in the literature take a particular focus on ICT as a technological application that facilitates information processing. For instance, ICT has been defined as the combination of informatics technology with other related technologies, specifically communications technology. This definition sees ICT as a merger of two areas; ‘informatics’ and ‘informatics technology’ (UNESCO, 2002a). Informatics (or computer science) is defined as the science dealing with the design, realization, evaluation, use, and maintenance of information processing systems, including hardware, software, organizational and human aspects, and the industrial, commercial, governmental and political implications of these. Informatics technology, on the other hand, is described as the technological applications (artifacts) of informatics in society. In this context, communications technology such as the Internet would be seen as one such area of technological application.

Other definitions seem to focus on ICT as computers and peripherals. In some sources, ICT is seen to encompass the range of hardware like desktop and portable computers, projection technology, calculators, data-logging and digital recording equipment; software applications including generic software, multimedia resources, and information systems like the intranet and the Internet (Hennessy et al, 2005). Other studies consider ICT as an umbrella term that includes any communication device or application encompassing radio, television, cellular phones, computer and network
hardware and software as well as the various services and applications associated with them, such as videoconferencing and distance learning (TechTarget, 2007). ICT may include satellites, broadband communication and mobile phones capable of transmitting data (Leach and Moon, 2000).

These definitions of ICT as computers and peripherals have been seen to be narrow in some studies. Such studies add non-computer digital devices, including those that simulate electronic devices, to the definition. For instance, in their study, Plowman and Stephen (2005) use a broad definition of ICT that encompasses a variety of audio–visual resources, ‘smart’ toys, and everyday technologies, such as remote control devices, photocopiers, telephones, fax machines and televisions. They also include toys that simulate appliances such as mobile phones, laptops, cash registers, microwave ovens, and barcode readers as well as digital cameras, tape recorders, computers and their peripheral devices.

The term ‘convergence’, which is associated with both old and new technologies, is commonly used in reference to the combination of voice, data and video onto a single platform, and can therefore be said to occur when multiple ICT products form one product with the combined advantages of all of them (Peters, 2007). This author argues that these previously separate forms of ICT create new efficiencies when they combine since they share resources and interact with each other. Where the focus is on the curriculum, the definition of ICT has tended to focus on the tools and techniques used in delivering learning. It has been defined as: “the range of tools and techniques relating
to computer-based hardware and software, to communication including both directed and broadcast, to information sources such as CD-ROM and the internet, and to associated technologies such as robots, video-conferencing and digital TV (Tanner, 2003). Whereas some studies have used the terms ‘ICT’ and ‘IT’ (Information Technology) interchangeably, others have attempted to draw a line between them (Vickery, 2002). Where the term ‘ICT’ is used, it defines a set of tools used to process and communicate information. The term ‘IT’ is more commonly used in the international business world to refer to a set of computer based systems for gathering, processing, storing and communication management of relevant data and information (Tanner, 2003). Other definitions of ICT in the education context that appreciate this difference refer to ICT as ‘the computing and communications facilities and features that variously support teaching, learning and a range of activities in education’ (Kent ICT, 2009). In this definition the focus is on the subject being taught or studied rather than developing pupils' skills with, and knowledge of, the technologies themselves.

IT, on the other hand, would comprise the knowledge, skills and understanding needed to employ information and communications technologies appropriately, securely and fruitfully in learning, employment and everyday life. The knowledge base expected of an IT capable student would therefore include an understanding of how information is structured in a database and skills that are relevant in carrying out a search on the World Wide Web or an understanding of how computers simulate processes (Kent ICT, 2009). The focus of IT is therefore on the learner’s capability in ICT.
Other definitions of ICT look at IT as a variant of ICT, blurring this dividing line even further. Dillon (2004) has defined ICT as “educational computing and its variants – the information technology (IT), Information and Communications Technology (ICT), educational multimedia and telematics in education”. Dillon however asserts that the focus of ICT inquiry in studies on ICT in education has mainly been the computer. Definitions of state-of-the-art instruction usually mention the most recently developed tools and the current focus on computers and the Internet does reflect the tendency of research to place emphasis on technology that is considered current at the time (Roblyer and Edwards, 2000). Studies in the field of ICT in education, which is referred to in some literature as ‘educational technology’ increasingly refers to the current and potential impacts of the computer and the Internet in education (Kriger, 2001). It is therefore not surprising that a history of technology in education between 1920 and the 1980s places the emphasis on radio and television, with computers as an afterthought (Cuban, 1986). Whereas Seattler (1990) argues that educational technology immediately brings to mind the use of some device or a set of equipment, particularly computer equipment, other researchers stretch the definition beyond this to focus on technology tools as an overlapping combination of media, instructional systems and computer based support systems (Roblyer and Edwards, 2000). The authors emphasize a subset of all these resources, focusing primarily on computers and their role in instructional systems. They justify the focus on computers thus:

Computers as media are more complex and more capable than other media such as film or overheads. Again, computer systems are currently moving towards subsuming all other media within their own resources. For instance, presentation software can generate overhead transparencies. Lastly, computers and computer-
based systems are not very easy to integrate into other traditional classroom activities p.6.

Computer technology in itself, therefore, is not significant and should be defined in a pedagogical context. Salomon et al. (1991) share this view when they point out thus: “although our attention is focused on computer technology, we are fully aware that computer technology, in and of itself, is of little interest. What is of interest are the kinds of programmes and tools that can be used with this technology, as well as the kinds of activities that they afford (in an educational setting)”. They argue that the term ‘computer technology’ is used only for the sake of brevity and that the real focus is primarily on computer tools and programmes which then enable the process of learning.

The historical function of educational technology has been seen to be a process rather than a product, and no matter how sophisticated the media of instruction may become, a distinction should always be made between ‘the process of developing a technology of education and the use of certain products or media within a particular technology of instruction’ (Muffoletto, 1994). This view presents technology not as a collection of devices but a way of acting or doing things. Other concurrent views see technology in education as a combination of these processes and tools involved in addressing educational needs and problems, with an emphasis on applying ‘the most current tools; computers and their related technologies’ (Roblyer and Edwards, 2000). In some literature, these current tools are referred to as ‘new technologies’ and the definition
goes beyond computers to include the internet and networked technologies (Peters, 2007; Shih and Mills, 2007; Hamelink, 1997).

Despite the variations in definitions of terms and understandings of concepts, a growing consensus seems to emerge to suggest that a definition of ICT should include information technologies, telecommunication technologies, and networking technologies. The definition of ICT therefore not only covers the concepts in the research literature, but also captures the ICT technologies and processes the researcher anticipate to encounter in teachers’ preparedness in integrating ICT in education. Whereas the use of analogue forms of ICTs like the radio, TV, audio tapes and analogue videos has been common in the education sector in Kenya (Odera, 2006), the use of the more current technologies like the Internet, computers, mobile and other digital technologies is only at its formative stages. The study will therefore focus on covering the entire range of technologies that are in use in the education sector including resource materials, radio, TV, computer, mobile technologies and the Internet. The study recognizes that the convergence of technologies (Peters, 2007; Traxler, 2007) may necessitate focus on policies, if any, around the use of other handheld devices that combine more than one technology.

ICT captures all latest technologies used for communication, data processing and data storage (Newby et al. 2006). According to Roblyer (2003), ICT is the application to address current educational needs and problems. It is the process of determining the appropriate electronic tools and methods for implementation in a given classroom.
situation and problem. Neiderhauser and Studdard (2001) observes that ICT is a ‘‘skill-based transmission use’’ and ‘‘ open-ended constructivist use’’ whereas Aimley et al. (2002) categorize ICT as information resource tools, authoring tools and knowledge construction tools. Hopper and Reinartz (2000) note that ICT refers to the contemporary computer software that contain combinations of texts, graphics, animation, audio and video. Further, ICT refers to several different classes of software that are used to achieve clearly defined educational goals. ICTs are means usually audio-visual or electronic for transmitting or delivering educational messages (Locatis and Atkison, 1984). It is the process of determining which electronic tools and which methods for implementing them are appropriate for given classroom situations and problems (Roblyer, 2003).

According to Gagne et al. (2005), ICT may be viewed as the variety of ways instruction can be communicated whereas Jonasen (2000) observes that ICT refers to and involves the integration of more than one medium into some form of communication. Such information includes imaging and spatial modeling into a computer system. ICTs are a major factor in shaping the new global economy and producing rapid changes in society (Facer et al. 2002). They further note that ICT has fundamentally changed the way people communicate and do business. Integration of technology offers many means of improving teaching and learning in the classroom (Lefebvre et al. 2006). According to Reser and Gagne (1983), ICT is the physical means via which instruction is presented to learners other than the teacher, chalkboard and textbooks whereas integration of ICT refers to technologies used for collecting, storing, editing and passing on information
using various forms (Jager and Lokman, 1999). This was why the current study sought to investigate how teachers are prepared to integrate this ICT in teaching and learning processes.

2.3 Global ranking on integration of ICT

Integration of ICT ranking commonly referred as e-readiness is released annually by the Economic Intelligence Unit (EIU). This is the world’s foremost provider of countries, industry, and management analysis in terms of integration of ICTs. Recent results released in 2008 indicate a digital divide between developed and developing countries (Commission of European Communities, 2008). The ranking outlines benefits of the level of preparedness in integrating ICTs. The 2008 regional ranking shows that North America and Western Europe integrate ICTs more than any other part of the world. The ranking allows a country to weigh the success of its integration alongside the rest of the world. The success of North America to its current level has been ascribed to the way they have embraced and made large investment in the ICT sector.

These ranking take into account integration of ICT as a knowledge-based economy where education will be used as a platform for equipping nations with ICT skills in order to create dynamic and sustainable economic growth. There is need therefore for teacher preparedness survey in integration of ICT in education globally considering the role that they play in improving the quality of education.
2.4 Global overview on integration of ICT in Education

There are efforts made in education both at national and regional levels to harness integration of ICT in education. European member states meeting in Lisbon identified ICT as a core component of the ‘knowledge society’ and a necessity to be adapted in education. As a result, ICT initiatives and programmes have been adopted with specific funding and strong support of stakeholders (Commission of European Communities, 2008). Member states have come with programmes that support and embrace integration of ICT in education which led to intensive efforts to provide infrastructure and prepare teachers in ICT skills. The initiative led to a rampant integration of ICT in schools in Europe. The European Union aims at promoting digital literacy, setting up European Virtual campuses and e-twinning of schools. E-twinning of schools refers to partnering schools where students and teachers share academic and social knowledge with their counterparts in other parts of the world. ICT use in Europe is widespread in higher education where universities have websites and nine out of ten intranets.

In spite of all these efforts, reports show a digital gap amongst member states (Commission of European Commission report, 2008). UK and Nordic Countries took an early lead in integrating ICT in education. To address the digital gap, European member states developed an e-European platform with a focus on digital literacy. The 2006 declaration gave this objective a specific target of halving the gap in internet usage by 2010 for groups under risk of exclusion, such as the old, people with disabilities and unemployed persons.
The Europe 2020 strategy acknowledges that a fundamental transformation of education and training is needed to address the new skills and competencies required if Europe is to remain competitive, overcome the current crisis and grasp new opportunities. The strategic framework for European cooperation in education and training (ET 2020) recognizes that education and training have a crucial role to play in meeting the many socio-economic, demographic, environmental and technological challenges facing Europe and its citizens today and in the years ahead. However, to determine how education and training policy can adequately prepare learners for life in the future society there is a need to envisage what competencies will be relevant and how these will be acquired by 2030.

A survey carried out in Romania between August 2007 and May 2008 that investigated integration of ICT in education indicated that seven out of ten teachers preferred teaching using computers. The teachers showed affirmative presentation in their discipline as a result of integrating ICT (Elina, 2008). This study showed that students measured the significant achievement of integrating ICT for school lesson as a basic process followed by easier understanding of the content delivered.

According to UNESCO (2008), the Asian-Pacific region has shown that ICT is not being integrated to its full potential to enhance the quality of teaching and learning because of technical and capacity related barriers that have to be overcome. The report shows infrastructure, equipment and connectivity as impediments to integration of ICT in education systems; a scenario similar to that affecting integration of ICT in Africa.
UNESCO has initiated projects such as UNESCO school Net with a focus on escalating ICT in schools in the region. Further, studies conducted by UNESCO (2007) in Asian countries indicate that ICT has the potential to help broader access to education and improve learning outcomes. This association of ICT with quality Education for All (EFA) goals by UNESCO (2010) calls for the improvement in quality of education in its entirety.

The noted roles of ICTs have led to increased investments in ICT in education. One area that has received a lot of support has been integration of ICT in learning institutions. For instance, in Scotland most of schools, colleges and other centers’ have put up effective infrastructure. In 2007, the government noted that almost all the institutions have access to broadband internet connections (Government of Scotland, 2007). The country has upgraded its internet supply moving to switch-based distribution arrangements capable of delivering data and applications to the desktop at high speed. In addition, they have set aside devolved budgets for institutions to be able to procure equipment and software to meet the particular needs of their schools. Students with Special Needs are taken into consideration with a number of schools having acquired sophisticated equipment to enable and encourage young people with severe learning difficulties to broaden their opportunities to express their feelings and emotions. Scotland ensures that integration of ICT into education starts with foundational classes. Both pre-school and primary institutions are provided with a wide range of ICTs for learning and teaching. Whilst the efforts of integrating ICT in Scotland institutions are
well coordinated, funding constraint remains a barrier. The provided ICTs are not adequate both for all children and teaching staff.

Another country where ICT has extensively been integrated to increase access to quality education Brazil is (Gutterman et al., 2009). The country’s national ICT policy makes it a requirement for institutions to integrate ICT in education (Muyaka, 2012). The country has adapted an education-rate (e-rate) that ensures that the cost of basic connectivity is affordable for both institutions and citizens. Moreover, Brazil has developed centers’ to train laboratory coordinators and teachers to ensure long term success in the learning institutions. Further, other than integrating ICT, the country allows funding for teachers professional developments in ICTs (Gutterman, et al., 2009).

2.5 Integration of ICT in Africa

Most studies on ICT in Africa have had more focus on constraints and benefits of ICT in a worldwide acuity. These necessitates for further studies on teachers’ preparedness to integrate ICTs if Africa has to benefit from ICT use especially in education. Infinedo (2005) study revealed that Africa has long been destitute by lack of swift and inexpensive connectivity with the rest of the world. African countries are compared unfairly with other economies on worldwide networked economy. Further, Infinedo (2005) ranks integration of ICT in Africa into three categories; North Africa, Sub-Saharan Africa (south) and Sub-Saharan Africa (East and West), South Africa has a superior achievement on integration of ICT than other parts of Africa, currently
followed by Rwanda. Miller (1999) attributes this to management with healthy nurtured policies. Variation in levels of integration of ICT can also be due to diverse levels of economic development and geographical locations. For instance, North Africa countries have high speed internet connectivity with Europe. East and Southern Africa are the only regions not connected to the global broadband infrastructure and accounts for less than 1% of the world’s international band width; the effect of this missing link makes the region to rely on satellite connectivity which is the most expensive in the world (Farrel, Glen and Shafika, 2007). However, East African regions are moving fast to address this shortage and commissioning of fibre optic from Fujaira.

According to Gitonga (2009), United Arabs Emirates (UAE) in Mombasa under the TEAMS project will lower the cost of connectivity and enhance access to information. Infinedo (2005) therefore suggests that Africa should come up with policies that can help in getting integrated in the global networked economy. The developed world should increase direct investment in ICT especially in the Sub-Saharan Africa. However, designing of policies without implementation and without clear guidelines may not connect Africa to the global economy (Maruti, 2010). In its effort to integrate ICT in education, Africa should survey the teachers’ preparedness, integration of ICT, if their efforts of digitalizing the continent have to be realized.

2.6 Status of Integration of ICT in education in Africa

African countries like any other country in the globe here realized the role of integrating ICT in education. Education ministers’ round table meeting at a first African ministerial
on ICT for education, training and development in June 2007 in Nairobi emphasized the role of ICT in promoting development (Farrel et al. 2007).

According to Farrel (2007), the state of infrastructure in Africa regarding access to ICT infrastructure has too little, too expensive and poorly managed. The study revealed that the average African University has a bandwidth capacity equivalent to a broadband residential connection available in Europe and pay 50 times more for their bandwidth than their educational counterparts in the rest of the world. The survey revealed that access to ICT in schools is poor; computer laboratories are ill equipped and with an average of computer to student ratio as 1:40 and low internet connectivity. This is evident that Sub-Saharan Africa is missing out on the boons of ICT, its population is missing out on better education compared to the rest of the world (Shafika, Irene and Thomas, 2006).

There are several initiatives to promote integration and use of ICT in education. For instance, Nepal’s E-schools project which is multicountry, multistakeholder continental initiative to impart ICT skills to African learners and to improve education provision in schools. Nepal’s e-initiative is to have all schools implementing integration of ICT in 10 years. The question is, are teachers in training institutions prepared with the necessary skills to implement the initiative?

The other initiative is African Virtual University (AVU) which is the first e-learning project to be implemented in Africa’s institutions of higher learning. AVU seeks to
increase access to tertiary and continuing education in African Universities by tapping global academic resources and offering training to academicians in African universities to prepare materials for development (Nafuko, 2005). Awoyele and Sinyambola (2007) study to assess students’ readiness in Nigerian Universities for e-learning adoption revealed that about 80% of students have access to computers, 91% have access to internet and communicate via email, while, 96.6% of teachers have access to computers and internet.

In Zimbabwe, university lecturers have slow take up of e-learning partly due to lack of awareness of e-learning facilities and reported lack of preparedness (Lockais and Daga, 2008). The research also showed that insufficient infrastructure in universities hindered the universities to use e-learning. The above studies have mostly considered universities and schools with little attention to other systems of education. They have also concentrated on different contextual content but not teachers’ preparedness. This study seeks to fill the gap by investigating teachers’ preparedness in integrating ICT in training teachers in primary teacher training colleges.

2.7 Readiness to the Integration of ICT in Kenya

Most studies in ICT in Kenya are focused on benefits and constraints to use ICT. One comprehensive study on integration of ICT in education in Kenya was done by Kenya Education Network (KENET) in 2007 whose focus was integration of ICT in higher learning institutions. Few studies have been done on other sub-systems of education such as tertiary colleges, and at both secondary and primary schools. This study sought
to establish how teachers are prepared in primary teacher training colleges to integrate ICT in teaching and learning.

KENET assessed the level of preparedness of higher education institutions to integrate ICT in teaching, learning, research and management and the capacity of readiness of the institution to use electronic learning to improve the quality of education (Kashorda, Waema, Omosa and Kyalo, 2007). Their findings in the study revealed that most institutions are not ready to use ICT for e-learning and allocation of the budget is minimal. Further, the findings also revealed that institutions of higher learning in Kenya have inadequate bandwidth, low access to networked personal computer (PC) by staff and students, low quality of campus network infrastructure and limited access to library resources (Kashorda et al, 2007), integration of ICT in education is still at a limited stage (Murithi 2005), Momanyi et al. (2006) noted that there is a gap in the ability to integrate ICT effectively in teaching and learning process in primary schools whereas Muyaka (2012) observes that the teaching of the ICT course rotated around the acquisition of ICT literacy skills which could not equip the teachers with relevant competence for its use in teaching and learning.

2.8 Integrating ICT and education in Kenya

The MOE policy on ICT is to integrate it into education and training in Kenya so as to prepare learners and staff for the Kenyan economy and enhance national ICT skills. The policy aimed at providing sufficient and affordable internet infrastructure capacity to all secondary schools and tertiary institutions by the year 2010. It encourages the use of IT
and promoting growth and development of integration of ICT at all levels of education in order to improve the quality of teaching and learning (Republic of Kenya, 2005).

Farrel (2007) notes that the education sector in Kenya lacks adequate connectivity and network infrastructure although a number of schools have direct access to high speed internet connectivity through internet service providers. The Ministry observes that all teacher training colleges in Kenya are working towards implementing ICT in their operations. Each college has a computer laboratory. The policy presupposes the need to upgrade computer labs and building ICT capacity in PTTCs which will yield high returns. It highlights challenges facing implementation of ICT in PTTCs as poor access to computers by students, computers lacking basic standards and lack of qualified teachers. A study by Ndiku (2003) on problems encountered in implementation of Educational ICT projects found that insufficient number of computers and peripheral devices, teachers’ lack of knowledge and inadequate software for instruction as impediments to integration of ICT in Kenya, were the main obstacles. Kenya school Net (2003) found that although schools are aware of the benefits of computers, a few had them with one only school having a website. Moreover, it also found that there was a close association between students studying Mathematics or Science and Computer Studies.

Ford (2007) study revealed that Kenya has approximately 19890 primary schools many of which one in the rural areas. Out of these schools, only 15% have electricity and only 500 have computers although with limited internet access. He further observes that in
the teacher training colleges ICT curriculum is taught but internet connectivity is limited and mostly available through dia up which concurs with Muyaka, 2012; Gode, 2013).

Kenya became the third African country to launch the integration ICT in secondary schools after South Africa and Nigeria (CheckPoint, 2008). The programme sponsored by Intel aims at equipping schools to use computers and wireless connectivity for all types of class work. The new programme aims to replace the blackboard with a touch screen and connectivity. However, rolling out this programme may not be effective in rural areas since they lack basic infrastructure to enhance it.

**2.9 Government of Kenya’s position regarding ICT**

The government of Kenya sees ICTs as critical tools for its development. Through its Master Plan 2008-2012 the government argued that without tapping ICTs, it will be difficult to achieve Vision 2030. The Vision itself emphasizes on the need to invest heavily in integration of ICT to ensure uniform access and reduce digital divide witnessed in the country. As a strategy to integrate of ICT to institutions, the government came up with the National ICT Sector Master Plan which among other things outlined the process the government proposed to integrate ICT to ensure ICTs are widely spread and easily accessed across the country. Among its objectives is to ensure universal access to ICTs for sustainable development by setting up digital villages throughout the country, and to strengthen Kenya’s learning opportunities to ensure that the country meets future technological challenges (Ministry of Education Strategic Plan 2008-2010; MOEST policy framework draft, 2012; MOE, 2006).
Further, the government made a commitment of increasing ICT infrastructure that will make Kenya the ICT focus for Africa. As a strategy, it promised to restructure the ICT sector to involve private sectors in increasing and deploying ICT infrastructure across the country. The partnership was to assist the country in achieving the universal ICT access in every part of the country including schools and villages. In 2006, the National ICT Policy was officially launched through a government Gazette Notice No. 24. With the ICT competence becoming part of the requirements on the job market, the policy was revised in 2008 recommending a minimum level of computer literacy. According to the policy, universal access to affordable ICT services is desirable for the country to meet its economic development program of Vision 2030.

In 2008, the government established the Kenya Information and Communications Technology Board (Kenya ICT Board) which was tasked to position and to promote Kenya as an ICT destination within the region. Integration of ICT has been one of the targets by the Kenya ICT Board especially with the growing evidence linking the availability of affordable ICT infrastructure with attraction of international business and particularly the Business Process Outsourcing (BPO) service industry (Kashorda, Waema, Acosta & Nyandiere, 2007). Furthermore, Kenya ICT Board was to create and encourage competitive ICT industries in the country by developing, launching and driving a National System of Innovation for Kenya. This would ensure creation of locally manufactured ICTs that support the local syllabuses and content that would enhance integration of ICT for teaching and learning in schools. The Board was also to ensure increased ICT access and utilization by all Kenyans by developing nationwide
grassroots awareness about ICTs and instituting a national framework for ICT skills development. The country has remained committed in fulfilling its stated objectives especially in access to internet. In 2009, Kenya was known to have a minimal international internet estimated to be about 100Mb/s. The minimum international internet by then was also provided by satellite links which normally introduced undesirable delays and high internet costs. After making it a priority to procure global internet, the government in 2010 acquired undersea optical fibre links which have provided global internet to the country greatly reducing the delays and the high costs that were associated with the satellite links.

For Kenya to reach that level of universal integration to ICT there is a need for the development of ICT hardware, ICT software, adequate connectivity, and access. The government acknowledges and identifies ICT hardware, software and connectivity as the three areas that are key pillars in integrating ICT for easier access (Kashorda, Waema, Acosta & Nyandiere, 2007). Consequently, it has established a number of collaborative institutions which include universities and private ICT industry to assist in developing and assembling cheap personal computers. Moreover, it has been in discussion with leading software vendors such as Microsoft about software license costs. Other efforts have been the government considering the use of open source software in educational and government institutions. The country’s national ICT policy makes it a requirement for institutions to integrate ICT in education even though there are no clear guidelines on integration (Muyaka, 2012).
The Ministry of Youth Affairs (MYA) through the Youth Enterprise Fund (YEF) in an effort to promote knowledge in the use of computers started a digital village project to connect rural and urban areas with ICT. The project which was to be funded through the government and private sector aimed at providing each constituency with eight computer work stations and training in entrepreneurship (Wanjiku, 2008). Education system will benefit through increase of online courses and improving management systems. The digital project aims to integrate ICT in formal and non-formal education and training. The question is, are teachers prepared to integrate ICT in teaching to handle these education programmes? Although these initiatives were set up as early as 2000, there has been inadequate information on teachers’ preparedness in integrating ICT in training teachers in the Kenyan PTCs which the current study seeks to investigate.

The Kenya Institute of Curriculum Development (KICD) have developed an online teacher orientation courses using Elimika Learning Management Systems (ELMS) whose main aim is to increase access to information on issues relating to the curriculum and curriculum delivery (Kenya Institute of Education, 2011). The programme aims at equipping teachers with knowledge and skills on how to effectively deliver the primary school programme (www.elimika.ac.ke). It is expected that after going through Elimika course the teacher will be able to:

a) Interpret the syllabus

b) Embrace innovation and creativity in their teaching
c) Select appropriate and relevant resources

d) Select and use varied, appropriate and relevant teaching and learning methods

e) Design varied and appropriate and relevant teaching and learning methods

The ability to integrate ICT has become a requirement in all institutions of learning in Kenya. The president of the republic of Kenya has embraced integration by introducing Primary School Laptop project starting from standard one which is about to roll in the primary school curriculum. (Jubilee Manifesto, 2013). Are teachers prepared to roll out jubilee manifesto initiative?

The above programmes and scholars have highlighted intensively on ICT integration but on different contexts. This justified the study which sought to examine teachers’ preparedness in integrating ICT in training teachers primary teacher training colleges.

2.10 The Rationale for Integrating ICT in Education

Although countries are at the beginning of using new technology, its future use in education cannot be underestimated (Canny & Rhoten, 2002). One of the major reasons for integrating ICT into teaching is to gain learner attention. According to Betz (1990), visuals attract attention; which is paramount in learning because many distractions compete for learners’ attention; thus making it imperative to employ attention-catching devices to focus their thoughts.
It is assumed that integrating ICT brings fundamental changes in teaching methodologies (Grabe & Grabe, 1998; Smaldino et al., 2012). The innovation lies not per se in the introduction and use of ICT, but in its role as a contributor towards a student-centered form of teaching and learning (Scrimshaw, 2004). John & Sutherland (2005) notes that caution need to be exercised when speaking of new technologies and when assuming that a given medium or technology will automatically afford particular learning outcomes. As new concepts of learning have evolved, teachers are expected to facilitate learning and make it meaningful to individual learners rather than just to provide knowledge and skills (Smaldino et al. 2012). Recent developments of innovative technologies have provided new possibilities to the teaching profession but at the same time have placed more demands on teachers to learn how to use these technologies (Robinson & Latchem, 2003; Smaldino et al., 2012). Globally integration of ICT is gaining prominence and as the most important component bridging the gap of basic competence of students (Newby et al. 2006). This therefore has put educational systems under great pressure to adopt innovative methodologies and to integrate New Information and Communication Technologies the (NICT) teaching and learning process to prepare students with the knowledge and skills they need in the 21st century. This is why Cooper & Todman (2006), observe that computer anxiety is often highlighted as the problem behind the digital divide whereas Prensky (2001) distinguishes between people who are born in a digital world and digital immigrants who have to learn the digital language and for whom ICT will always be a second language. According to Cox et al. (2003), there is need to measure among other factors teacher’s beliefs and understanding of the role of ICT in teaching their subject.
In addition, teaching profession is evolving from an emphasis on teacher-centered, lecture-based instructions to student-centered interactive learning environments. NICT integration is understood as the usage of technology seamlessly for educational processes like transacting curricular content, students working on technology to do authentic tasks and developing technology supported products, providing authentic assessments and institutional development. Today a variety of NICT can facilitate not only delivery of instruction but also learning process itself. Moreover, NICT can promote international collaboration and networking in education and professional development.

According to IJEDICT (2007) report, integrating ICT into the education curriculum has been promoted as a key step in bridging the digital divide in Kenyan colleges in the recent years and despite the sacrifices made to finance these venture, there has been little evaluation of their effectiveness. However, this did not look into the influence of pre-service teacher training on integrating ICT in the curriculum in primary teacher education which the current researcher seeks to investigate. Murithi (2005) argues that in Kenya like most developing countries, integrating ICT is still limited to computer literacy training. She contends in her study that the present ICT curriculum merely deals with “teaching about computers” but not how computers can be integrated to transform teaching and learning in primary teacher training colleges. According to Waema (2005) study on the impact of ICT revolution throughout the world, most countries have gotten computers literacy and India as a country has the largest scientific management in the world, whereby it is able to provide computer education teaching via internet and
according to New House (2005), Australia also practices ICT education and Malaysia gives ICT education a priority. This implies therefore that integrating ICT is not merely technology but it is primarily about content and effective instructional process.

The above scholars have looked at ICT in different contextual concerns but not teachers’ preparedness in integrating ICT in training teachers in public primary teacher training education which the current researcher seeks to study.

2.11 Challenges of Integrating ICT in the primary teacher training curriculum

Increasingly the quality of teaching and learning has been a seemingly important concern for education; however, education has faced a variety of social, cultural, economical, and technical challenges (Januszewski & Molenda, 2008). A predetermined process is important for the integration of ICTs in the classroom, curriculum, school management, library, and any educational setting (ISTE, 1999). Integration of ICTs enhances the quality of education by helping teachers to do their job and by helping students to learn more effectively. In these contexts, teachers’ shifting role in the 21st century involves an essential mission, which is to be the frontier for applying technological innovations to the teaching and learning process. At this point, necessary skills and the level of future teachers’ are key factors in implementing new ICTs. Consequently, institutions of teacher education play a crucial role in preparing future teachers to become proficient in the integration of ICTs into the curriculum. They need to help prospective teachers understand how ICTs can be integrated to teach content in rich and meaningful ways (ISTE, 1999; Keating & Evans, 2001; Roblyer & Edward, 2000).

However, integration of ICTs into pre-service teacher education is critical. Despite the huge investment of financial and human resources, pre-service teacher education
programmes do not currently provide prospective teachers with the necessary skills, competencies, and experiences to prepare them to use ICTs effectively in their future profession (Stensaker, 2007; Dura, 2000; Moursund & Bielefeldt, 1999; Bullock, 20004; Melhlinger & Powers, 2002). Similar trends have been witnessed in developing countries (SAIDE, 2005). Numerous studies have been undertaken to investigate this phenomenon, and a common and dominating perspective behind these studies is the expectation of change of a particular kind (Orlando, 2009). Orlando observes that higher education institutions are particularly well-known for their ability to protect ‘traditional core activities’ from external interference. There is therefore a lack of direct effects of ICT on traditional teaching and learning activities and ‘Chalk and Talk’ is, in many institutions, still the dominant and most legitimate ‘teaching technology’ in use. A number of researchers have attempted to explain why the pace of change with ICT in educational settings has been slow. Some have argued that working with ICTs is difficult because ICTs are new, and because individual and social routines have to be established in using them (Goktas et al., 2009). Others have suggested that integration of technology would not necessarily change pedagogy as such, but needs to be accompanied by measures that stimulate and encourage such change (Oliver and Dempster, 2003). It should be understood that integration of ICT is not by amount or type of technology used but how and why it is used (Earle, 2002).

In light of the above-mentioned literature, it is obvious that integration of ICTs into primary teacher education is influenced by many challenges; thus, justifying the current study. Danes (2001) asserts that the new technologies have the potential to support
education across the curriculum and provide opportunities for effective communication between teachers and students in ways that have not been possible before. ICT in education has the potential to be influential in bringing about changes in ways of teaching. Smaldino et al. (2012) emphasizes that if teachers want to search for more effective leaning experiences for their students, they need to have some general ideas about productive learning experiences that integrating ICT enhances. However, this potential may not be easily realized as Dawes (2001) observes that problems arise when teachers are expected to implement changes in what may well be adverse circumstances.

Despite ICT’s importance in society and perhaps in the future of education, identifying the possible challenges to the integration of these technologies in primary teacher training would be an important step in improving the quality of teaching and learning. Balansak et al. (2006), argue that although education appears to acknowledge the value of ICT in colleges, difficulties continue to be encountered during the process of using these technologies. Integration of ICT into pre-service teachers’ education is critical. Bromme (2005) observes that challenges come from psychological research on problem solving and creativity. A variety of action plans have been developed to effectively integrate ICT in pre-service teacher education programs, but many challenges still exist in practice. This is probably why Becker (2000) argues that computers have not transformed teaching practices whereas Bowes (2003) notes that to use these technologies effectively and efficiently, teachers need visions of technologies’ potential, opportunities to apply them, training and just-in-time support, and time to experiment.
Only then can teachers be informed and confident in their integration of ICTs. Thus, these challenges need to be identified so that they are curbed.

2.12 Summary of the existing gaps in the literature


The above scholars’ findings cannot be generalized to influence of pre-service teacher training on integrating ICT in the curriculum in primary teacher training colleges in Kenya. Moreover, many of these studies have been done in developed countries, while education in Kenya is still at its infancy in the integration of ICT (Muriithi, 2005). Furthermore, research focusing on ICT integration is generally limited to the study on different conceptual and contextual concerns. Thus, the gaps and inconsistencies created by the above scholars justifies the current study on teachers’ preparedness in integrating information communication technology in training teachers in public primary teacher training colleges in Kenya which this study seeks to investigate.
CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter highlights the following: Research design, Locale of the study, Variables, Target population, Sampling procedures and Sample size, Research Instruments, Pilot study: Validity and Reliability of instruments, Data collection procedures, Data analysis techniques and Logistics and ethical considerations.

3.2 Research Design

The study was conducted using a descriptive survey design. Sproul (1995); Weisma and Jurs (2005) state that; a descriptive survey research design collects background information. They recommend the technique for research where attitudes, ideas, comments and public opinion on a problem under investigation are studied. It helps a researcher gain insight in generalizing a situation without utilizing the whole population. It is suitable in determining reasons or causes for the current status under study. Further, Bell (1993) emphasize that it also aims to obtain information from a representative selection of the population from which the investigator presents the findings as being representative of the population as a whole.

Meredith, Borg and Gall (1996) and Weisma and Jurs (2005) add that careful reporting methodology of the descriptive survey promotes replication later by other researchers and re-testing the finding. Survey technique does secure situations that identify standards or norms in order to plan the next step. In addition, descriptive survey
research is intended to produce statistical information aspects of education that interests policy makers and educators. By involving a broad category of stakeholders, the study fitted with the cross sectional sub-types of descriptive survey study design (Weisma and Jurs, 2005).

The study used both qualitative and quantitative in collecting and analyzing data. Quantitative involved the collection of numerical data in order to explain, predict and or control phenomena of interest: data analysis was mainly statistical. Qualitative technique involved the collection of extensive narrative data in order to gain insights into phenomena of interests: data analysis included the coding of data and production. It was studying the phenomena as they were in natural setting (Gay, 1996). To achieve this, the researcher employed different methodologies and data collection strategies. The design chosen for the study was suitable because it helped the researcher to:

a) Describe teachers’ preparedness in integrating ICT in the curriculum in public primary teacher training colleges in the identified region.

b) Describe the extent to which the training of teachers is preparing them for the world of ICT.

3.3 Variables

A variable can be considered as a quantitative or qualitative entity which can take on different values or levels (Meredith et al. 1996). They are interacting factors that bring about an outcome. In this study, emanating from the conceptual framework, the dependent variables were: effective teaching using ICTs, using ICT tools and facilities,
preparing lesson plans incorporating use of ICT and fluency in use of ICT, intervening variable were: PTTC ICT policy and Personal interest in use of ICT whereas independent variables were: tutors’ preparedness in ICT integration and trainees’ preparedness in ICT. Table 3.1 shows the variable factors considered under each the variables.

**Table 3.1 Independent, intervening and Dependent variables**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Preparedness in ICT integration</th>
<th>Intervening variables</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutors’ preparedness</td>
<td>Technological Pedagogical Knowledge</td>
<td>PPTC ICT policy</td>
<td>Effective teaching using ICTs</td>
</tr>
<tr>
<td></td>
<td>Pedagogical Content Knowledge</td>
<td>Personal interest in integration of ICT</td>
<td>Use of ICT tools and facilities</td>
</tr>
<tr>
<td></td>
<td>Pedagogical Knowledge</td>
<td></td>
<td>Preparation of lesson plans incorporating use of ICT</td>
</tr>
<tr>
<td>Trainees’ preparedness</td>
<td>Technological Knowledge</td>
<td></td>
<td>Fluency in integration of ICT</td>
</tr>
<tr>
<td></td>
<td>Pedagogical Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content Knowledge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4 Locale of the Study

According to Gay (1992), a study may cover any geographical area. This study therefore was carried out in Central region of Kenya. The region covers an area of 13,191 km² and is located in north of Nairobi and west of Mt. Kenya which has five counties namely; Kiambu, Kirinyaga, Murang’a, Nyandarua and Nyeri. This study was limited to the counties of Kiambu, Muranga and Nyeri in which four (4) public PTTC’s were located.

3.5 Target Population

The target population is the population to which the researcher intends to generalize the findings (Nkpa 1997; Orodho 2008; Weisma and Jurs 2005). The target population for this study was drawn from 4 teacher training colleges in Central Region of Kenya. The researcher targeted all tutors, principals and second year student teacher trainees because they had experience in PPTC. The e-learning officers of Kenya Institute of Curriculum Development (KICD) were also part of the target population as shown in Table 3.2
Table 3.2 Distribution of the target population

<table>
<thead>
<tr>
<th>Distribution of respondents per Department</th>
<th>Kamwenja</th>
<th>Kilimambogo</th>
<th>Muranga</th>
<th>Thogoto</th>
<th>KICD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Creative Arts tutors</td>
<td>15</td>
<td>13</td>
<td>11</td>
<td>10</td>
<td>0</td>
<td>49</td>
</tr>
<tr>
<td>Education tutors</td>
<td>6</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>ICT tutors</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Languages tutors</td>
<td>16</td>
<td>16</td>
<td>10</td>
<td>13</td>
<td>0</td>
<td>55</td>
</tr>
<tr>
<td>Mathematics tutors</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Science tutors</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Social Science tutors</td>
<td>13</td>
<td>11</td>
<td>7</td>
<td>9</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>2nd Year Students</td>
<td>484</td>
<td>550</td>
<td>360</td>
<td>490</td>
<td>0</td>
<td>1884</td>
</tr>
<tr>
<td>e-Officers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>554</strong></td>
<td><strong>622</strong></td>
<td><strong>412</strong></td>
<td><strong>545</strong></td>
<td><strong>3</strong></td>
<td><strong>2136</strong></td>
</tr>
</tbody>
</table>

Table 3.2 shows that the target population of the study is 2136. These target population were chosen because they are the implementers of the integration process. Based on the objectives of the study, it was believed that any conclusion drawn on the basis of the data collected from them would reflect the nature and profile of teachers’ preparedness in integrating information communication technology in training teachers in public primary teacher training colleges in Kenya.
3.5.0 Sampling Techniques

Sampling is the process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected (Gay, 1992). The purpose of sampling is to gain information about a population. For the purpose of this study, the following sampling techniques were employed.

3.5.1.1 Quota Sampling

Quota sampling is the process of deciding beforehand the type and number of members the research intends sampling (Biggam, 2008). It strives to represent significant characteristics (strata) of the wider population (Cohen, Manion and Morrison, 2011). Quota sampling was applied to determine the regions/County from which the study colleges were to be selected.

3.5.1.2 Stratified Sampling

According to Biggam (2008), a stratified sampling technique is made up of a group from which a researcher directly selects samples. In this study, the technique was used to obtain the specific colleges from the region/counties. The sample size of the tutors and student teacher trainees were selected from each of the aforementioned colleges.

Quota and Stratified sampling techniques were used with the intention of ensuring that every county in the region, public teacher training college, tutors and student teacher trainee at each college had an equal and calculable opportunity of being selected for the study. This improved the representativeness of the sample by reducing the sampling
error. Stratified Sampling technique is said to be very reliable with a high degree of representativeness of results (Asher, 1995).

3.5.1.3 Simple Random Sampling

Simple random sampling is a subset of a target population in which each member of the subset has an equal probability of being chosen (Cohen et al., 2011). In this study, a simple random sampling technique was used to select the sample size of tutors and student teacher trainees. The reason was that these groups are homogeneous in nature, and it was assumed that any sample drawn from the accessible population would be acceptable enough to fairly represent a cross section of the target population at the four colleges, thereby minimizing the sampling error.

Further, in the case of tutors and student teacher trainees, proportionate sampling was employed to proportionately distribute respondents to the four colleges, moreover to the departments in each college and the second year student teacher trainees (Iarossi, 2006) as shown in Table 3.3 sampling grid. Based on the nature of the research objectives, the tutors and student teacher trainees fit into this technique and, therefore, advanced better understanding of the study. Simple random sampling was employed after a proportionate distribution of respondents to the four colleges. In addition, Purposive sampling was used for college principals and KICD e-officers. Purposive sampling technique involves targeting respondents who have relevant experience and information that are not necessarily similar. Patton (2002) asserts that purposive sampling is a non-random method of sampling where the researcher selects information rich cases for in
depth study. Purposive sampling takes place when the researcher selects a sample from which the most can be learned (Merriam, 1998; Cohen et al., 2011).

### 3.5.2 Sampling Procedure

Sampling is the process of selecting individuals for study. A sample is any group on which information is obtained (Fraenkel and Wallen 1993) or part or section of a population (Nwana, 1981). The target population was generally too large for the study. The researcher obtained a sample from the target of four public teacher training colleges in central region which were used in the study. The findings of the sample will be a representative of the entire target population (Meredith et al. 1996 and Weisma and Jurs, 2005). From the four colleges, the researcher used second year student teacher trainees for the study because they were better placed, had longer experience in the college, they were focused as they had already gone through their first year experience in college, they had had the teaching practice experience in real classroom set-up and were focused to achieve their targets as professionals. From the target population of 2136, the researcher used 345 respondents as calculated by Yamane formula \( n = \frac{N}{1 + Ne^2} \) where “n” is the sample size, “N” is the population and “e” is the error margin, while taking confidence level of 95% (Israel, 1992; Yamane, 1967). As Iarossi (2006) notes, using proportionate allocation, the 345 respondents were proportionately distributed in the four (4) colleges and further to the respective tutors in the eight (8) departments in each college and 2nd year student teacher trainees sampled as outlined in Table 3.3. By simple random sampling, tutors were selected from their respective departments and the second year student teacher trainees. Simple random sampling gave
each respondent an equal and independent chance of being part of the sample (Cohen et al.; 2011). The e-learning officers from KICD were selected on census basis. The total sample size used for this study was therefore 348 respondents.

### 3.5.2.0 Sample Size

A sample is a subset from the accessible population and should be a representation of the actual population (Meredith et al., 1996). Amedahe (2002) noted that a sample size between ten (10) to twenty (20) percent is generally ideal enough for any descriptive study. In addition, Ferguson (1979) proposed that when grouping for inferential statistical comparisons, each group should exceed thirty (30) subjects.

Considering the experts’ view coupled with the nature of accessible population, a proportionate of 345 sample size was used on tutors, student teacher trainees and principals (Iarossi, 2006). More so, a census of three (3) e-officers from KICD respectively was used for the study. A census was necessary in this situation because of the numerical paucity of the target group (SAGE, 2006). In total, a sample size of 348 respondents was covered in this study and was considered acceptable. Table 3.3 provides a breakdown of the sample size with respect to the accessible group.
Table 3.3 Sampling grid: Distribution of target population and strata sample size for respondents

<table>
<thead>
<tr>
<th>Distribution of respondents per Department</th>
<th>Kamwenja</th>
<th>Kilimambogo</th>
<th>Muranga</th>
<th>Thogoto</th>
<th>KICD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Creative Arts tutors</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Education tutors</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>ICT tutors</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Languages tutors</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Mathematics tutors</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Science tutors</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Social Sciences tutors</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>2nd Year Students</td>
<td>76</td>
<td>87</td>
<td>57</td>
<td>77</td>
<td>0</td>
<td>297</td>
</tr>
<tr>
<td>e-Officers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100</td>
<td>67</td>
<td>88</td>
<td>3</td>
<td>348</td>
</tr>
</tbody>
</table>

According to Weisma and Jurs (2005), in carrying out a research, a researcher should use methods which provide high accuracy, generalisability and explanatory power with minimum management and demands with administrative convenience. Mwiria and Wamahiu (1995) note that: “the qualitative researcher uses multi-techniques for data collection in order to obtain holistic view of the researcher”.

3.6. Research Instruments

According to Meredith et al. (1996), in carrying out a research, a researcher should use methods which provide high accuracy, generalisability and explanatory power with minimum management demands with administrative convenience. Mwiria and Wamahiu (1995) note that: “the qualitative researcher uses multi-techniques for data collection in order to obtain holistic view of the researcher”. Data was collected using three instruments namely; the questionnaire, interview schedule and observation schedule. The instruments supplemented each other to close the gap which might have been left if one instrument only was used (Weisma and Jurs, 2005). They state that optimal strategy is to use a variety of instruments. The researcher was guided by the study objectives in constructing these instruments.

3.6.1 Questionnaire

Questionnaires were the main instrument for data collection in the study. Milne (1999) asserted that, with a questionnaire, the respondents are free to express their views on issues without fear and also answer questions at their own pace. According to Kothari (2004), some of the merits of the questionnaire are; low cost, freedom from the interviewer’s bias as answers are in respondents’ own words and that it gives respondents adequate time to give well thought answers.

These questionnaires were divided into two categories; those for Tutors and those for Student Teacher Trainees. The questionnaires use consisted a mixture of closed and
open ended questions that suited the objectives of the study (Tinnerman, 2007). These questionnaires had three sections as Nkpa (1997) advises.

a).Biographical information,

b). Closed ended questions weighted on a Likert scale of 1-5 with questions on Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree,

c) .Open ended type of questions.

These questionnaires focused on; determining the types of ICTs and infrastructure available, establishing the competency of tutors in integrating ICT in teaching and learning, establishing the factors influencing tutors’ integration of ICT into the curriculum, and to investigate tutors’ attitudes towards integration of ICT in teaching and learning. The questionnaires were developed to address specific objectives just as Orodho (2008) notes. This type of questions saved time, were direct in analysis and ensured that the discussants had a similar range of options to choose from, thus making coding more convenient on influence of pre-service teacher training on integrating ICT in teaching and learning as they allowed respondents to choose from the available alternatives provided.

3.6.2. Interview Schedule

Kane (1995) states that, interviews can be modified to fit needs of the situations, they can convey empathy build trust, collect rich data and provide a clear understanding of the respondents view. However the researcher chose interview technique because they gave the researcher an opportunity for in-depth-data on integration of ICT, ensuring
high response rates and encouraged naturalness (Meredith et al. 1996). Thus, ensuring that more information was obtained just as noted by Stone et al. (1984) and Bell (1993). These were for the principals of selected public teacher training colleges and Kenya Institute of Curriculum Development e-learning officers respectively.

3.6.3. Observation Schedule

Orodho (2004) state that observation schedule is a method of collecting data in which a researcher notes things or occurrences as they occur naturally. Mugenda and Mugenda (1999) sensitize that observation schedule record what the researcher observes during data collection. In the study, the researcher prepared observation schedules containing ICTs integrated in teaching and learning such as audio, visual and audio-visual which could be used in teaching learning process in public primary teacher training colleges. The researcher then observed and recorded the available ICTs in the targeted colleges as Gay (1996) suggests. Thus a total of four (4) items of observation schedules were used, each for every college sampled for the study.

3.7 Piloting

In order to ensure that the tutors and student teacher trainees circumscribed, a try-out was conducted. This was undertaken to determine the effectiveness of the research instruments used to give the feasibility of the study. The pilot study to pre-test the research instruments was carried out among tutors and the second year teacher trainees of one public primary teacher training colleges, which was not be used in the actual study. The training college was Machakos teachers training colleges in Machakos
County. The purpose of a pilot study was to ascertain whether the instruments were logical and clear. These items in the instruments that were found unclear were rectified (Weisma and Jurs, 2005).

3.7.1 Validity of the instruments

Validity is the extent to which an instrument measures what is supposed to measure. (Meredith et al. 1996). For the instrument to have validity the content selected and included in the questionnaire and interview must be relevant to the variable being investigated. For the study, validity referred to both construct validity and the content validity. Validity also refers to the extent to which differences found with a measuring instrument reflects a true difference among those being tested (Kothari, 2004; Weisma and Jurs, 2005). These forms of validity are assured in the study.

3.7.1.1 Construct Validity

This is a measure of the degree to which data obtained from an instrument meaningfully and accurately reflects or represents a theoretical concept (Cohen et al. 2011). Construct validity is achieved through correlations with other measures of the issues and its constituent elements.

In this study, care was taken to construct the instruments based related on previous related studies and the theory reviewed. The study therefore positioned, established construct validity by looking at variables in the context of influence of pre-service
teacher training on integrating information communication technology in the curriculum in public teacher training colleges, Kenya.

Further, other measures were taken to ensure construct validity such as including the following statements on the questionnaire and interview schedule: ‘All information provided will be highly confidential’. This was meant to instil confidence to the respondents to give reliable responses. During data analysis, questionnaires with excessively missing data were eliminated with a view of maintaining construct validity.

3.7.1.2 Content Validity

According to Meredith et al. (1996), content validity is a measure of the degree to which data collected using a particular instrument presents a specific content of a particular concept. To ensure content validity for the study, all the major independent variables necessary to validate the content of the study were identified in the existing literature and the theoretical framework reviewed. Moreover, to ensure a comprehensive coverage of the content, mixed methodology was employed to explore the various facets of the influence of pre-service teacher training on integrating information communication technology in the curriculum in public teacher training colleges, Kenya. To validate the test items, the questionnaires and interview schedule were submitted to the two supervisors who had experience on instrument design for verification. The essence of this process was to further ensure the clarity and accuracy, appropriateness as well as of the questionnaire in measuring the objectives of the study. The feedback received helped the researcher to delete items considered inappropriate. Further, biased,
unclear and ambiguous items which were detected were accordingly modified in line with the objectives of the study just as Ary et al. (2002) emphasizes that:

...the most obvious type of scientific validity is based on content, which may be gathered by having some competent colleagues who are familiar with the purpose of survey examine the items to judge whether they are appropriate to measure what they are supposed to measure and whether they a representative sample of the behaviour under investigation p.79.

3.7.2 Reliability of the instruments

Reliability is the consistency of the research and the extent to which studies can be replicated (Weisma and Jurs, 2005) and the ability of the instruments to return same responses after repeated administration (Meredith et al. 1996). This is concerned with the degree to which a particular measuring procedure gives similar result over a number of repeated trials (Orodho, 2004). Reliability measure demonstrates that operations of a study such as data collection procedures could be repeated consistently. Mugenda and Mugenda (2003) recommend using the internal consistency techniques to calculate the reliability coefficient.

Besides estimating conservative value of reliability, the Cronbach’s coefficient Alpha has an added advantage of reducing the time required to compute a reliability coefficient. Like Mugenda and Mugenda (2003), Cooper and Schindler (2003) also confirm that Cronbach’s Alpha is a good way to measure construct reliability because the higher the Cronbach’s Alpha is, the more reliable the construct is. Nunnally (1978) indicated that when researchers achieve an alpha level of 0.70 or above, this provides a sufficient ground for researchers to proceed to use their reliable scales with greater
confidence in their results. The Statistical Package for Social Sciences version 22 (SPSS.v 22) was used to calculate the Cronbach’s Alpha reliability coefficient. This was done using the questionnaire which was the main tool for this study as the other tools in this study were used for triangulation (Cohen et al., 2011). Using the formula for alpha:

\[ \alpha = \frac{n \bar{r}_u}{1 + (n-1) \bar{r}_u} \]

where \( n \) is the number of items in the test or questionnaire and \( \bar{r}_u \) is the average of all the inter-item correlations. The finding gave a Cronbach Alpha value of 0.779 which was enough ground for the researcher to proceed to the actual study (Cohen et al. 2011). Piloting enabled the researcher come up with suitable research instruments that were accurate.

3.8 Data collection Procedures

Before going to the field, the researcher obtained permission from the government authorizing the researcher to carry out the study. The researcher then visited the sampled primary teacher training colleges to establish rapport, get permission from the college principals, talk to the tutors and arrange with the second year student teacher trainees who were randomly sampled to arrange when to give out the questionnaires. Data collected was analyzed and discussed.

3.8.1 The Tutors’ questionnaire

The researcher sought permission from the principals of the selected colleges. Once permission was granted, the researcher met the tutors and explained the purpose of the research and reassured them of confidentiality, administered the questionnaires and agreed on the time to pick them at a central place within the colleges.
3.8.2 Student teacher trainees’ questionnaire

The researcher sought permission from the college’s administration. Once permission was granted, the researcher discussed with the student teacher trainees randomly sampled on the venue and time to administer the questionnaires. The researcher came on the agreed date and time, met with the students in the agreed venue; the researcher explained the purpose of the study went through the instructions and let the students fill the questionnaires. The researcher then collected the questionnaires after the students were through. The same procedure was followed in each college for the four (4) selected colleges for the study.

3.8.3 Interview schedule

The researcher arranged with the principals of the four (4) colleges and Kenya Institute of Curriculum Development e-learning officers when to administer the interview schedules. Then, the researcher agreed with the principals of the four (4) colleges on the convenient time for the interview schedules to be collected. The same was done to KICD e-learning officers. The researcher then administered the interview schedules as agreed with the above respondents.

3.9 Data Analysis

The study was a descriptive survey. Data was analyzed using the SPSS programme. The study used both quantitative and qualitative techniques in collecting and analyzing data. Quantitative involved the collection of numerical data in order to explain, predict and or control phenomena of interest: data analysis was mainly statistical. Qualitative
technique involved the collection of extensive narrative data in order to gain insights into phenomena of interests: data analysis included the coding of the data and production. It was studying the phenomena as they were in natural setting (Gay, 1996; Weisma and Jurs, 2005). To achieve this, the researcher employed different methodologies and data collection strategies.

The analysis was systematically done as per the objectives of the study just as Gay (1996) advises. Objective one sought to establish types of technologies available in primary teacher training colleges for instructional purposes. The objective was analyzed using the mean, objective two was set to investigate the preparedness of tutors in integrating ICT in teaching and learning process and objective three sought to establish the relationship between the tutors’ teaching experience and their adoption on integrating ICT into their instructional process. The two objectives were analyzed using Pearson Moment Correlation Coefficient whereby objective two was on training levels and use whereas objective three was on the relationship between experience and adoption, objective four was set to establish the tutors’ attitudes towards integrating ICT in teaching and learning process. This objective was analyzed using the analysis of the variance (ANOVA) and objective five sought to establish the challenges faced by tutors while integrating ICT into the curriculum. The objective was analyzed using factor analysis based on demographic and stated challenges.
3.10 Logistics and ethical considerations

These are post field logistics. The researcher collected completed instruments from the field and gave them serials and started coding and analyzing. This was be after ensuring that the instruments were properly completed. Once the coding to the computer was done, the instruments were kept for reference in case of an error noted when making statistical analysis for further reference.

3.10.1 Ethical issue related research

Ethics is a branch of philosophy that deals with moral values which guides one’s behaviour (Mugenda and Mugenda (1999). A research should therefore take note of following:

a) That the researcher will not refer another person’s work as his/her own without acknowledging the author or give false research methodology and results.

b) The researcher is an integral person who will not undertake research for self gain or the research to have a negative impact on other people’s lives.

c) That the research will not use the collected data to victimize or stigmatize people/a person.

3.10.2 Ethical issue on research subjects

The researcher sought permission from the government authorities and the principals of selected colleges before involving tutors and student teacher trainees. The researcher explained to the student teacher trainees that the research was voluntary. Student teacher trainees were assured of confidentiality and no elements of individual
identification was attempted. No embarrassing questions or statements made that interfered with the self esteem of the respondents just as Gay (1996) advises.
CHAPTER FOUR
REPORTING AND DISCUSSION OF FINDINGS

4.1 Introduction

The purpose of this study was to establish teachers’ preparedness in integrating information communication technology in public primary teacher training colleges in Kenya. More specifically, the study was:

a) To establish the types of ICTs available in primary teacher training colleges for instructional purposes,

b) Investigate the preparedness of tutors in integrating ICT in teaching and learning process,

c) To establish the relationship between the tutors’ teaching experience and their adoption of integrating ICT into their instructional process,

d) To investigate the tutors’ attitudes towards integrating ICT in teaching and learning process, and

e) To explore the challenges faced by tutors while integrating technology into the curriculum.

The data was analyzed as per the objectives and the findings are reported and discussed.
4.2 General and Demographic Information

Questionnaire return rate from the respondents

The return rate was 100%. This implies that the same numbers of questionnaires administered to the tutors (table 4.1a) and to the students (table 4.1b) were collected.

Table 4.1a: Questionnaire return rate for the Tutors

<table>
<thead>
<tr>
<th></th>
<th>Kamwenje</th>
<th>Kilimambogo</th>
<th>Muranga</th>
<th>Thogoto</th>
</tr>
</thead>
<tbody>
<tr>
<td>QNS administered</td>
<td>13</td>
<td>12</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Returned</td>
<td>13</td>
<td>12</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Return rate</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.1b: Questionnaire return rate for the student Teacher trainees

<table>
<thead>
<tr>
<th></th>
<th>Kamwenje</th>
<th>Kilimambogo</th>
<th>Muranga</th>
<th>Thogoto</th>
</tr>
</thead>
<tbody>
<tr>
<td>QNS administered</td>
<td>76</td>
<td>87</td>
<td>57</td>
<td>77</td>
</tr>
<tr>
<td>Returned</td>
<td>76</td>
<td>87</td>
<td>57</td>
<td>77</td>
</tr>
<tr>
<td>Return rate</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.2.0 Tutors’ background information

The background information that was sought included sex, age, marital status, religious beliefs, academic and professional qualification, training on ICT use, department, teaching subject and teaching experience. The purpose of their bio data was to make them feel committed to respond to the items basing their arguments on what they taught in the sampled colleges. In addition, the bio data was important when analyzing their
responses based on the objectives of the study. Out of 43 sampled tutors, 97.7% consented that their religious beliefs allowed them to freely embrace ICTs whereas only one tutor felt that his religious belief do not allow him to embrace ICTs as shown on Table 4.2.

Table 4.2: Bio data of the Tutors

<table>
<thead>
<tr>
<th>Bio data of the Tutors</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (N = 43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>60.5</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>39.5</td>
</tr>
<tr>
<td>Age (years) (N = 43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 – 34</td>
<td>3</td>
<td>7.0</td>
</tr>
<tr>
<td>35 – 39</td>
<td>8</td>
<td>18.6</td>
</tr>
<tr>
<td>40 – 44</td>
<td>11</td>
<td>25.6</td>
</tr>
<tr>
<td>45 – 50</td>
<td>9</td>
<td>20.9</td>
</tr>
<tr>
<td>Over 50</td>
<td>11</td>
<td>25.6</td>
</tr>
<tr>
<td>No answer</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Marital status (N = 43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Married</td>
<td>37</td>
<td>86.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>Separated</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Divorced</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>No answer</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Highest academic qualification (N = 43)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHD</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Masters</td>
<td>23</td>
<td>53.5</td>
</tr>
<tr>
<td>Bachelors degree</td>
<td>17</td>
<td>39.5</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>No answer</td>
<td>1</td>
<td>2.3</td>
</tr>
</tbody>
</table>
4.2.1. Marital Status and academic qualifications

Out of the 43 sampled tutors, 60.5% were male and 39.5% were female Tutors. Most of the Tutors were married, 86.0% and 2.3% were divorced, separated or single. In their academic qualifications, the study showed that most of the Tutors in these colleges had Masters degree of education which is 53.5% of the sampled respondents, whereas 39.5% had bachelors degree and only one of the sampled Tutors had a Ph.D.

4.2.2. Tutors’ training on use of ICT

Out of 43 tutors, 67.4% of the Tutors stated that they were trained on the use of ICT whereas 27.9% stated that they were not trained on use of ICT. This showed that most of these Tutors were able to use ICTs however, 4.7% of them had no answer as shown on Figure 4.1.

![Figure 4.1: Tutors Training on use of ICT](image-url)
4.2.3. Subject taught by the Tutors

The tutors taught the following subjects as per the proportionate distribution from the target population in various departments as shown on Table 4.3

Table 4.3: Number of Tutors teaching the subject

<table>
<thead>
<tr>
<th>Subject taught</th>
<th>Number of Tutors (N = 43)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art and craft</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>English</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
<td>14.0</td>
</tr>
<tr>
<td>Kiswahili</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>Social studies</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>C.R.E</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Education</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>History</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>P.E</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>ICT</td>
<td>4</td>
<td>9.3</td>
</tr>
<tr>
<td>Science</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>Music</td>
<td>2</td>
<td>4.7</td>
</tr>
</tbody>
</table>

4.2.4. Teaching experience of the Tutors

Out 43 of the Tutors in the selected colleges, 46.5% had taught for more than 20 years, 18.6% had 11 – 15 years of teaching experience, whereas 7.0% had only taught for less than 5 years as shown on Table 4.4
### Table 4.4: Tutors’ teaching experience

<table>
<thead>
<tr>
<th>Teaching experience (Years)</th>
<th>$f(N = 43)$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>3</td>
<td>7.0</td>
</tr>
<tr>
<td>6 – 10</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>11 – 15</td>
<td>8</td>
<td>18.6</td>
</tr>
<tr>
<td>16 – 20</td>
<td>7</td>
<td>16.3</td>
</tr>
<tr>
<td>Over 20 years</td>
<td>20</td>
<td>46.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>43</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### 4.2.5. Student teacher trainees’ background information

The background information that was sought included sex, age, marital status, religious beliefs and subject option. Student teacher trainees were both male and female. The purpose of their bio data was to make them feel committed to respond to the items basing their arguments on the subject option and responses on data analysis. Male student teacher trainees accounted for 47.8% whereas the female student teacher trainees were 51.5% of the sampled population. Majority (69.4%) of the student teacher trainees were between 20 – 24 years of age and 77.8% of them were single as shown on Table 4.5.
### Table 4.5: Bio data of the student teacher trainees

<table>
<thead>
<tr>
<th>Bio data</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender (N = 297)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>142</td>
<td>47.8</td>
</tr>
<tr>
<td>Female</td>
<td>153</td>
<td>51.5</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Age (years) (N = 297)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 – 19</td>
<td>27</td>
<td>9.1</td>
</tr>
<tr>
<td>20 – 24</td>
<td>206</td>
<td>69.4</td>
</tr>
<tr>
<td>25 – 29</td>
<td>50</td>
<td>16.8</td>
</tr>
<tr>
<td>30 – 34</td>
<td>9</td>
<td>3.0</td>
</tr>
<tr>
<td>Over 35</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>No answer</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Marital status (N = 297)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>231</td>
<td>77.8</td>
</tr>
<tr>
<td>Married</td>
<td>58</td>
<td>19.5</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Separated</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>0.7</td>
</tr>
</tbody>
</table>
4.2.6. Student teacher trainees’ subject option

During their trainings, the teacher trainees have two subject options, option A and B as required by the Ministry of Education Science and Technology in Kenya. Out of the 297 sampled student teacher trainees (50.5%) were taking subject option B whereas 48.5% were taking option A. Three student trainee teachers had no answer and failed to indicate the subject options they were taking as shown on Figure 4.2.

![Pie chart showing subject options taken by student teacher trainees]

**Figure 4.2:** Subject options taken by student teacher trainees

4.2.7. Interview schedule report

In the interview schedule for four college Principals and two Kenya Institute of Curriculum Development (KICD) officers were involved. Interview schedule was conducted for the respondents and the results captured verbatim in a thematic format. The main themes of the study were as set in the objectives;

a) To establish the types of ICTs available in primary teacher training colleges for instructional purposes;
b) To investigate the preparedness of tutors to integrate ICTs in teaching and learning process,

c) To establish the relationship between the tutors’ teaching experience and their adoption of integrating ICTs into their instructional process,

d) To investigate the tutors’ attitudes towards integrating ICTs in teaching and learning process, and

e) To explore the challenges faced by tutors while integrating ICTs into the curriculum.

4.2.8. Background information of the College principals

Both male and female college principals were interviewed. Three female and one male principal were all over 50 years of age. During the interview, three of the college principals admitted that their religious beliefs allow them to freely embrace Information and Communication Technology (ICT). One principal, however, felt that her religious belief do not allow her to freely embrace ICT. The purpose of their background information was enable the researcher draw conclusions based on embracing integration of ICT in their colleges based on the objectives of the study.

4.3 Types of Information Communication Technology available

Dale (1969) categorizes ICTs as visual, audio and audio visual. The visual ICTs include; illustrated books, pictures, photographs, flashcards, charts, maps, posters, exhibits, self instructional materials, flip books, bulletin boards, magnetic boards,
flannel graphs, dioramas, models, mock-ups, filmstrips, slides, transparencies, silent films, chalkboards, drawing and cartoons. Audio ICTs include; radio, language laboratories, tape and disc recording, telephone, telecture and sound distribution system and audio visual ICTs comprises of television, films (8mm, 16mm, 35mm) video tapes, sound filmstrips printed materials with recorded sound, study trips and demonstration.

According to Ayot (1986), ICTs are categorized in three broad groups. The first category comprises ICTs such as books, periodicals, newspapers, posters, flashcards, charts, cartoons, globes and maps, flannel boards, chalkboards, exhibits and bulletin boards. The second category consists of ICTs such as projectors record players, radios, films, televisions, magnetic tapes, slides, aural aids, sound and still projectors and the third category is of community resources like field trips, environment and people.

Objective one of the study was to establish the type of ICTs available for instructional purpose. An item inquiring on availability was administered to forty three tutors of the sampled colleges and their responses were as shown on Table 4.6.
Table 4.6: Types of ICTs (and related resources) available to teach trainees in the colleges

<table>
<thead>
<tr>
<th>Types of colleges</th>
<th>ICT available in f (n = 43)</th>
<th>%</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td>41</td>
<td>95.3</td>
<td>1.05</td>
<td>0.21</td>
</tr>
<tr>
<td>Overhead projectors</td>
<td>37</td>
<td>86.0</td>
<td>1.14</td>
<td>0.35</td>
</tr>
<tr>
<td>Black boards</td>
<td>39</td>
<td>90.7</td>
<td>1.09</td>
<td>0.29</td>
</tr>
<tr>
<td>White boards</td>
<td>39</td>
<td>90.7</td>
<td>1.09</td>
<td>0.29</td>
</tr>
<tr>
<td>Radio</td>
<td>19</td>
<td>44.2</td>
<td>1.56</td>
<td>0.50</td>
</tr>
<tr>
<td>Television</td>
<td>39</td>
<td>90.7</td>
<td>1.09</td>
<td>0.29</td>
</tr>
<tr>
<td>LCD</td>
<td>30</td>
<td>69.8</td>
<td>1.30</td>
<td>0.46</td>
</tr>
<tr>
<td>Computers</td>
<td>43</td>
<td>100.0</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Tablets</td>
<td>14</td>
<td>32.6</td>
<td>1.86</td>
<td>0.35</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>30</td>
<td>69.8</td>
<td>1.30</td>
<td>0.46</td>
</tr>
<tr>
<td>Charts</td>
<td>35</td>
<td>81.4</td>
<td>1.19</td>
<td>0.39</td>
</tr>
<tr>
<td>Others (1 Laptops, 2 Video cameras)</td>
<td>4</td>
<td>9.4</td>
<td>1.90</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Respondents answered more than once. According to table 4.6, out of the 43 tutors, 100% noted availability of Computers, 95.3% Text books, 90.7% Whiteboards, 90.7% Black boards, 90.7% Television, 81.4% Charts, 86.0% overhead projectors and other available ICTs with minimal percentages as shown on Table 4.6.

Using a scale of 1 – 2 (1- available, 2-Not available), the Tutors ranked the availability for each of the ICTs to establish the types of ICTs available in their colleges. The mean
value of types of ICTs available therefore ranged from 1.00 – 2.00 whereby the most available ICT reported was computers with a mean of 1.00 with a standard deviation of 0.00 and text books with a mean of 1.05 with a standard deviation of 0.21 as shown in the table 4.6.

The researcher wanted to find out whether whatever was self reported by tutors was so, therefore, in regard to this objective, the researcher sought information from student teacher trainees as shown on Table 4.7

**Table 4.7:** Types of ICTs (and related resources) available in the colleges as indicated by the student teacher trainees

<table>
<thead>
<tr>
<th>Type of ICT available</th>
<th>f (N = 297)</th>
<th>%</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td>281</td>
<td>94.6</td>
<td>1.05</td>
<td>0.23</td>
</tr>
<tr>
<td>Overhead projectors</td>
<td>215</td>
<td>72.4</td>
<td>1.28</td>
<td>0.45</td>
</tr>
<tr>
<td>Black boards</td>
<td>271</td>
<td>91.2</td>
<td>1.09</td>
<td>0.28</td>
</tr>
<tr>
<td>White boards</td>
<td>255</td>
<td>85.9</td>
<td>1.14</td>
<td>0.35</td>
</tr>
<tr>
<td>Radio</td>
<td>79</td>
<td>26.6</td>
<td>1.73</td>
<td>0.44</td>
</tr>
<tr>
<td>Television</td>
<td>245</td>
<td>82.5</td>
<td>1.18</td>
<td>0.38</td>
</tr>
<tr>
<td>LCD</td>
<td>109</td>
<td>36.7</td>
<td>1.63</td>
<td>0.48</td>
</tr>
<tr>
<td>Computers</td>
<td>294</td>
<td>99.0</td>
<td>1.01</td>
<td>0.10</td>
</tr>
<tr>
<td>Tablets</td>
<td>57</td>
<td>19.2</td>
<td>1.81</td>
<td>0.39</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>228</td>
<td>76.8</td>
<td>1.23</td>
<td>0.42</td>
</tr>
<tr>
<td>Charts</td>
<td>143</td>
<td>48.1</td>
<td>1.52</td>
<td>0.50</td>
</tr>
</tbody>
</table>
According to table 4.7, out of 297 student teacher trainees, 99.0% of the student teacher trainees reported availability of computers, 94.6% text books, 91.2% black boards, 82.5% television, 76.8% mobile phones, 26.6% radios, 48.1% charts, 36.7% L.C.Ds and 19.2% stated their colleges had tablets as shown on Table 4.7.

Using a scale of 1 – 2 (1- available, 2- Not available), the student teacher trainees’ responses rated the availability for each of the ICTs to establish the types of ICTs available in their colleges. The mean value of types of ICTs available therefore ranged from 1.00 – 2.00 whereby the most available ICT reported was computers with a mean of 1.01 with a standard deviation of 0.10 and text books with a mean of 1.05 with a standard deviation of 0.23 as shown in table 4.7.

Further, student teacher trainees reported other ICTs available in the colleges such as; DSTV, public address systems, internet connections, and others as indicated on Table 4.8.

**Table 4.8: Other types of ICT in the colleges**

<table>
<thead>
<tr>
<th>Other types of ICT available in colleges</th>
<th>Number of tutors (N = 43)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSTV</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>Internet connection</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>Laptop</td>
<td>2</td>
<td>16.7</td>
</tr>
<tr>
<td>Public address system</td>
<td>2</td>
<td>16.7</td>
</tr>
<tr>
<td>Maps</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>Models</td>
<td>1</td>
<td>8.33</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>66.67</td>
</tr>
</tbody>
</table>
Further, the researcher wanted to know whether the ICTs were enough for instructional purpose and whether the student teacher trainees were satisfied with the types of ICTs used for teaching and learning. Out of 297 respondents, 61.3% of student teacher trainees reported that their colleges did not have enough ICTs for teaching and learning purposes and 57.6% student teacher trainees reported that they were not satisfied with the type of ICTs used for teaching and learning purposes in their colleges as shown on Table 4.9 and Table 4.10.

**Table 4.9:** Student teacher trainees’ opinion on adequacy of ICTs in colleges for teaching and learning.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of teacher trainees (297)</th>
<th>%</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enough ICT for teaching and learning</td>
<td>Yes</td>
<td>113</td>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>182</td>
<td>61.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>2</td>
<td>0.7</td>
<td>1.62</td>
</tr>
</tbody>
</table>

**Table 4.10:** Student teacher trainees’ opinion on satisfaction on use of ICTs in colleges for teaching and learning.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of teacher trainees (297)</th>
<th>%</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfied with the type of ICT used for teaching and learning</td>
<td>Yes</td>
<td>122</td>
<td>41.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>171</td>
<td>57.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No answer</td>
<td>4</td>
<td>1.3</td>
<td>1.58</td>
</tr>
</tbody>
</table>
In addition, an item in the college principals’ interview schedule confirmed what was reported by both the tutors and student teacher trainees. The types of ICTs available in the colleges which were used by the tutors apart from the computers were; Text Books, Televisions, Radios, Charts, Overhead Projectors, LCD, Public address system, Mobile phones, Photographs and Camera. Further, from the observation schedule, the study confirmed that the ICTs in primary teacher training college are inadequate.

Further, the researcher wanted to find out what Kenya Institute of Curriculum Development (KICD) as curriculum developers what they have in store for PTTCs. This was because the researcher wanted to know which types of ICTs that KICD prepare for instructional purposes. An item in the KICD e-officers sought to find out the objectives of integrating ICTs in teaching and learning. The study established that some of the objectives were to make learners have a variety of resources to learn from, ensure connectivity and availability of infrastructure, provide opportunities for learning through simulation in dangerous experiments and operation reducing the risk involved and help students better understand abstract concepts. The study further sought KICD officers’ opinion as an institution on implementation of laptops in the Kenyan primary schools. The researcher found out that it’s a welcome innovation to assist learners in their quest for digital learning. One of the officers stated that they had been in a consortium formed by the government where over 15 organizations were involved in implementation of the project. They prepared training manuals for Teachers of Teachers, as Teachers Guide, curriculum for the same and trained Teachers of Teachers and also prepared digital content for class 1 and 2.
4.3.0. Availability of computer laboratories and internet connectivity in colleges

Further, an item in the tutors’ questionnaire sought to inquire if the colleges had computer laboratories and whether there was internet connectivity. All the 43 respondents, that is; 100% of the tutors reported availability of computer laboratories which were mainly used for the teaching of Computer as a subject in the colleges commonly known as ICT. Although not examinable, students were taught since it was a requirement for primary teacher training institutions. All the students were taught basic skills in computer. Computer laboratories in two out of the four colleges did not have internet connectivity as indicated by 27.9% of the tutors whereas 72.10% reported that they had internet connectivity as shown on Figure 4.3.

![Figure 4.3: Number of Tutors aware of internet connectivity in colleges](image)

The researcher wanted to confirm what was self-reported by the tutors. An item in the Principals’ interview schedule sought to find out on the availability of internet connectivity. Out of the four colleges sampled for the study, three of the colleges the
principals felt they had reliable internet connectivity whereas one principal reported that there was no internet connectivity in the college. In one of the colleges, the principal noted internet connection was through Zuku ISP-reliable and payment for the services is promptly done on monthly basis. The colleges had a reliable power supply also available from Kenya Power and lighting Company and they had a wireless hot spot.

Moreover, the researcher further probed to know how individual Tutors accessed the computers. Based on the college principals’ interview report findings, in most of the colleges the individual tutors access the computers when using departmental computers since some departments had computers such as in Science and Mathematics departments. Some tutors use their personal computers whereas others used their laptops. In some offices, there were computers and the tutors were able to use them in their offices. The tutors also accessed the students’ computer laboratories when not in use by the student teacher trainees whereas other tutors also accessed the computers in the cyber cafes.

However, through observation schedule, the researcher established that not all colleges had internet connectivity. Three of the sampled colleges had internet connectivity mainly in the principals’ office whereas one college had internet connectivity in the whole college. Limited internet connectivity make ICT lecturers to use modems to download mapping information. Further, computers were accessed by student teacher trainees during ICT lessons which are two hours per week. This hinders the rolling out on integration of ICT.
The findings of the study established the mean value of types of ICTs available therefore ranged from 1.00 – 2.00 whereby the most available ICT reported were computers with a mean of 1.01 with a standard deviation of 0.10 and text books with a mean of 1.05 with a standard deviation of 0.23. The researcher viewed that types of ICTs available were inadequate for teaching and learning purposes. That access to the computers in colleges was poor with limited internet connectivity even though internet connectivity avails academic materials across the globe thus making ICT lecturers to use modems to download mapping information. Moreover, poor accessories in colleges impede use. Even the tutors with personal computers/laptops do not use them for college work. This hinders the rolling out on integration of ICT. This study concurs with Maruti (2010) study that revealed that in as much as internet connectivity is vital in promoting e-learning, teacher training colleges have very poor internet connectivity which implies that the colleges in Kenya are not prepared to reap from emerging technology to harness quality learning/education.

Further, the findings revealed that the available computer versus student teacher trainees’ population leads to poor student computer ratio because of sharing. This finding concurs with Gode (2013) study which established that ICT infrastructure in training colleges were not adequate. In addition, the study revealed that even the few ICTs available, there were no qualified technicians to help the tutors and student teacher trainees when in need. This study findings concurs with Ogange (2011) study on an analysis of ICT policy development and practice in teacher education in Kenya which
revealed the lack of ICT technological infrastructure, and Muyaka (2012)’s study on ICT infrastructure and teacher preparation in the integration of ICT in teaching and learning in primary teacher training college which established inadequate access to the few ICT infrastructure available. The study therefore concludes that there is lack of preparedness on integration of ICT in teaching and learning since the ICTs available in PTTCs are inadequate.

4.4 Preparedness of Tutors in integrating ICT.

Objective two of the study sought to investigate the preparedness of tutors to integrate ICT in teaching and learning process. According to the Ministry of Education Science and Technology (2005) session paper No 1, teachers are an important resource in the teaching and learning process. Their preparedness therefore should enable them acquire sufficient subject mastery and pedagogy. An item in the tutors’ questionnaire sought to find out if tutors were trained on ICT use. Out of 43 tutors, 67.4% of the tutors stated that they were trained on the use of ICT whereas 27.9% stated that they were not trained on use of ICT. This showed that most of these tutors were able to use ICTs however, 4.7% of them failed to indicate whether they were trained or not as shown on Figure 4.4.
Having established whether tutors were trained on ICT use, the study explored how often tutors used computers and computer accessories in preparing to teach their subject. Out of 43 tutors sampled, 44.2% never use any computers accessories, 9.4% of the tutors use computers once a year, 14.0% use computers once a month while 9.3% use computers once a week in preparing to teach whereas 23.3% of the tutors admitted they used computers and accessories every time they are preparing to teach as shown on Table 4.11.

Table 4.11: How often the Tutors use computers and accessories in preparing to teach

<table>
<thead>
<tr>
<th></th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Tutors</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>(N = 43)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>23.3</td>
<td>9.3</td>
<td>14.0</td>
<td>9.4</td>
<td>44.2</td>
</tr>
</tbody>
</table>
Further, an item in the tutors’ questionnaire sought to find out how often tutors used internet in preparation for teaching and learning. Out of 43 sampled tutors, 34.9% of the tutors never use internet in preparation for teaching, 7.0% of the tutors use internet once a year, 18.6% use it once a month whereas 20.9% use internet once a week in preparing for teaching. Only 18.6% of the tutors use internet every time they prepare for teaching as shown on Table 4.12.

**Table 4.12: How often the tutors use internet in preparing to teach**

<table>
<thead>
<tr>
<th></th>
<th>Every time</th>
<th>Once a Week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Tutors (N = 43)</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>%</td>
<td>18.6</td>
<td>20.9</td>
<td>18.6</td>
<td>7.0</td>
<td>34.9</td>
</tr>
</tbody>
</table>

Moreover, the study sought to find out how often tutors used computers and other ICT tools in presenting their lesson. Out of 43 sampled tutors, 58.1% never used computers and other ICT tools to present their lessons, 7.0% used computers and other ICT tools once a year, 9.3% used once a month, 2.3% use computer and other ICT tools once a week to present a lesson whereas 23.3% of the tutors use computers and other ICT tools every time they present a lesson as shown on Table 4.13.
Table 4.13: How often the Tutors use computers and other ICT tools to present a lesson

<table>
<thead>
<tr>
<th>Number of Tutors</th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N = 43)</td>
<td>10</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>%</td>
<td>23.3</td>
<td>2.3</td>
<td>9.3</td>
<td>7.0</td>
<td>58.1</td>
</tr>
</tbody>
</table>

To confirm what had been self reported by tutors, the study sought to find out from the principals some of the task tutors used computer for. The principals revealed that tutors used computers for setting, keying in marks and analyzing examinations, making lesson notes, making professional documents such as schemes of work, records of work covered, writing departmental minutes, sourcing for information from the internet, typing notes, research, preparing time tables and posting students for teaching practice.

4.4.0. Tutors’ skill levels on integration of ICT

Furthermore, an item in the tutors’ questionnaire sought tutors to rate their skill level on integration as they prepared student teacher trainees in their teaching career. Out of 43 tutors sampled, 44.2% rated their skill levels on integration as fair, 34.9% of the tutors rated their skill as good, 4.7% rated their skill to be very good whereas 16.3% of the tutors rated that they had no skill as shown on Table 4.14.
Table 4.14: Tutor rating of their skills levels on integration of ICT as they prepare teacher trainees

<table>
<thead>
<tr>
<th>Rating of skill</th>
<th>No. of tutors (N = 43)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No skill at all on integration</td>
<td>7</td>
<td>16.3</td>
</tr>
<tr>
<td>Fair</td>
<td>19</td>
<td>44.2</td>
</tr>
<tr>
<td>Good</td>
<td>15</td>
<td>34.9</td>
</tr>
<tr>
<td>Very good</td>
<td>2</td>
<td>4.7</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>100</td>
</tr>
</tbody>
</table>

The rating of the skills by the tutors was based on their ability to get information and apply in context, guide learners to get the context well and enable the student teacher trainees be able to integrate ICTs in their teaching career. Tutors who rated their ICT skills were fair stated this was because most of the computers available were not functional, tutors were not competent in integration as they were not fully trained on computer and other ICTs, some had left integration to the ICT department, some tutors were not computer literate at all, tutors noted they lacked time to practice yet their departments had only one computer whereas the classrooms were not ICT friendly to enhance integration.

Tutors who rated that their skills as good stated so because they were able to get information and apply it in context, were able to guide student teacher trainees get the content well and perform most of the tasks, in using ICT they had devised skills to be able to teach well. They were able to integrate emerging issues from the television, newspapers and others in teaching and refer to the internet in search for information. They stated that the available ICTs were used appropriately and since they had learnt
computer use in ICT lessons; they believed they can use however; there was room for improvement on integration of ICTs.

To confirm what had been reported by tutors, the researcher sought the principals’ views on literacy of the tutors in their colleges on the use of ICT. The four principals (100%) reported that most of the tutors have basic skills on ICT use. Tutors, especially those teaching ICT subject had advanced skills and were competent. The principals however noted that other tutors ignored using ICT. In general, the College principals felt that the tutors’ literacy levels were above average.

Using a Pearson moment correlation analysis to establish the relationship between training on use of ICTs and tutors rating on skill level on integration of ICTs as they prepare teacher trainees in their teaching career where a (p-value > 0.05 shows no significant relationship at 95% confidence level whereas a p-value < 0.05 shows that there is a significant relationship), the researcher established that there was no significant relationship (r = -0.267, P-value = 0.097). The negative correlation implied that those who were trained on use of ICTs tended to rate their skill as fair compared to those who were not trained. However, the overall statistics showed that there was no significant difference between training and the tutors rating on skill level on integration of ICTs as shown on Table 4.15.
**Table 4.15:** Correlation results between Tutors training on ICT use and skill level on integration of ICTs

<table>
<thead>
<tr>
<th>Skill level on integration of ICTs</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>Training on ICT use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-.267</td>
<td>Training on ICT use</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.092</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>41</td>
<td></td>
</tr>
</tbody>
</table>

Further, the study sought to explore if tutors were competent enough in the use of ICTs in teaching. Out of 43 tutors sampled, 60.5% reported that they were not competent enough whereas 39.5% of the Tutors felt that they were competent enough as shown on Figure 4.5.

**Figure 4.5:** Tutors considering themselves competent in use of ICT
An item on the tutors’ questionnaire sought to find out why tutors felt that they were not competent enough in the use of ICTs. Out of 43 tutors sampled, 44.8% of the tutors revealed that they lack adequate training on integration, 12.5% of the tutors reported that they lack practice using ICTs, 12.5% of the tutors reported that they were not conversant with some ICT operations whereas other tutors in minimal percentages reported that computers were not available at departmental level, they have been trained in ICT use but the facilities are not available in the institution, have not been trained for it, are not trained in ICTs integration, they have a lot of lessons, lack of practice in use of ICTs due to Limited exposure, tutor haven't got any knowledge and skills on integration and lack of enough textbooks therefore not conversant with the syllabus as shown on Table 4.16.

**Table 4.16: Reasons for the Tutors considering themselves not competent in use of ICT in teaching**

<table>
<thead>
<tr>
<th>Reasons</th>
<th>F  (N = 43)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of adequate training on integration</td>
<td>11</td>
<td>44.8</td>
</tr>
<tr>
<td>Lack of enough computers</td>
<td>2</td>
<td>8.33</td>
</tr>
<tr>
<td>Lack of practice in using ICTs</td>
<td>3</td>
<td>12.5</td>
</tr>
<tr>
<td>Not conversant with some ICT operations</td>
<td>3</td>
<td>12.5</td>
</tr>
<tr>
<td>A lot of lessons</td>
<td>1</td>
<td>4.2</td>
</tr>
<tr>
<td>Is expensive to use</td>
<td>1</td>
<td>4.2</td>
</tr>
<tr>
<td>Lack of text books</td>
<td>1</td>
<td>4.2</td>
</tr>
<tr>
<td>Trained but facilities are not available</td>
<td>1</td>
<td>4.2</td>
</tr>
<tr>
<td>Haven't got any knowledge and skills on integration</td>
<td>1</td>
<td>4.2</td>
</tr>
</tbody>
</table>
On the same note, there were those tutors who felt they were competent in the use of ICTs. Out of 43 tutors, 18.6% reported they were trained in the use of ICT, 18.6% reported they had experienced in the use of ICTs to teach, 11.6% reported that they were computer literate and 4.7% reported that integration of ICT enhanced their content delivery as shown on Table 4.17.

**Table 4.17: Reasons for the tutors considering themselves competent**

<table>
<thead>
<tr>
<th>Reasons</th>
<th>No. of tutors (N = 43)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trained in use of ICT</td>
<td>8</td>
<td>18.6</td>
</tr>
<tr>
<td>Experience in use of ICT to teach</td>
<td>8</td>
<td>18.6</td>
</tr>
<tr>
<td>Computer literate</td>
<td>5</td>
<td>11.6</td>
</tr>
<tr>
<td>Integration of ICT enhances content delivery</td>
<td>2</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Further, the researcher wanted to find out what the Kenya Institute of Curriculum Development e-officers have in store for PTTCs since they were the curriculum developers in Kenya. An item in the interview schedule explored what objectives KICD had on integration of ICTs in teaching and learning. The KICD e-officers reported that the objectives of integration of ICT in teaching as, to train teaches on ICT related skills, support achievement of sound pedagogy design, develop and produce digital content for learners, change the method of delivering the curriculum, make the teachers and learners acquire ICT skills and provide teachers and learners with reliable and variable information source. Moreover, the study sought to find out what KICD is doing in
teacher training colleges in terms of integration of ICTs. The study established that the KICD e-officers were mainly involved in ensuring that all public TTCs have been equipped with infrastructure for ICTs devices, tutors and support staff in public TTCs have been trained on how to integrate ICT, that KICD is currently developing digital content for first year student teacher trainees of PTTCs, that KICD has developed Tafakari content which is in all PTTCs and that KICD and her partners have held workshops for PTTCs on integration ICT. Further, the study explored if the KICD e-officers had communicated to the principals of teacher training colleges on integration. One of the e-officers reported that he had communicated to the principals through Teacher Professional Development, MOE and partners had facilitated various training for Principals of PTTCs on the same whereas the other e-officer had not communicated because he was still making some logistical arrangements to do curriculum orientation in the field.

However, on the ground (PTTCs), the researcher established that programmes such as Tafakari were never implemented. In addition, all the content developed is meant for secondary schools not for PTTCs. The researcher therefore reviews that in spite of the government putting emphasis on integration of ICT, nothing much has been done in PTTCs to prepare tutors and student teacher trainees to roll out integration to enhance quality education. The researcher noted that KICD officers used a lot of funds for teachers already in the field on integration, and wondered why they do not go to the primary teacher training colleges and train there. In response to this the KICD officers
revealed that there is need for logical arrangements to do curriculum orientation in the field.

4.4.1. Training in the teaching career

To confirm what had been reported by tutors, the researcher sought to establish whether student teacher trainees use internet in college for their preparation in teaching and learning especially during teaching practice. Out of 297 student teacher trainees, 75.8% of the teacher trainees never used internet in college, 7.4% used every time, 9.4% used once a week, 4.4% used once a month whereas 1.3% used it once a year as shown on Table 4.18.

Table 4.18: How often the student teacher trainees used internet in college for preparation in teaching during teaching practice

<table>
<thead>
<tr>
<th>Usage of internet in college</th>
<th>No. of teacher trainees</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N = 297)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every time</td>
<td>22</td>
<td>7.4</td>
</tr>
<tr>
<td>Once a week</td>
<td>28</td>
<td>9.4</td>
</tr>
<tr>
<td>Once a month</td>
<td>13</td>
<td>4.4</td>
</tr>
<tr>
<td>Once a year</td>
<td>4</td>
<td>1.3</td>
</tr>
<tr>
<td>Never</td>
<td>225</td>
<td>75.8</td>
</tr>
<tr>
<td>No answer</td>
<td>5</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Furthermore, Pearson moment Correlation analysis was conducted to establish the relationship between how student teacher trainees were being prepared to integrate ICT
in their teaching career with how often they used internet in college to prepare for teaching especially during teaching practice. The result showed that there was a significant relationship \( r = 0.203, P\text{-value} = 0.001 \). This implied that student teacher trainees who felt that they were prepared to integrate ICT in their teaching career often used internet in college especially during teaching practice. However, those who felt that they were not prepared to integrate ICT in their teaching career especially in teaching practice never used internet in college for preparation for their teaching as shown on Table 4.19.

**Table 4.19:** Correlation results between student teacher trainees preparation to integrate ICT with use of internet.

<table>
<thead>
<tr>
<th>Training preparation to integrate ICT in teaching career</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of internet in college for preparation in teaching</td>
<td>1</td>
<td>.001</td>
<td>295</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

Additionally, the study sought to find out why the correlation. An item in the Student Teacher trainees’ questionnaire sought to find out if the training prepared them to integrate ICT in their teaching career. Out of 297 student teacher trainees sampled, 70.4% felt that the training had prepared them to integrate ICT in teaching and learning
process whereas 29.60% of the student teacher trainees felt that their training had not prepared them to integrate ICT in teaching and learning process as shown on Figure 4.6.

![Figure 4.6: Student Teacher Trainees’ opinion on trainings preparing them in integrating ICT.](image)

Further, an item in the student teacher trainee sought to establish reasons why student teacher trainees were for the opinion that they were adequately prepared. The student teacher trainees reported in a narrative form that they were adequately trained because they were able to use computers as they are taught basic skills in computer such as PowerPoint, access internet and get information, they were able to access teaching and learning materials and can make reference to textbooks comfortably, ICT is taught as a subject though not examinable, the Computer lessons are taught from first year up to 5th term of 2nd year. Further, at least after training the student teacher trainee can try and operate computer programme but not competently, the knowledge students get in ICT is relevant in teaching and learning process and in the profession as a whole, the skills they had acquired in ICT would help in searching job opportunities and that
Training allows students to have knowledge on ICT and hence can teach the ICT subject easily or with ease in the teaching career.

On the same note, an item in the questionnaire sought to establish why student teacher trainees felt that the training did not prepare them to integrate ICT in teaching and learning because they do not know how to operate a computer since the computers were very few for doing practical and that there was limited time for practice, there was no training on integration during their ICT training programme, there were incomplete packages taught in college during training, the teaching and learning resources they had needed to be equipped on how to integrate ICT were inadequate, the students were being trained about basic skills on computer but not integration and that in the area where the student teacher trainees were going to work the project of laptop was still not implemented.

Further, an item in the student teacher trainees sought to find how student teacher trainees rated their skill level on integration of ICTs as they were being prepared as teacher professional. Out of 297 student teacher trainees sampled, (47.5%) rated that they were fair, 31.6% rated that they good, 8.8% rated that they were excellent, 8.4% rated that they were very good whereas 3.0% rated that they had no skill at all as shown on Table 4.20.
**Table 4.20**: Student teacher trainees’ rating of the individual skill level on integration of ICT

<table>
<thead>
<tr>
<th>Rating on the skill level</th>
<th>Number of T. trainees (N = 297)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No skill at all on integration</td>
<td>9</td>
<td>3.0</td>
</tr>
<tr>
<td>Good</td>
<td>94</td>
<td>31.6</td>
</tr>
<tr>
<td>Excellent</td>
<td>26</td>
<td>8.8</td>
</tr>
<tr>
<td>Fair</td>
<td>141</td>
<td>47.5</td>
</tr>
<tr>
<td>Very good</td>
<td>25</td>
<td>8.4</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>0.7</td>
</tr>
</tbody>
</table>

In addition, the study sought to find out why student teacher trainees rated their individual skills as good. They reported that they were good because they felt were able to access information using the available computers as they are able to operate them, able to use PowerPoint, access internet even by use of mobile phones, able to use text books, blackboards and can prepare and use charts in teaching.

Moreover, there were those who felt their rating of the skills were low and were of the opinion that they had fair or no skills at all because accessibility to internet was low due to few computers compared to number of students as well as irregularly taught computer leave alone not well conversant with all the programs in the computer, fewer rooms for practical, ICTs are not enough for adequate preparation and negative attitude of some lecturers towards student teacher trainees’ performance and progress.
To establish further what had been reported by the student teacher trainees, the researcher used Pearson Moment Product correlation. The correlation results for the student teacher trainees’ preparedness to integrate ICT in teaching and learning in their teaching career with their rating on skill level on integration of ICTs as they are being prepared as teacher professional showed that there was no significant relationship (r = 0.102, p-value = 0.082). This implied that student teacher trainees who had reported that they were prepared to integrate ICT in teaching and learning process in their teaching career still rated their skills to be fair or no skill at all as shown on Table 4.21.

Table 4.21: Correlation between student teacher trainee preparedness to integrate ICT and rating on skill level on integration of ICTs

<table>
<thead>
<tr>
<th>Training preparation to integrate ICT</th>
<th>Pearson Correlation</th>
<th>Rating of skill level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training preparation to integrate ICT</td>
<td>1</td>
<td>.102</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>Sig.</td>
<td>.082</td>
</tr>
<tr>
<td>Sig.</td>
<td>(2- tailed)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>295</td>
<td>293</td>
</tr>
</tbody>
</table>

This implies that the training is only offering pedagogy, content, knowledge but not the technology which make integration a reality in the classroom setting.
In addition, the study sought to find out the KICD e-officers’ opinion on whether the student teacher trainees in primary teacher training colleges were well prepared for the integration of ICT in teaching and learning. The entire KICD e-officer reported that the teacher trainees were not well prepared because more training and exposure is required to prepare tutors and student teacher trainees during the training of trainer of trainees in PTTCs. The e-officers reported that teacher trainees were still using manila papers yet computers were in colleges, digital content for use in primary was also PTTCs and tutors and student teacher trainees require utilization of the infrastructure to benefit from ICT integration.

Moreover, KICD e-officers opinion as curriculum developers on integration of ICTs in PTTCs to enhance the same at the primary schools in Kenya were that; It was necessary to involve and train tutors in colleges so as to fully participate in teaching while integrating ICTs and student teacher trainees need to acquire ICT skills in PTTCs which they can impart at the primary schools. They also needed to acquire the devices through more training and exposure for the successful implementation of projects to integrate ICTs in teaching and learning.

**4.4.2. Skills required by the Tutors to prepare student teacher trainees**

Since the study is on teachers’ preparedness, the study explored whether there had been any ICT training for tutors in the last three years in colleges. The principals revealed that they had been to some form of ICT trainings for tutors once every term, two times or three times. Further, an item in the principals’ interview schedule sought to find out
the principals’ opinion on the skills required by the tutors to prepare student teacher trainees. The college principals in verbatim revealed that, for the tutors to prepare teacher trainees in integration of ICTs, they require to use ICT tools and facilities, prepare teaching and learning resources, good communication skills, ICT proficiency teaching skills, internet manipulation skills, basic cabling and safety skills, computer skills and education technology. Further, college principals felt that the tutors should have adequate skills in ICT by being trained regularly and be provided with desktops/laptops. The findings reveal lack of proper training in the use of ICT. The study concurs with Selwyn (2007)’s study on factors influencing integration of ICT in higher education in Vietnam revealed that there was a poor slow uptake of ICT in education in spite of heavy investments put in place on integration of ICTs in education which is similar case in Kenya.

The study findings revealed that there was no significant relationship between training on use of ICTs and tutors rating on skill level on integration of ICTs as they prepare teacher trainees. The negative correlation implied that those who were trained on use of ICTs tended to rate their skill as fair compared to those who were not trained. The overall statistics showed that there was no significant difference between training and the tutors rating on skill level on integration of ICTs. The study therefore views that computers have not transformed practice and that access to ICT is the foremost and necessary step in the integration process even though mere access will not automatically lead to integration of ICT for teaching and learning. The findings further revealed that there was lack of proper training in the use of ICTs and that preparedness on integration
is an infant stage. The researcher viewed therefore that both the tutors and student teacher trainees were not prepared to benefit from integration of ICT to harness quality learning. This concurs with Maruti (2010) study on e-readiness. Moreover, the training programme does not currently provide prospective student teacher trainees with the necessary skills, competencies and experiences to prepare them to integrate ICTs effectively in their teaching profession. The study concurs with Mukiri (2012) study which revealed that teachers lacked proper training in the use of ICT as they were not exposed to the use of ICT as a teaching resource in teaching despite the fact they had ICT qualifications which does not help them in lesson delivery.

Moreover, this study also concurs with Duran (2000) study on preparing technology-proficient teachers and Muyaka (2012) study which revealed that student teacher trainees lacked an allocated time within the college timetable when they could freely access computer labs to enforce practice as they were expected to have free time when they could access the facilities and put to practice what they had learned if integration of ICTs has to be realized in Kenyan PTTCs. According to Bowes (2003), to use these tools effectively and efficiently, teachers need visions of technologies’ potential, opportunities to apply them, training, and just-in-time support and time to experiment only can then teachers be informed and confident in their use of ICTs whereas Collins and Jung (2003) observe ICT can be used as a core or complementary to the teacher training process if integration has to be realized.
4.5 The relationship between the tutors’ teaching experience and their adoption of integrating ICT

Objective three of the study sought to establish the relationship between the tutors’ teaching experience and their adoption of integrating ICT into their instructional process. It is obvious that for teaching and learning to be efficient and effective, integration of ICT is inevitable. An item in the tutors’ questionnaire sought to find out how often they integrated ICTs to their teaching. Out of 43 tutors, 90.7% of the tutors stated that they integrate the use of textbooks, 90.7% integrate black boards every time, 44.2% integrate the use of white boards every time whereas only 2.3% integrate use of Tablets, 7.0% use of LCD, 7.0% integrate use of overhead projector and 20.9% integrate use of computers every time they teach their subjects whereas 90.7% of the tutors reported that they never integrated the use of radios every time in their teaching as shown on Table 4.22.
Table 4.22: How often the Tutors integrate ICTs to teach

<table>
<thead>
<tr>
<th>ICTs</th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td>39 (90.7%)</td>
<td>1 (2.3%)</td>
<td></td>
<td>1 (2.3%)</td>
<td>2 (4.7%)</td>
</tr>
<tr>
<td>Overhead projector</td>
<td>3 (7.0%)</td>
<td>2 (4.7%)</td>
<td>2 (4.7%)</td>
<td>6 (14.0%)</td>
<td>30 (69.8%)</td>
</tr>
<tr>
<td>Black boards</td>
<td>39 (90.7%)</td>
<td>1 (2.3%)</td>
<td></td>
<td>3 (7.0%)</td>
<td></td>
</tr>
<tr>
<td>White boards</td>
<td>19 (44.2%)</td>
<td>5 (11.6%)</td>
<td>2 (4.7%)</td>
<td>3 (7.0%)</td>
<td>14 (32.5%)</td>
</tr>
<tr>
<td>Radio</td>
<td>-</td>
<td>1 (2.3%)</td>
<td></td>
<td>3 (7.0%)</td>
<td>39 (90.7%)</td>
</tr>
<tr>
<td>Television</td>
<td>3 (7.0%)</td>
<td>3 (7.0%)</td>
<td>2 (4.7%)</td>
<td>5 (11.6%)</td>
<td>30 (69.8%)</td>
</tr>
<tr>
<td>LCD</td>
<td>3 (7.0%)</td>
<td>4 (9.3%)</td>
<td>1 (2.3%)</td>
<td>5 (11.6%)</td>
<td>30 (69.8%)</td>
</tr>
<tr>
<td>Computer</td>
<td>9 (20.9%)</td>
<td>7 (16.3%)</td>
<td>2 (4.7%)</td>
<td>4 (9.3%)</td>
<td>21 (48.8%)</td>
</tr>
<tr>
<td>Tablets</td>
<td>1 (2.3%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>42 (97.7%)</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>10 (23.3%)</td>
<td>5 (11.6%)</td>
<td>4 (9.3%)</td>
<td>5 (11.6%)</td>
<td>19 (45.2%)</td>
</tr>
<tr>
<td>Charts</td>
<td>16 (37.2%)</td>
<td>8 (18.6%)</td>
<td>4 (9.3%)</td>
<td>2 (4.7%)</td>
<td>13 (30.2%)</td>
</tr>
</tbody>
</table>

Further, integration of ICTs by the tutors was established using a likerts scale of 1 – 5 (1-Every time, 2-Once a week, 3-once a month, 4-once a year and 5-Never, the tutors ranked the responses received for each of the ICTs to establish the level at which they integrate ICTs. The Mean level of integration was therefore established for each of the
ICTs used by the tutors. The highly used ICT was ranked as 1 whereas the never/least used was ranked 5. The research finding showed that the type of ICT that was mostly integrated by the tutors in teaching and learning in colleges were text books (mean 1.19) and Black boards ((mean 1.24). Tutors ranked radio (mean 4.84) and tablets (mean 4.87) showing that they never integrated these ICTs in teaching as shown on Table 4.23.

**Table 4.23**: Mean ranks by the Tutors for the integration ICTs in teaching

<table>
<thead>
<tr>
<th>ICTs</th>
<th>Mean rank</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td>1.19</td>
<td>0.12</td>
</tr>
<tr>
<td>Overhead projector</td>
<td>4.24</td>
<td>0.21</td>
</tr>
<tr>
<td>Black boards</td>
<td>1.24</td>
<td>0.14</td>
</tr>
<tr>
<td>White boards</td>
<td>2.42</td>
<td>0.28</td>
</tr>
<tr>
<td>Radio</td>
<td>4.84</td>
<td>0.09</td>
</tr>
<tr>
<td>Television</td>
<td>4.19</td>
<td>0.22</td>
</tr>
<tr>
<td>LCD</td>
<td>4.16</td>
<td>0.22</td>
</tr>
<tr>
<td>Computer</td>
<td>3.33</td>
<td>0.27</td>
</tr>
<tr>
<td>Tablets</td>
<td>4.87</td>
<td>0.13</td>
</tr>
<tr>
<td>Mobile phones</td>
<td>3.26</td>
<td>0.27</td>
</tr>
<tr>
<td>Charts</td>
<td>2.42</td>
<td>0.26</td>
</tr>
</tbody>
</table>

1-used every time, 2-once a week, 3-once a month, 4-once a year, 5-never

Based on the likert scale 1 – 5 (1-Every time, 2-Once a week, 3-once a month, 4-once a year and 5-Never), the researcher established individual tutors integration level by
getting the mean ranking of the eleven ICT items. Best rank was 1 (which implied that the tutor was integrating the entire eleven items every time he/she was teaching, whereas the worst ranking was 5 (which implied that the tutors never integrated the ICT). The overall mean for the tutors’ integration of ICT was established to be 3.09 with a standard deviation of 0.86. This implied that the tutors generally integrate ICT once a month in the Likert scale for adoption of ICT. Since the study sought to find out the relationship between tutors’ teaching experience and adoption to integration, the researcher further used Pearson moment correlation to establish the relationship between tutors’ teaching experience and their adoption to integrating ICT into their instructional process.

Correlation analysis to find out the relationship between the tutors’ teaching experience and their adoption of integrating ICTs into their instructional process revealed that tutors in this study had an average of 19.79 with a standard deviation of 8.74 years of teaching experience whereby most of the tutors had taught for between 10 – 25 years. Further, the researcher sought to correlate the number of years the tutors had in teaching visavis their adoption of integrating ICT into their instructional process, the result gave a Pearson moment correlation (where a p-value > 0.05 shows no significant relationship at 95% confidence level and < 0.05 shows no significant relationship) value of $r = 0.006$, $P$-value $= 0.967$. This implied that, adoption of integrating ICT by tutors into their instructional process was not significantly related to their years of teaching experience as shown on Table 4.24.
Table 4.24: A correlation table showing relationship in adoption of integrating ICT to tutors experience

<table>
<thead>
<tr>
<th>Teaching experience in years</th>
<th>Pearson Correlation</th>
<th>Adoption of integrating ICT into instructional process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>.006</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>.967</td>
</tr>
<tr>
<td>(2-tailed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>

The researcher views therefore that teaching experience had little influence on adoption of integrating ICT into instructional process. That is why Waits and Demana (1990) observed that adoption of technology by teachers require professional development that focuses on both conceptual and pedagogical issues, on-going support in terms of “intensive start-up assistance and regular follow-up activities” and a desire to change from within the profession.

4.5.0. Influence of previous teaching experience in use of ICTs for instructional purposes

The researcher correlated the tutors teaching experience in years and how positively it influenced use of ICTs for instructional purposes, the result showed that there was a
significant relationship (r = 0.408, p-value = 0.007). This implied that tutors who had longer experience in teaching were positively influenced in the use of ICTs in their instructional process as shown on Table 4.25.

**Table 4.25**: Relationship in teaching experience in years and how positively it influenced use of ICTs

<table>
<thead>
<tr>
<th>Teaching experience in years</th>
<th>Previous teaching experience’s positive influence to the use of ICTs for instructional purposes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.007</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).

Further, the researcher sought to find out reasons why discussants were positively influenced. An item in the tutors’ questionnaire sought to establish if their previous teaching experience influenced their use of ICT. Out of 43 Tutors, 60.5% reported that their previous teaching experience had positively influenced their use of ICTs for instructional purposes whereas 39.5% of the tutors did not realize any positive influence of previous teaching experience in their use of ICTs for instructional purposes as shown on Figure 4.7.
Moreover, an item in the tutors’ questionnaire explored more on reasons why tutors felt that they were positively influenced by their previous teaching experience in use of ICT for instructional purpose. The tutors reported that it was easy to store and retrieve information using ICT, the tutors were well versed with textbooks usage, and they had been encouraged to use ICTs to make meaningful learning. With their experience, tutors no longer went to class without making a reference and it was easier now to do research as they prepared their teaching notes/lessons.

In addition, having ICT enables integration of emerging issues in teachers, ICT has enriched the tutors knowledge, made teaching easier and exciting, in the process of teaching ICT makes it much more effective and efficient. They also got more information from the internet, updating notes and content was made easier. Further, tutors revealed that teaching became easier when one uses ICTs since they were well
versed with the use of text books and not the modern ICTs. They also revealed that students embrace the use of ICT and that enhances their interest in a lesson. However, the tutors noted that college system do not support integration of ICT by subject lecturers but complexity of some content forces them to use ICT since this creates better understanding of content. Tutors who were not versed with ICT always use textbooks only for referencing. The major impediment of integration of ICT was mainly lack of exposure.

To confirm what was reported by tutors, the study sought to find out the relationship between the tutors’ teaching experience and their adoption on ICT use from the principals. The principals revealed that younger inexperienced tutors embrace ICTs and were more receptive to the use of ICT in teaching and learning process whereas those with long teaching experience tended to ignore the use of ICTs in teaching and learning. Young tutors enjoy using ICTs whereas the older tutors find it a bother. Further, the college principals revealed that with the introduction of ICTs, the student teacher trainees were gradually embracing the concept of ICT integration. The principals recommended that tutors be required to undergo in-service training on integration ICT. The student teacher trainees like the younger tutors as they enjoy ICT presented lessons. This was because basic skills of ICT’ were more inherent in young tutors who find them exciting and interactive.
4.5.1. Student teacher trainee opinions on integration of ICT

Additionally, the study sought to get the student teacher trainees’ opinion on integration of ICT. An item in the student teacher trainees’ questionnaire explored for their opinion on the integration of ICT. Out of 297 student teacher trainees, 77.8% revealed that integration of ICTs greatly enhances content delivery, 75.4% revealed that integration of ICTs influences understanding of the content whereas 60.3% disagreed that integration of ICT in teaching is adding extra costs unnecessarily. When looking at the syllabus coverage, 59.6% disagreed that integration of ICT reduces syllabus coverage whereas 60.1% reported that integration of ICT in teaching is not adding extra costs unnecessarily as shown on Table 4.26.
Table 4.26: Student teacher trainees’ opinion on integration of ICT

<table>
<thead>
<tr>
<th>Statements on ICT (N = 297)</th>
<th>Teacher Trainees’ opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td>Integration of ICT in teaching is adding extra costs unnecessarily</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>(37.7%)</td>
</tr>
<tr>
<td>More time is spent when commuters are used</td>
<td>134</td>
</tr>
<tr>
<td></td>
<td>(45.1%)</td>
</tr>
<tr>
<td>Use of ICT reduces syllabus coverage</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>(32.7%)</td>
</tr>
<tr>
<td>Use of ICTs greatly enhances content delivery</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>(5.1%)</td>
</tr>
<tr>
<td>Use of ICTs in teaching influences understanding of the content</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>(5.1%)</td>
</tr>
</tbody>
</table>

Key: SD=strongly disagree, D=Disagree, N=Neutral, A= Agree, SA=Strongly agree

Further, an item in the student teacher trainees’ questionnaire sought to establish how they expressed their opinion on integration ICTs in the training colleges. Out of 297 student teacher trainees, 24.2% revealed that there were ICTs in their colleges sometimes available whenever they needed them, 30.0% revealed that sometimes there was limited knowledge and skills on integration of computers in teaching, 25.9%
revealed that they sometimes used computers to access specific education materials, 29.3% liked browsing the internet to learn and get more information, 32.0% had accessed the ICT every time they were free. The result further showed that 35.0% of the student trainees very rarely had enough time to use the ICTs whereas 31.3% revealed that computers in the colleges were very rarely used for teaching special subjects as shown on Table 4.27.

**Table 4.27:** Student teacher trainee use of the ICTs

<table>
<thead>
<tr>
<th>Statements on use of ICT (N = 297)</th>
<th>Teacher Trainees’ Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>ICTs are available whenever need arises</td>
<td>62 (20.9%)</td>
</tr>
<tr>
<td>There is limited knowledge and skills on integration of computers in teaching</td>
<td>63 (21.3%)</td>
</tr>
<tr>
<td>I use computers to access specific education materials</td>
<td>42 (14.1%)</td>
</tr>
<tr>
<td>I like browsing the internet to learn and get more information</td>
<td>87 (29.3%)</td>
</tr>
<tr>
<td>I have enough time to use computer</td>
<td>16 (5.4%)</td>
</tr>
<tr>
<td>I have access to computers every time I’m free</td>
<td>34 (11.4%)</td>
</tr>
<tr>
<td>Computers are used for teaching specific subjects</td>
<td>49 (16.5%)</td>
</tr>
</tbody>
</table>

A=Always, O=Occasionally, S=Sometimes, R=Rarely, VR=Very rarely
From the means shown on Table 4.26, the study therefore concluded that the overall impression was that the use of ICTs greatly enhanced content delivery (mean of 4.01 using the scale of 1-5).

4.5.2. ICT policy in Education

The study explored further on ICT policy. An item in the tutors’ questionnaire sought to find out whether the colleges had an ICT policy. Out of 43 tutors, 48.8% reported that the colleges do not have ICT policies, 44.2% reported that the colleges have ICT policies whereas 7.0% had no answer as shown on Table 4.28.

Table 4.28: ICT Policy in the colleges

<table>
<thead>
<tr>
<th>College have ICT policy (N = 43)</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes policy</td>
<td>19</td>
<td>44.2</td>
</tr>
<tr>
<td>No policy</td>
<td>21</td>
<td>48.8</td>
</tr>
<tr>
<td>No answer</td>
<td>3</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Further, the study sought to find out why tutors were of the opinion that their colleges did not have an ICT policy in colleges. The tutors felt that there was no ICT policy because for a programme to roll out, the policy must be put in place first, there are no guidelines on integration of ICT in teacher training colleges as any good policy should be accompanied by modalities which lack in many areas, ICT is not included in the primary teacher Training curriculum and the tutors had not had access to any policy documents, no syllabus has yet been developed on how to integrate ICT in teaching
various subjects, computer as a subject is not examinable, so student teacher trainees do not take it seriously even though its compulsory and most primary schools do not have computers. Moreover, there were tutors who felt that their colleges had an ICT policy because the government endeavored to achieve introduction and implementation of the millennium development goals (MDGs), the tutors had seen documents to that effect on policy issues, the government had posted lecturers to handle the ICT as a subject in colleges, tutors were aware of Memorandum and write-up trainings available, the government was also training personnel to undertake the teaching of ICT in primary school through PTTCS, the tutors were aware of the policy and workshops outside the institution, tutors are encouraged in ICT seminars to integrate ICT in this teaching, the college has adhered to the requirement by coming up with an ICT policy, already an ICT programme in their curriculum, and the government is in the process to provide laptops to standard one pupils in Kenya.

Since the student teacher trainees were the beneficiaries of integration in the training, the study sought to find out whether the student teacher trainees were aware of an ICT policy in college. Out of 297 student teacher trainees, (59.6%) of the student teacher trainees revealed that the colleges had an ICT policy, 38.7% revealed that their colleges did not have any policy on ICT whereas 1.7% had no answer. On the same note, there was an item to establish from the student teacher trainees whether they were aware if the government had policy on integration of ICT. Out of 297 respondents, 71.0% reported that they were aware of the government policy on integration of ICT, 27.9%
reported that they were not aware of the government policy on integration of ICT whereas 1.0% were no answer as shown on Table 4.29

**Table 4.29: Presence of ICT policy**

<table>
<thead>
<tr>
<th>Policy on integration of ICT (N = 297)</th>
<th>f(N = 297)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>177</td>
<td>59.6</td>
</tr>
<tr>
<td>No</td>
<td>115</td>
<td>38.7</td>
</tr>
<tr>
<td>No answer</td>
<td>5</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Government policy on integration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>211</td>
<td>71.0</td>
</tr>
<tr>
<td>No</td>
<td>83</td>
<td>27.9</td>
</tr>
<tr>
<td>No answer</td>
<td>3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Further, the researcher wanted to know why student teacher trainees noted the presence of a policy on integration of ICT. The respondents gave various responses such as; all trainees in teacher's training colleges were entitled to learn ICT, the government is providing computers to schools and colleges because it was aiming at transforming the analog era to digital era, the government policy on e-learning and the determination to make education more digital. All teachers must be computer literate since the government wanted to introduce the issue of laptops in primary schools, ICT as a subject was timetabled and tested in the PTTCs mock exams, certificates awarded and it was a must that all student teacher trainees must pass all subjects including ICT, and on buying computers the government had set the policy on the ratio of computer to the number of students going to use the computers.
However, on the same note, there were student teacher trainees who felt there was no policy on integration of ICT because the teachers were not always in a mood to help student teacher trainees to learn more on ICT, the student teacher trainee had never seen any policy, the government is full of corruption and it’s not easy to implement the policy and that the government had promised about the implementation of the laptop project but still no positive results had been seen concerning that project.

4.5.3. Conversance with ICT systems being propagated by Kenya Institute of Curriculum Development

Moreover, the researcher sought to find out if the tutors were conversant with ICT systems being propagated by Kenya Institute of Curriculum Development (KICD). The result indicated that out of 43 tutors, 72.1% revealed that they were not conversant with the ICT system being propagated, 23.3% revealed that they were conversant with the systems by KICD whereas 4.7% had no answer as shown on Table 4.30.

Table 4.30: Tutors conversant with ICT systems being propagated by Kenya Institute of curriculum development (KICD)

<table>
<thead>
<tr>
<th>Conversance with ICT system</th>
<th>No. of Tutors (N = 43)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversant</td>
<td>10</td>
<td>23.3</td>
</tr>
<tr>
<td>Not conversant</td>
<td>31</td>
<td>72.1</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>4.7</td>
</tr>
</tbody>
</table>
In addition, the study sought to find out if student teacher trainees were conversant with the ICT system being propagated by Kenya Institute of Curriculum Development (KICD). Out of 297 respondents, 56.20% reported that they were not conversant, 37.70% reported that they were conversant whereas 6.10% had no answer as shown on Figure 4.8.

Moreover, the researcher wanted to know if the college principals were conversant with the systems propagated by KICD since they were the managers of colleges. The principals from the sampled colleges also confirmed that they were conversant with the ICT system being propagated by KICD. However, they revealed that these ICT systems were meant to help in preparation of content to be used in secondary schools.
The findings of the study therefore revealed that the overall mean for the tutors’ integration of ICT was established to be 3.09 with a standard deviation of 0.86. This implied that the tutors generally integrate ICT once a month in the likert scale for adoption of ICT. From the findings on correlation of the number of years the tutors had in teaching *visavis* their adoption of integrating of ICT into their instructional process, the result gave a Pearson moment correlation value of $r = 0.006$, $P$-value $= 0.967$. This implied that, adoption of integrating ICT by tutors into their instructional process was not significantly related to their years of teaching experience. According to Demana (1990), adoption of technology by teachers require professional development that focuses on both conceptual and pedagogical issues, on-going support in terms of “intensive start-up assistance and regular follow-up activities” and a desire to change from within the profession.

Further, the researcher correlated the tutors teaching experience in years and how positively it influenced the use of ICTs for instructional purposes and the result showed that there was a significant relationship ($r = 0.408$, $p$-value $= 0.007$). This implied that tutors who had longer experience in teaching were positively influenced in the use of ICTs in their instructional process. The researcher viewed therefore that the influence was both positive and negative. Better skilled tutors tend to use more diverse ICTs and on more regular basis than tutors who perceive lower ICT skills. A crucial barrier to the integration of ICT is ICT competence or skills and ICT confidence. A very significant determinant of tutors/teachers’ levels of engagement in ICT is their level of confidence in using technologies. Jones (2004) observes that age can influence the uptake of ICT
for teaching whereas Cox et al. (2003) argues that the way ICTs are used in lessons is influenced by teachers’ knowledge about their subject and how ICT is related to it. College systems do not support integration of ICT by subject tutors. There is no ICT policy in colleges to give guidelines on integrating ICT. Further, the government has not given clear guidelines on integration of ICT especially in PTTCs. Both tutors and student teacher trainees are not conversant with ICT systems being propagated by KICD. The findings concur with Gode (2013) study on factors influencing integration of ICT in teacher training colleges. Prensky (2001) distinguishes between ICT natives who are born in a digital world and digital immigrants who have to learn the digital language and for whom ICT will always be the second language. Further, he notes that the tutors’ subject domain may influence the use of ICT.

4.6 Tutors’ attitudes towards integrating ICT

Objective four of the study sought to investigate the tutors’ attitude towards integrating ICT in teaching and learning process. Teachers play an important role in the implementation of ICT in schools and their attitudes are major predictors of the utilization of technologies in instructional settings (Al-Zaidiyeen, 2010). An item in the tutors’ questionnaire sought to establish their opinion towards integrating ICT in teaching and learning process. Using the likert scale of 1 – 5 whereby 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree, the researcher established the following. Out of 43 tutors sampled, 51.2% strongly disagreed that integration of ICT in teaching was adding extra costs unnecessarily, 25.6% disagreed, 11.6% were neutral, 7.0% agreed and 4.7% strongly agreed as shown on Table 4.31.
Table 4.31: Tutors attitude on use of ICT (N = 43)

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration of ICT in teaching is adding extra costs unnecessarily</td>
<td>22 (51.2%)</td>
<td>11 (25.6%)</td>
<td>5 (11.6%)</td>
<td>3 (7.0%)</td>
<td>2 (4.7%)</td>
</tr>
<tr>
<td>More time is spent for extra training for ICT use</td>
<td>7 (16.3%)</td>
<td>13 (30.2%)</td>
<td>4 (9.3%)</td>
<td>14 (32.6%)</td>
<td>3 (7.0%)</td>
</tr>
<tr>
<td>Use of ICTs greatly enhances content delivery</td>
<td>2 (4.7%)</td>
<td>2 (4.7%)</td>
<td>2 (4.7%)</td>
<td>13 (30.2%)</td>
<td>24 (55.8%)</td>
</tr>
<tr>
<td>Use of ICT reduces syllabus coverage</td>
<td>13 (30.2%)</td>
<td>17 (39.5%)</td>
<td>-</td>
<td>9 (20.9%)</td>
<td>3 (7.0%)</td>
</tr>
<tr>
<td>Use of ICTs in teaching influences understanding of the content</td>
<td>2 (4.7%)</td>
<td>3 (7.0%)</td>
<td>2 (4.7%)</td>
<td>19 (44.2%)</td>
<td>16 (37.2%)</td>
</tr>
</tbody>
</table>

SD-Strongly disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly agree. N = 43.

The general attitude of the tutors on integrating ICT was further established by getting the number of tutors who responded to the items as indicated in the table 4.31. From the table, out of 43 tutors, (86.0%) were having a positive attitude towards use of ICTs to enhance content delivery whereas 69.7% had a negative attitude that use of ICT reduces syllabus coverage time as shown on Table 4.32.
Table 4.32: Tutors attitude towards integration of ICT in teaching

<table>
<thead>
<tr>
<th>Statement</th>
<th>Tutors attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration of ICT in teaching is adding extra costs unnecessarily</td>
<td>76.8% 11.6% 11.7%</td>
</tr>
<tr>
<td>Most time is spent for extra training for ICT use</td>
<td>46.5% 9.3% 39.6%</td>
</tr>
<tr>
<td>Use of ICTs greatly enhances content delivery</td>
<td>86.0% 4.7% 9.4%</td>
</tr>
<tr>
<td>Use of ICT reduces syllabus coverage time</td>
<td>27.9% - 69.7%</td>
</tr>
<tr>
<td>Use of ICTs in teaching influences understanding of the content</td>
<td>81.4% 4.7% 11.7%</td>
</tr>
</tbody>
</table>

Moreover, ratings of the tutors’ attitude were done based on their responses towards the questionnaire variable items asked. In questionnaire item 1 and 2 which inquired; if integration of ICT adds extra costs unnecessarily and if more time was spent for extra training for ICT respectively, all the tutors who accepted these items were taken to have a negative attitude and were coded 1. In questionnaire item 3, 4 and 5 (Use of ICTs greatly enhances content delivery, Use of ICT reduces syllabus coverage time and if use of ICTs in teaching influences understanding of the content), all the tutors who consented were taken to have positive attitude towards integrating ICT were coded 2. Further, a variable developed to establish the individual tutors’ attitudes based on the mean responses on the five items showed that, out of 43 tutors sampled, 9 (20.9%) had
negative attitude towards integrating ICTs whereas 34 (79.1%) of the tutors were positive.

The average attitude of the tutors in the study was calculated to be 1.64 with a standard deviation of 0.21 in the scale of 1 – 2 (1= negative, 2=positive). Using this scale, Analysis of variance (ANOVA) was conducted on the attitude of the tutors as determined by their integration of ICTs to teach their subjects and training on use of ICT. The study revealed the following as shown on Table 4.33.

**Table 4.33.** The attitude of tutors as determined by their integration of ICTs

<table>
<thead>
<tr>
<th>Items</th>
<th>F-value</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textbooks</td>
<td>0.204</td>
<td>0.893</td>
</tr>
<tr>
<td>Overhead Projectors</td>
<td>0.389</td>
<td>0.815</td>
</tr>
<tr>
<td>Blackboard</td>
<td>0.045</td>
<td>0.669</td>
</tr>
<tr>
<td>Radio</td>
<td>0.382</td>
<td>0.685</td>
</tr>
<tr>
<td>Television</td>
<td>0.225</td>
<td>0.922</td>
</tr>
<tr>
<td>LCD</td>
<td>0.188</td>
<td>0.943</td>
</tr>
<tr>
<td>Computer</td>
<td>0.348</td>
<td>0.843</td>
</tr>
<tr>
<td>Tablets</td>
<td>0.534</td>
<td>0.471</td>
</tr>
<tr>
<td>Mobile Phones</td>
<td>0.308</td>
<td>0.871</td>
</tr>
<tr>
<td>Charts</td>
<td>2.482</td>
<td>0.063</td>
</tr>
<tr>
<td>Whiteboards</td>
<td>2.957</td>
<td>0.034</td>
</tr>
</tbody>
</table>

*Indicate a significant value of F at 95% confidence level

The study revealed that there was no significant relationship between the tutors attitude towards integrating ICTs in teaching their subjects. However, there was a significant
relationship in the integrating whiteboards in teaching their subjects ($F = 2.957$, $P$-value $= 0.034$). Tutors who had negative attitude towards integration of ICTs in teaching their subjects never integrated whiteboards whereas those who had positive attitude integrated whiteboards in teaching their subjects as shown on Table 4.34. 

Table 4.34: ANOVA table for the tutors attitude towards integration of whiteboard in teaching their subjects ($N = 43$)

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.482</td>
<td>4</td>
<td>.121</td>
<td>2.957</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1.346</td>
<td>33</td>
<td>.041</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.828</td>
<td>37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The researcher therefore viewed that integration of ICT is not related to the tutors’ attitude on integration of ICT. This concurs to Jones (2004)’s observation that one key area of teachers’ attitudes towards ICT is their understanding of how it will benefit their work and their students’ learning.

4.6.0. Tutors attitude on ICT by their Training on ICT use

Moreover, the study sought to establish the tutors’ attitude by their training on ICT use. The results showed that: tutors who were trained on ICT use with a mean of 1.64 with a standard deviation of 0.22 had positive attitude towards integration of ICT in teaching and learning whereas tutors who had not been trained had a mean of 1.60 with a
standard deviation of 0.22. Thus, the study revealed that the difference between the trained and those not trained was not significant ($F = 0.391$, $P = 0.535$) as shown on Figure 4.9.

![Figure 4.9: Attitude levels of tutors by training on ICT use.](image)

The researcher therefore viewed that tutors have a positive attitude on ICT use. However, according to Mueller et al. (2008), positive attitudes towards ICT on learning will not automatically lead to the uptake of ICT integration in teaching and learning.

To confirm what had been established from tutors, the study sought for the principals’ views on tutors’ attitude towards integration of ICT in teaching and learning. Based on the views of the college principals’ interview results, tutors were not positive to the concept of integrating ICT in teaching and learning process.
4.6.1. Student teacher trainees’ attitude towards integration of ICTs

Since the student teacher trainees were the beneficiaries of integration in PTTCs, the study sought to find out student teacher trainees’ attitude towards integration of ICT. Ratings of the student teacher trainees’ attitude were done based on their responses towards the questionnaire variable items asked. In questionnaire item 1 and 2 which inquired; if integration of ICT adds extra costs unnecessarily and if more time was spent for extra training for ICT respectively, all the student teacher trainees who accepted these items were taken to have a negative attitude and were coded 1. In questionnaire item 3, 4 and 5 (Use of ICTs greatly enhances content delivery, Use of ICT reduces syllabus coverage time and if use of ICTs in teaching influences understanding of the content), all the student teacher trainees who consented were taken to have positive attitude towards integrating ICT were coded 2. Further, a variable developed to establish the individual student teacher trainees’ attitudes based on the mean responses on the five items showed that; out of 297 student teacher trainees sampled, 75 (25.3%) had negative attitude towards integrating ICTs whereas 222 (74.7%) of the student teacher trainees were positive.

The average attitude of the student teacher trainees in the study was calculated to be 1.63 with a standard deviation of 0.24 in the scale of 1 – 2 (1= negative, 2=positive). Using this scale, Analysis of variance (ANOVA) was conducted on the attitude of the student teacher trainees as determined by their skill levels on integration of ICTs as they are being prepared in the teaching profession. The results of the study showed that there was a significant relationship in the skill level on integration of ICTs by student teacher
trainees as they were being prepared as teacher professional (F = 2.690, P value = 0.031) as shown on Table 4.35.

**Table 4.35:** ANOVA table for the student teacher trainees’ attitude towards integration of ICT and their skill level (N = 297)

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.611</td>
<td>.153</td>
<td>2.690</td>
<td>.031</td>
</tr>
<tr>
<td>Within Groups</td>
<td>16.459</td>
<td>290</td>
<td>.057</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>17.069</td>
<td>294</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further, the study revealed that student teacher trainees who had negative attitude towards integration of ICTs had no skill at all with a mean of 1.49 whereas those who had positive attitudes towards integration of ICTs rated their skill levels to be good with a mean of 1.66. According to Judson (2006), there is little correlation between stated beliefs and the actual practice whereas Ertmer (in Hermans et al.; 2008) observe that teachers’ educational beliefs can be barriers to the integration of ICT.

The findings of the study show that there was no significant relationship between the tutors attitude towards integrating ICTs in teaching their subjects. The researcher therefore viewed that integration of ICT is not related to the tutors’ attitude on integration of ICT. This is why Jones (2004) says that one key area of teachers’ attitudes towards ICT is their understanding of how it will benefit their work and their
students’ learning. The study also revealed that the difference between the trained and those not trained was not significant. The researcher therefore viewed that tutors have a positive attitude on ICT use even though the principals were of the view that tutors were not positive to the concept of integrating ICT in teaching and learning process.

According to Mumtaz (2000), positive attitudes encourage less technologically capable teachers to learn the skill necessary for the implementation of technology-based activities in the classroom. Teachers’ perception of technology use also is affected by their belief about the way the subject content should be taught. However, Mueller et al. (2008) observe that positive attitudes towards ICT on learning will not automatically lead to the uptake of ICT integration in teaching and learning. Further, the results of the study showed that there was a significant relationship in the skill level on integration of ICTs by student teacher trainees as they were being prepared as teacher professional. It further revealed that student teacher trainees who had negative attitude towards integration of ICTs had no skill at all even though Judson (2006) observe that there is little correlation between stated beliefs and the actual practice.

### 4.7 Challenges faced by Tutors while integrating ICT

Objective five of the study sought to explore the challenges faced by tutors while integrating ICT into the curriculum. An item in the tutors’ questionnaire sought to explore the challenges faced by tutors when integrating ICT. Out of 43 tutors, 79.1% of the tutors reported that the main challenge in integration ICT was that computers were used for analysis of trainees’ exam performance whereas 32.6% reported that computers
were used to access specific education materials. This certainly required the tutors to be conversant with the use of computers, hence posing a challenge for all the tutors as shown on Table 4.36.

**Table 4.36:** Number of Tutors facing challenges (N = 43)

<table>
<thead>
<tr>
<th>Statement</th>
<th>A</th>
<th>O</th>
<th>S</th>
<th>R</th>
<th>VR</th>
</tr>
</thead>
<tbody>
<tr>
<td>In my opinion trainees’ interest is greatly reduced when computers are used</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(2.3%)</td>
<td>(9.3%)</td>
<td>(7.0%)</td>
<td>(34.9%)</td>
<td>(41.9%)</td>
</tr>
<tr>
<td>Computers are used in teaching specific subjects</td>
<td>8</td>
<td>11</td>
<td>11</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>(18.6%)</td>
<td>(25.6%)</td>
<td>(25.6%)</td>
<td>(14.0%)</td>
<td>(11.6%)</td>
</tr>
<tr>
<td>Computers are used to access specific education materials</td>
<td>10</td>
<td>14</td>
<td>11</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(23.3%)</td>
<td>(32.6%)</td>
<td>(25.6%)</td>
<td>(14.0%)</td>
<td>(2.3%)</td>
</tr>
<tr>
<td>Computers are used for analysis of trainees’ exam performance</td>
<td>34</td>
<td>5</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(79.1%)</td>
<td>(11.6%)</td>
<td>(4.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is limited knowledge and skills on integration of computers in teaching</td>
<td>11</td>
<td>10</td>
<td>11</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>(25.6%)</td>
<td>(23.3%)</td>
<td>(25.6%)</td>
<td>(11.6%)</td>
<td>(11.6%)</td>
</tr>
<tr>
<td>There is limited support from the college administration on ICT integration</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>(23.3%)</td>
<td>(23.3%)</td>
<td>(23.3%)</td>
<td>(9.3%)</td>
<td>(18.6%)</td>
</tr>
</tbody>
</table>

A-Always, O-Occasionally, S-Sometimes, R-Rarely, VR-Very rarely

To establish the main challenges in integration of ICT, responses from the tutors were ranked in a likert scale of 1 – 5 (1 – Always, 2 – Occasionally, 3 – Sometimes, 4 – Rarely, 5 – Very Rarely). The most ranked challenge was therefore rank 1 and the minimal challenge was ranked 5. The researcher calculated the mean value based on the ranking for each item. The highest challenge experienced by the tutors in integration of
ICT therefore was use of computers for analysis of trainees’ exam performance (mean rank 1.22) as indicated in Table 4.37.

**Table 4.37:** Challenges faced by tutors in integration of ICT (N = 43)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>In my opinion trainees’ interest is greatly reduced when computer are used</td>
<td>4.10</td>
<td>1.07</td>
</tr>
<tr>
<td>Computers are used in teaching specific subjects</td>
<td>2.73</td>
<td>1.29</td>
</tr>
<tr>
<td>Computers are used to access specific education materials</td>
<td>2.38</td>
<td>1.08</td>
</tr>
<tr>
<td>Computers are used for analysis of trainees’ exam performance</td>
<td>1.22</td>
<td>0.53</td>
</tr>
<tr>
<td>There is limited knowledge and skills on integration of computers in teaching</td>
<td>2.60</td>
<td>1.33</td>
</tr>
<tr>
<td>There is limited support from the college administration on ICT integration</td>
<td>2.76</td>
<td>1.43</td>
</tr>
</tbody>
</table>

1-Always, 2-Occasionally, 3-Sometimes, 4-Rarely, 5-Very rarely

Further, the entire six variables on challenges as were recorded by the tutors were subjected to factor analysis. To establish this, the researcher had to first find out the adequacy of the sample to ensure that the sample was large enough to conduct a factor analysis. This was done using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy as presented in Table 4.38.
Table 4.38: Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett’s Test of Sphericity

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .497 |
| Bartlett’s Test of Sphericity | 23.119 |
| Approx. Chi-Square | 15 |
| df | .082 |

The researcher established that all the challenges were significant based on their Eigen values and the result gave a Keiser-Meyer test result (KMO) values greater than 0.5. The result showed a KMO adequacy value of 0.497. Just as Gupta (2006) observes and considering that this value is 0.5 and considering that Bartlett’s Test of Sphericity value was greater than 0.05, the researcher concluded that the sample was adequate for factor analysis. The recommendation is that we ignore the values pooling down the KMO overall values to less than 0.50. In this result, the pooling values were established to be in the variable 6 (limited support from the college on ICT) and variable 5 (Limited knowledge and skills on integration on teaching).

The variations of the Eigen values of the challenges were shown in the scree plot.
Component analysis therefore demonstrated that the variables in cluster three (variable 1, 2 and 5) were greater challenges to integration of ICT. These were followed by variable in category 2 (variable 6) and then variables in category 1 (variable 3 and 4). The factor analysis was further conducted on the 6 variables which resulted to 3 underlying components/factors as shown in table 4.39 in the Structure Matrix of factor analysis as shown on Table 4.39.
Table 4.39: Structure Matrix of factor analysis

<table>
<thead>
<tr>
<th></th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>In my opinion trainees' interest is greatly reduced when computers are used</td>
<td>-.660</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers are used in teaching specific subjects</td>
<td>.611</td>
<td>.503</td>
<td></td>
</tr>
<tr>
<td>Computers are used to access specific education materials</td>
<td>.828</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers are used for analysis of trainees' exams performance</td>
<td>.689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is limited knowledge and skills on integration of ICTs in teaching</td>
<td>.595</td>
<td>.532</td>
<td></td>
</tr>
<tr>
<td>There is limited support from the college administration on ICT integration</td>
<td>.760</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
a 3 components extracted.

From table 4.39, out of the 6 variables, Factor 1(component1) had three variables which were; computers are used in teaching specific subjects, computers are used to access specific education and computers are used for analysis of trainees’ exam performance. Factor 2(component 2) had two variables namely; there is limited knowledge and skills on integration of ICTs in teaching and there is limited support from college
administration on ICT integration. Factor 3 (component 3) had three variables which were; in my opinion trainees’ interest is greatly reduced when computers are used, computers were used in teaching specific subjects and there is limited knowledge and skills on integration of ICTs. Observations on factor 1 reveal accessibility and preparedness challenge. Observations on factor 2 reveal skill levels on integration and attitudes on ICT integration and observations on factor3 reveal attitudes on integration and training on ICT use.

The study went on to explore the challenges that are supported by the three factors through tabulation of the Eigen values and presented the findings in Table 4.40.

**Table 4.40: Total Variance Explained**

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigen values</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.738</td>
<td>28.970</td>
</tr>
<tr>
<td>2</td>
<td>1.373</td>
<td>22.881</td>
</tr>
<tr>
<td>3</td>
<td>1.044</td>
<td>17.395</td>
</tr>
<tr>
<td>4</td>
<td>0.821</td>
<td>13.688</td>
</tr>
<tr>
<td>5</td>
<td>0.606</td>
<td>10.096</td>
</tr>
<tr>
<td>6</td>
<td>0.418</td>
<td>6.970</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
From table 4.40, there are 6 components/factors that are challenges to integration of ICT. The variances of these factors are the Eigen values associated with each factor representing the variance explained by that particular linear component and they also explained in terms of that particular linear component (Gupta, 2006). The first few variables explain relatively large amounts of variance and that they are also displayed in terms of the percentage variance (so factor 1 explains 28.970% of the total variance). The first few component/factors explain relatively large amounts of data whereas subsequently factors explain smaller amounts of variance. Each component/factor is based on correlated with Eigen value greater than 1, is considered to have a significant influence on the dependant variable. Moreover, we extract all the factors with the Eigen values greater than 1 which leave us with 3 factors as shown on table 4.39.

When components were correlated, sums of squared loadings could not be added to obtain a total variance. The Eigen values associated with these three factors were displayed and the percentages of variance explained as Extraction Sum of Squares Loadings. The three factors explained relatively large amounts of variance especially factor 1 whereas the subsequent factors explained smaller amounts of variance. Rotation has the effect of optimizing the factor structure. The last cumulative percentage of variance in the rotation sums squared loading is 69.246%. This showed that the three factors were influenced up to 69.246% of challenges of integration of ICT in teaching and learning.
The findings of the study revealed a heap of challenges such as; inadequate facilities, lack of competence, knowledge and skills in ICT integrations, limited time for accessing the computer in the college, power blackout, lack of support from college administration and government, college systems do not embrace integration in all subjects, inadequate training, lack of enough ICTs and negative attitude of students, low levels of ICT literacy among tutors especially on use of modern ICTs, lack of appropriate and relevant content from publishers and the ministry, apathy on usage of ICT in teaching learning process, some tutors ignore using the ICT facilities available and initial preparation time is too long.

To confirm what was established from tutors, the study sought to find out from the principals if there were any challenges of integrating ICT in teaching in primary teacher training colleges in Kenya. The principals revealed that there were challenges such as inadequate ICT facilities in colleges, low levels of ICT literacy among tutors especially on use of modern ICTs, lack of appropriate and relevant content from publishers and the ministry, a pathy on usage of ICT in teaching learning process, some tutorial ignore using the ICT facilities available and lack of ICT proficiency skills.

Further, the study sought to explore challenges faced by student teacher trainees in an attempt to integrate ICTs. Out of 297 student teacher trainees, 19.4% reported inadequate knowledge and skills on integration, 16.4% reported lack of ICT materials or limited number of ICT materials, 14.4% lack of inadequate time, 12.9% reported inadequate power supplies which sometimes break connections, 10.9% reported lack of
facilities such as computer labs while others were in minimal percentages as shown in Table 4.41.

**Table 4.41: Challenges faced by the student teacher trainees in an attempt to integrate ICT in teaching and learning**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Number of teacher trainees (N = 201)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate knowledge and skills on integration</td>
<td>39</td>
<td>19.4</td>
</tr>
<tr>
<td>Lack of ICT materials or Limited number of ICT materials</td>
<td>33</td>
<td>16.4</td>
</tr>
<tr>
<td>Lack of enough facilities such as computer labs.</td>
<td>22</td>
<td>10.9</td>
</tr>
<tr>
<td>Lack of funds and high costs of ICTs</td>
<td>8</td>
<td>4.0</td>
</tr>
<tr>
<td>Lack or inadequate time</td>
<td>29</td>
<td>14.4</td>
</tr>
<tr>
<td>Lack of computers or inadequate computers in colleges</td>
<td>21</td>
<td>10.4</td>
</tr>
<tr>
<td>High number of students in the lab during teaching</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Inadequate power supply which sometimes break connections</td>
<td>26</td>
<td>12.9</td>
</tr>
<tr>
<td>Lack of security</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Negative attitudes</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Lack of enough teachers</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Poor role model by lecturers</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Unavailability of teachers</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Bulky curriculum and it might be difficult to draw all required pictures</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>No training on integration of ICT</td>
<td>11</td>
<td>5.5</td>
</tr>
<tr>
<td>Expensive ICT materials</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Inaccessibility to internet</td>
<td>3</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Moreover, tutors and principals were further asked to give suggestions regarding the challenges on integration of ICT in primary teacher training colleges. Tutors suggested that to overcome challenges in integrating ICT in the colleges, there is need for; training of all lecturers on integration of ICTs, adequate facilities be provided to the tutors and students to enhance integration ICT, classrooms be ICT friendly and motivate the teachers, sensitize administration on the importance of integration of ICT, have e-content and books, install generators to supplement power blackouts, student teacher trainees to be tested in ICT as a subject at the primary teacher examination (PTE level), sensitize the staff members continually and have integration friendly classrooms, more cash to be allocated to fuel the stand by generator all the times, colleges to have connectivity of internet which are reliable, employ more ICT tutors in the colleges, stock the Learning Resource Centre with ICT materials, have a clear guidelines on integration of ICTs, there is need for coming up with an ICT policy and be strictly followed and to embrace integration in all subjects using the policy provided by the government.

On the same note, the principals stated that there was need to; enhanced budgetary allocation for equipment and materials, have regular capacity building of staff and conduct in-service training of tutors on integration of ICT, enhance time tabling whereby ICT should be taken seriously and be incorporated in the curriculum and ICT be examinable at PTE level.
Further, an item in the principals’ interview schedule sought the principals’ opinion on policy interventions that can be put in place on integration of ICT to make it fully realized in primary teacher training colleges in Kenya. The principals recommend policy interventions such as; The government should employ technical staff to support ICT teaching, ICT tutors should be given better terms of service as they multi-task, teacher training colleges should be funded to purchase ICT facilities to be used on integration of ICT, the ministry should prepare appropriate content to be used in PTTCs on integration of ICT, have clear guidelines on what integration of ICT is all about should be put in place, all PTTCs should be equipped with adequate computers and other ICTs and all tutors be computer literate, integration of ICT needs to be in the PTTCs curriculum, Student teacher trainees should see the need of integrating ICT in their training and integration of ICTs should not only be compulsory but should also be given adequate time on the time table.

The findings of the study therefore revealed a heap of challenges such as; inadequate facilities, lack of competence, knowledge and skills in ICT integrations, limited time for accessing the computer in the college, power blackout, lack of support from college administration and government, college systems do not embrace integration in all subjects, inadequate training, lack of enough ICTs and negative attitude of students, low levels of ICT literacy among tutors especially on use of modern ICTs, lack of appropriate and relevant content from publishers and the ministry, apathy on usage of ICT in teaching learning process, some tutorial ignore using the ICT facilities available and initial preparation time is too long. These findings concurs earlier studies on ICT
infrastructure in PTTCs (Farrell, 2007 and Hennessy et al. 2010). Muyaka (2013) observes that it is evident that the presence or absence of ICT infrastructure is becoming a crucial factor in teachers’ decision to use ICT in teaching. According to Gomes (2005), lack of technical support on integration affects to a great extent the use of ICTs in teaching whereas Gutterman et al. (2009) notes that lack of quality teachers to apply ICT to the existing education systems to poor policy framework for integration of ICT. Tong and Trinidad (2010) observes that without technical support for teachers, they become frustrated resulting in their unwillingness to integrate ICT to teach.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The main purpose of this chapter is to make a summary of the findings based on the objectives of the study and make suggestions and recommendations for possible action and further research. This chapter therefore, consists of three sections namely; summary of the findings, conclusions of the study and finally recommendations.

5.2 Summary of the major findings and implications

Objective one of the study was to establish the type of ICTs available for instructional purpose. The findings revealed that types of ICTs available were inadequate for teaching and learning purposes. That access to the computers in colleges was poor with limited internet connectivity even though internet connectivity avails academic materials across the globe thus making ICT lecturers to use modems to download mapping information. Moreover, poor accessories in colleges impede use. Even the tutors with personal computers/laptops do not use them for college work. Further, the findings revealed that the available computer versus student teacher trainees’ population leads to poor student computer ratio leading to sharing. In addition, the study revealed that even the few ICTs available, there were no qualified technicians to help the tutors and student teacher trainees when in need.
Objective two of the study sought to investigate the preparedness of tutors to integrate ICT in teaching and learning process. The findings revealed that there was lack of proper training in the use of ICTs and that preparedness on integration is at an infant stage. The study established therefore that both the tutors and student teacher trainees were not prepared to benefit from integration of ICT to harness quality learning. One is therefore justified to say that the basic ICT development has been the major concern of teacher training not integration of ICTs in pedagogical strategies in their teaching career.

Objective three of the study sought to establish the relationship between the tutors’ teaching experience and their adoption of integrating ICT into their instructional process. The findings revealed that the influence was both positive and negative. Better skilled tutors tended to use more diverse ICTs and on more regular basis than tutors who perceive lower ICT skills. A crucial barrier to the integration of ICT is ICT competence or skills and ICT confidence. Further, a very significant determinant of tutors/teachers’ levels of engagement in ICT is their level of confidence in using technologies. The study established that college systems do not support integration of ICT by subject tutors. There is no ICT policy in colleges to give guidelines on integrating ICT. The findings further revealed that the government has not given clear guidelines on integration of ICT especially in PTTCs and that both tutors and student teacher trainees were not conversant with ICT systems being propagated by KICD.

Objective four of the study sought to investigate the tutors’ attitude towards integrating ICT in teaching and learning process. The findings of the study revealed that integration
of ICT is not related to the tutors’ attitude on integration of ICT. The study also revealed that the difference between the trained and those not trained was not significant. The researcher therefore viewed that tutors have a positive attitude on ICT use even though the principals were of the view that tutors were not positive to the concept of integrating ICT in the teaching and learning process.

Objective five of the study sought to explore the challenges faced by tutors while integrating ICT into the curriculum. The findings of the study revealed a myriad of challenges such as; inadequate facilities, lack of competence, knowledge and skills in ICT integrations, limited time for accessing the computer in the college, power blackout, lack of support from college administration and government, college systems do not embrace integration in all subjects, inadequate training, lack of enough ICTs and negative attitude of students, low levels of ICT literacy among tutors especially on use of modern ICTs, lack of appropriate and relevant content from publishers and the ministry, apathy on usage of ICT in teaching learning process, some tutors ignore using the ICT facilities available and initial preparation time is too long.

5.3 Implications of the study

The study established that there was content knowledge, pedagogical knowledge and pedagogical content knowledge in teachers’ preparedness however; there was lack of technological pedagogical content knowledge. That is; the knowledge required by teachers for integrating technology in the teaching in any content area. Thus have interplay between content knowledge, pedagogical knowledge and technological
knowledge using appropriate technologies. Based on the findings of the study therefore; there is need for a T-model if integration of ICTs has to be realized in education in Kenya and especially in PPTCs. The T-model proposes measures to be take to impact on the type of training and professional experiences needed in PPTCs. It remains the teachers’ responsibility to integrate ICTs effectively to enhance meaningful instruction. T-model as shown in Figure 5.1

The T-model suggests a creation of integration environment; an understanding of integration, teachers accepting the barriers to integration and acceptance which will make integration a reality. This is because all teachers require continuing support once they reach the classroom to enable them to reflect on teaching practices, to foster motivation and to help them adapt to change. Burden and Shea (2013) notes that
isolating ICT as a subject yields limited impact on student learning. This implies that integration of ICTs improves learning outcomes. Kirimi (2013) emphasizes that high policies must be reengineered to address how ICT is utilized in education environment as a pedagogical tool. Thus, it is imperative to adopt the T-model in education to focus on improving teacher skills and pedagogy as key to effectively implement ICT to enhance teaching and learning and eventually improving the quality of education.

5.4 Conclusions

The main question that this study endeavored to find was an answer to the teachers’ preparedness to integrate information communication technology in training teachers in teaching and learning. Based on the findings of the study, this study has resulted in the following main conclusions:

Firstly, based on the findings that types of ICTs available were inadequate for teaching and learning purposes the researcher concluded that even the few ICTs available, there were no qualified technicians to help the tutors and student teacher trainees when in need. Further, a large numbers of tutors do not access to computers and other ICT tools to enable them integrate in teaching and learning process. This implies that tutors did not have access to the internet which means that rolling out on integration is impeded to a large extent by inadequate facilities/infrastructure.

Secondly, that tutors in the PTTCs were either average or below average in terms of handling computers due to little exposure with computers and computer related
technologies. Provision of adequate ICTs will ensure that computer and other ICTs and training of personnel on how to use ICT thus addressing technophobia which causes tutors and student teacher trainees to fail to take up tasks that require integration of ICT. The researcher viewed therefore that both the tutors and student teacher trainees were not prepared to benefit from integration of ICT to harness quality learning.

Thirdly, given that curriculum delivery was done in classrooms which were not ICT friendly, the study views that ICTs were to a large extent not aiding curriculum delivery in PTTCs and therefore the student teacher trainees lacked exposure on integration as they are being prepared in their teaching career.

Fourth, there was also lack of training opportunities for the staff on integration of ICT in the process of teaching and learning which impedes a great deal the rolling out of integration of ICTs in the process of teaching and learning.

Fifth, Adequacy of ICTs influence adoption of ICT in the process of teaching and learning. Integration therefore should go beyond the use of basic computer packages/skills and textbooks for delivering subject specific content.

Sixth, Teaching experience influence integration of ICT in the process of teaching and learning. This factor would be mitigated by policy and frequent training of tutors in teacher training Colleges on use of ICT in teaching and learning if integration of ICT has to be realized in Kenya.
Bereiter (2002) observes that; “Learning is facilitated when new knowledge is integrated into the learners’ world…” This study will give educators a better understanding of the importance of integrating ICT in the process of teaching and learning especially in PTTCs.

5.5 Recommendations for action

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

a) The curriculum in PTTCs should be revised to include ICT as a subject in the syllabus which should be examinable at primary teacher examination. This will enhance the development of basic ICT skills, design and development skills, and pedagogical strategies.

b) Kenyan PTTCs curriculum should train teacher trainees on how to use ICT in their classrooms by being engaged in the process of ICT-integrated training. Further, develop tutors’ ICT skills and promote ICT-pedagogy integration in their teaching by providing ICT-based training environments where on-demand access to materials; peers, and networks of experts where expertise and advices can be obtained and active discussion can take place in relation to technology and pedagogy. (This approach of using ICT to support teachers’ on-going professional development and networking can be very effective as long as organized support is provided, Pace, 1999).

c) PTTCs to provide tutors with regular trainings and seminars on how to integrate ICT in the teaching and learning process. The refresher courses/training be on regular basis.
d) PTTCs should establish strategies to identify strengths and weaknesses of various ICTs with a view to adapt embrace and integrate them in the process of teaching and learning.

e) College administration should have an ICT policy to guide tutors and student teacher trainees on integration. It should also embrace and support integration of ICT in teaching and learning.

f) PTTCs should adopt policies that guide them on integration of ICT in the process of teaching and learning. One of the mandatory policies to be adoption of appraisal practices to ensure that tutors are rewarded for integration of ICTs in teaching and learning process, and ensure online ICT competency for both tutors and student teacher trainees.

g) Kenya Institute of Curriculum Development (KICD), the body responsible for developing curriculum materials should develop and supply the primary teacher training colleges with relevant e-content in all subject areas to ensure delivery of the curriculum is integrated with ICTs. When planning the curriculum, KICD should ensure that it is in harmony with the educational vision, the culture and context of learning. In this case the e-content should be locally manufactured to be responsive to the needs of the PTTCs and in harmony with the current syllabus. This will avoid provision of an irrelevant e-content or those that do not support the curriculum as observed in the ‘‘Tafakari Project’’.

h) The study established inadequate facilities in the colleges. The study recommends the MoEST to initiate partnership with private sectors to equip PTTCs with facilities/infrastructure such as providing ICT friendly classrooms and e-rate
installation of internet to PTTCs through partnership with private sectors to pay for the substantial costs to ensure secure and continual internet connectivity. This will ensure that PTTCs are supplied with an extra resource base other than books for teaching and learning.

Further, PTTCs should source for partners, well-wishers, stakeholders and sponsors to finance the acquisition of more ICT facilities/infrastructure. This will ensure that the adequacy of ICTs in the colleges so as to improve their use/integration in the process of teaching and learning.

5.5.1 Policy Recommendation

The following policy recommendations were made based on the findings of the study.

a) The Ministry of Education should develop an ICT policy on integration of ICTs in teaching and learning for PTTCs and ensure it is implemented to the later.

b) The KICD should come up with clear guidelines on integration of ICTs in PTTCs together with relevant content on the same if Kenyan outputs from PTTCs have to be relevant with the demands of the global job market.

c) The government should be involved in proper management of available ICT infrastructure by devising sustainability plans for ICTs especially machines which require refurbishing. This will aid institutions in management and repair of ICT infrastructure.
5.5.2 Recommendation for further research

a) There is need for a further research to assess whether there has been any improvement on the preparedness of teachers on integration of ICTs in teaching and learning.

b) There is need for an empirical research in the use of ICT for teacher training and professional development

c) There is need to conduct a research to assess the cost-effectiveness of specific pedagogical approaches on integration of ICT in teacher training colleges.
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digital villages project/pp=& fid-i4


APPENDIX A

TUTORS’ QUESTIONNAIRE

Welcome and thank you for sparing time to fill this questionnaire. I’m undertaking a Postgraduate Degree in education in Kenyatta University. The purpose of this questionnaire is to find out teachers’ preparedness in integrating Information Communication technologies (ICT) in teaching and learning. Please complete each section as instructed. All information provided will be highly confidential.

SECTION A: Biographic Data

Please tick your chosen response ( ) where appropriate.

1. Sex: Male [ ] Female [ ]

2. Age: a) 20-24 yrs [ ] b) 25-29 yrs [ ] c) 30-34 yrs [ ] d) 35-39 yrs [ ] e) 40-44 yrs [ ] f) 45-49 yrs [ ] g) Over 50 yrs [ ]

3. Marital status. a) Single[ ] b) Married[ ] c) Widowed[ ] d) Separated[ ] e) Divorced[ ]

4. Do your religious beliefs allow you to freely embrace ICTs?
   Yes [ ] No [ ]

5. What is your highest academic qualification?
   a). PhD [ ] b). Masters [ ] c). Bachelors s Degree [ ] d). Others (Specify)____________________

6. Are you trained on ICT use?
   Yes [ ] No [ ]

7. Which department do you belong?________________________________________________
8. Which subject do you teach?

9. Indicate your teaching experience__years

**SECTION B:** Types of Information Communication Technologies available in Primary Teacher training Colleges.

10. Which of the following ICTs are available in your college?

   i. Text books [ ]
   ii. Overhead projectors [ ]
   iii. Black boards [ ]
   iv. White boards [ ]
   v. Radio [ ]
   vi. Television [ ]
   vii. LCD [ ]
   viii. Computer [ ]
   ix. Tablets [ ]
   x. Mobile phones [ ]
   xi. Charts [ ]
   xii. Others

   (Specify)________________________________________________________
11. How often do you integrate the following ICTs to teach your subject?

<table>
<thead>
<tr>
<th>Technology</th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead Projector</td>
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<tr>
<td>Black boards</td>
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<tr>
<td>While boards</td>
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<td>Radio</td>
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<td>Television</td>
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<td>Computer</td>
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<tr>
<td>Tablets</td>
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<tr>
<td>Mobile phones</td>
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<tr>
<td>Charts</td>
<td></td>
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<tr>
<td>Other (Specify)</td>
<td></td>
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</tr>
</tbody>
</table>

12a). Do you consider yourself competent enough in the use of ICTs in teaching?

Yes [  ]  No [  ]

b). Give reasons for your answer in 12a above.

i. ____________________________________________________________

ii. ____________________________________________________________

iii. ____________________________________________________________
iv.____________________________________________________________________________________

v.____________________________________________________________________________________

13a). Does your college have a computer laboratory?

Yes [ ]

No [ ]

b). Give reasons for your answer in 13a above

i.____________________________________________________________________________________

ii.___________________________________________________________________________________

iii.___________________________________________________________________________________

iv.___________________________________________________________________________________

v.___________________________________________________________________________________

14. Do the computers have internet connectivity?

Yes [ ]

No [ ]

15a). How often do you use computers and accessories in preparing to teach your subject?

<table>
<thead>
<tr>
<th></th>
<th>Every</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

b). How often do you use internet in preparation for teaching and learning?

<table>
<thead>
<tr>
<th></th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>
c). How often do you use computer and other ICT tools to present your lesson?

<table>
<thead>
<tr>
<th></th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

16a). Has your previous teaching experience positively influenced your use of ICTs for instructional purposes?

[ ] Yes [ ] No

b). Give reasons for your answer in 16a above.

i. __________________________________________

ii. __________________________________________

iii. __________________________________________

iv. __________________________________________

v. __________________________________________

17a). How would you rate your skill level on integration of ICTs as you prepare teacher trainees in their teaching career?

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>[ ]</th>
<th>[ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No skill at all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very good</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b). Give reasons for the skill chosen in 17a above.

i. __________________________________________

ii. __________________________________________
18. For question 18, use the following keys and tick only once per statement. Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A) and Strongly Agree (SA).

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Integration of ICT in teaching is adding extra costs unnecessarily.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>b) More time is spent for extra training for ICT use</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>c) Use of ICTs greatly enhances content delivery.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>d) Use of ICT reduces syllabus coverage.</td>
<td></td>
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<tr>
<td>e) Use of ICTs in teaching influences understanding of the content</td>
<td></td>
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</tbody>
</table>

**SECTION C:** Challenges faced in the integration of ICT. Indicate by using the following keys. Tick only once per statement. Always (A), Occasionally (O), Sometimes (S), Rarely (R) and Very Rarely (VR).

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>A</th>
<th>O</th>
<th>S</th>
<th>R</th>
<th>VR</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. In my opinion trainees’ interest is greatly reduced when computers are used.</td>
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<tr>
<td>20. Computers are used in teaching specific subjects.</td>
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<tr>
<td>21. Computers are used to access specific education materials.</td>
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</tr>
</tbody>
</table>
22. Computers are used for analysis of trainees’ exam performance.

23. There is limited knowledge and skills on integration of computers in teaching.

24. There is limited support from the college administration on ICT integration.

25. Does the college have an ICT policy?
   Yes [ ]   No [ ]

26. Do you think the government has a policy on integration of ICT in primary teacher education curriculum?
   Yes [ ]   No [ ]

b). Why do you think so?

________________________________________________________

________________________________________________________

________________________________________________________

27. Are you conversant with the ICT systems being propagated by Kenya Institute of Curriculum Development (KICD)? Yes [ ] No [ ]

28. What challenges do you face when integrating ICT?
   i.__________________________________________________________
   ii.__________________________________________________________
   iii.__________________________________________________________
   iv.__________________________________________________________
29. What would you suggest as way forward of overcoming challenges in integrating ICT in primary teacher training colleges for instructional process?

i.______________________________

ii.______________________________

iii.______________________________

iv.______________________________

v.______________________________

Thank you.
APPENDIX B

STUDENT TEACHER TRAINEE QUESTIONNAIRE

The following questionnaire seeks to obtain information on the extent to which Information Communication Technologies are integrated in your preparation for teaching profession/career. Kindly tick [ ] your response where appropriate. Information provided will be strictly confidential. You may not sign in your name.

SECTION A: Biographic Data.

1. Sex: Male [ ] Female [ ]

2. Age: a) 15-19 yrs [ ] b) 20-24 yrs [ ] c) 25-29 yrs [ ] d) 30-34 yrs [ ] e) Over 35 yrs [ ]


4. Do your religious beliefs allow you to freely embrace use of ICTs?

   Yes [ ] No [ ]

5. Which subject option do you do?_________________________________________________

6. Which of the following ICTs are available in your college?

   i. Text books [ ]
   ii. Overhead projectors [ ]
   iii. Black boards [ ]
   iv. White boards [ ]
   v. Radio [ ]
   vi. Television [ ]
vii. LCD [ ]
viii. Computer [ ]
vix. Tablets [ ]
x. Mobile Phones [ ]
xi. Charts [ ]

xii. Others (Specify) ______________________

7. How often are the ICTs integrated for teaching and learning process?

<table>
<thead>
<tr>
<th>Technology</th>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text books</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Overhead projectors</td>
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<tr>
<td>Black boards</td>
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<td>White boards</td>
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<tr>
<td>Others(Specify)</td>
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</tbody>
</table>

8a). Is the training preparing you to integrate ICT in teaching and learning process in your teaching career?
Yes [ ]                No [ ]

b). Give reasons for your answer in 8a above.

i._________________________________________________________________

ii._________________________________________________________________

iii._________________________________________________________________

iv._________________________________________________________________

v._________________________________________________________________

9. Does your college have enough ICTs for teaching and learning purpose?

Yes [ ]                No [ ]

10. Are you satisfied with the type of ICTs used for teaching and learning purpose?

Yes [ ]                No [ ]

11. How often do you use internet in college for your preparation in teaching and learning especially teaching practice?

<table>
<thead>
<tr>
<th>Every time</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Once a year</th>
<th>Never</th>
</tr>
</thead>
</table>


12a). How would you rate your skill level on integration of ICTs as you are being prepared as a teacher professional?

No skill at all [ ]                Fair [ ]

Good [ ]                Very good [ ]

Excellent [ ]

b). Give reasons for the skill level chosen in 12a above.
13. For question 13, use the following keys. Tick only one choice per statement.

Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A) and Strongly Agree (SA).

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Integration of ICT in teaching is adding extra costs unnecessarily.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) More time is spent when computers are used.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>c) Use of ICT reduces syllabus coverage.</td>
<td></td>
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</tr>
<tr>
<td>d) Use of ICTs greatly enhances content delivery.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>e) Use of ICTs in teaching influences understanding of the content.</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION C: Respond to the following statements to the best of your knowledge by ticking one appropriate box in each question using the following keys: Always (A), Occasionally (O), Sometimes (S), Rarely (R) and Very Rarely (VR).

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>A</th>
<th>O</th>
<th>S</th>
<th>R</th>
<th>VR</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. ICTs are available whenever need arises.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. There is limited knowledge and skills on integration of computers in teaching.</td>
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</tbody>
</table>
16. I use computers to access specific education materials

17. I like browsing the internet to learn and get more information.

18. I have enough time to use the computer.

19. I’m prepared well to make computer programs and how to use power point in my teaching.

20. I have access to computer every time I’m free.

21. Computers are used for teaching specific subjects.

22. Do you think the college has an ICT policy?
   Yes [ ]   No [ ]

23a). Do you think the government has a policy on integration of ICT?
   Yes [ ]   No [ ]

b). Explain the reason for your answer above.

______________________________________________________________________

______________________________________________________________________

24. Are you conversant with the ICT systems being propagated by Kenya Institute of Curriculum Development (KICD)?
   Yes [ ]   No [ ]

25. What challenges do you face in an attempt to integrate ICTs in teaching and learning?
   i. _________________________________________________________________
   ii. _______________________________________________________________
26. Suggest ways of addressing these challenges.

i. ____________________________________________________________

ii. ____________________________________________________________

iii. ____________________________________________________________

iv. ____________________________________________________________

v. ____________________________________________________________

Thank you.
APPENDIX C

PRINCIPALS’ INTERVIEW SCHEDULE

The purpose of this interview is to find out the teachers’ preparedness in integrating ICTs in teaching and learning. Please complete each section as instructed. All information provided will be highly confidential.

1. Sex: Male [ ] Female [ ]

2. Age: a) 20-24 yrs [ ] b) 25-29 yrs[ ] c) 30-34 yrs[ ] d) 35-39 yrs[ ] e) 40-44 yrs[ ] f) 45-49 yrs[ ] g) Over 50 yrs[ ].

3. Do your religious beliefs allow you to freely embrace ICTs?
   Yes [ ] No [ ]

4. How do individual tutors access the computers?
   i.________________________________________________________________
   ii._________________________________________________________________
   iii._________________________________________________________________
   iv._________________________________________________________________
   v._________________________________________________________________

5. What is your opinion on the literacy of tutors on ICT level?
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________

6. How do you facilitate the students to access the computers?
   ______________________________________________________________________
7a). Is there technical support systems for tutors and students to use ICTs for facilitation?

b). Explain reasons for your answer in 7a above.

i. ___________________________________________________________________

ii. ___________________________________________________________________

iii. ___________________________________________________________________

iv. ___________________________________________________________________

v. ___________________________________________________________________

8a). Do you have reliable internet connectivity in the college?

b). Give reasons for your answer in 8a above.

i. ___________________________________________________________________

ii. ___________________________________________________________________

iii. ___________________________________________________________________

iv. ___________________________________________________________________

v. ___________________________________________________________________

9. What are some of the tasks that the tutors use computers for?

i. ___________________________________________________________________

ii. ___________________________________________________________________
10a). Has there been any form of ICT training for tutors in the last three years? __________

b). If yes in 10a above, how many times?

________________________________________________________________________

c). If no in 10a above, please give a reason(s).

i. _______________________________________________________________________

ii. _______________________________________________________________________

iii. _______________________________________________________________________

iv. _______________________________________________________________________

v. _______________________________________________________________________

11. Apart from computers, which other ICTs do tutors use for instructional purposes?

i. _______________________________________________________________________

ii. _______________________________________________________________________

iii. _______________________________________________________________________

iv. _______________________________________________________________________

v. _______________________________________________________________________

12. Is there a relationship between the tutors’ teaching experience and the adoption of ICT use?

________________________________________________________________________
Give reasons for your opinion.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

13. What are the a) tutors and b) student teacher trainees’ attitudes towards integration of ICT in teaching and learning?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

Give a reason(s) for your answer.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

14. Are you aware of learning management systems that could be used to enhance learning experiences within the college?

______________________________________________________________________

Explain why?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

15. Are you conversant with the ICT systems being propagated by Kenya Institute of Curriculum Development (KICD).
16. Are there any challenges of integrating ICT in teaching and learning in the primary teacher education curriculum?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

17. Highlight these challenges of integrating ICT in teaching primary teacher training colleges in Kenya.

i.______________________________________________________________

ii.________________________________________________________________

iii.______________________________________________________________

iv.________________________________________________________________

v.________________________________________________________________

18. In your opinion, what skills do you think tutors should have to prepare student teacher trainees in integration of ICTs?

i.________________________________________________________________

ii.________________________________________________________________

iii.________________________________________________________________

iv.________________________________________________________________

v.________________________________________________________________

19a). Does your office face any administrative challenges in integrating ICT for instructional purposes?

______________________________________________________________________
b). If yes in 19a above, please list them.

i. ________________________________________________

ii. ________________________________________________

iii. ________________________________________________

iv. ________________________________________________

v. ________________________________________________

20. In your opinion, what policy interventions that can be put in place on integration of ICT to make it fully realized in primary teacher training colleges in Kenya?

i. ________________________________________________

ii. ________________________________________________

iii. ________________________________________________

iv. ________________________________________________

v. ________________________________________________

21. In conclusion, how can the above challenges be overcome?

i. ________________________________________________

ii. ________________________________________________

iii. ________________________________________________

iv. ________________________________________________

v. ________________________________________________

Thank you.
APPENDIX D

INTERVIEW SCHEDULE FOR KENYA INSTITUTE OF CURRICULUM DEVELOPMENT (KICD) E-OFFICERS

The purpose of this interview is to find out the teachers’ preparedness in integrating ICT in teaching and learning. Please complete each section as instructed. All information provided will be highly confidential.

1. Sex: Male [ ] Female [ ]

2. Age: a) 20-24 yrs [ ] b) 25-29 yrs [ ] c) 30-34 yrs [ ] d) 35-39 yrs [ ] e) 40-44 yrs [ ] f) 45-49 yrs [ ] g) Over 50 yrs [ ].

3. What are the objectives if integration of ICTs in teaching and learning?
   i. _____________________________________________________________
   ii. ___________________________________________________________________
   iii. ___________________________________________________________________
   iv. ___________________________________________________________________
   v. ___________________________________________________________________

4. What are you doing in teacher training colleges in terms of integration of ICTs?
   i. ___________________________________________________________________
   ii. ___________________________________________________________________
   iii. ___________________________________________________________________
   iv. ___________________________________________________________________
   v. ___________________________________________________________________

5. Have you communicated to the Principals of teacher training colleges on integration?
   ___________________________________________________________________
Give a reason (s) for your answer.

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

6. You use a lot funds for teachers already in the field on integration, why not go to the primary teacher training colleges and train there?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

7. What is your take as an institution on implementation of laptops in the Kenyan primary schools?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

8. Do you think student teacher trainees in primary teacher training colleges are well prepared for the integration of ICT in teaching and learning? ________________________________

Give a reason (s) for your answer.

______________________________________________________________________
9. What can you say as curriculum developers on integration of ICTs in primary teacher training colleges to enhance the same at the primary schools in Kenya?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

10. What is your view on the training of primary teachers for the integration of ICTs?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

Thank you.
APPENDIX E

OBSERVATION SCHEDULE

1. Name of college__________________________________________

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Adequate</th>
<th>Inadequate</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. PRINTED RESOURCES</td>
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<tr>
<td>1. Pure Sciences</td>
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<td>2. Social Sciences</td>
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<td>3. Applied Sciences</td>
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<tr>
<td>B. AUDIO-VISUAL</td>
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<td>1. Overhead Projector</td>
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<td>2. L.C.D</td>
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<td>3. Videos</td>
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<td>4. Television</td>
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<td>5. Filmstrips</td>
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<td>6. Slides</td>
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<td>7. Computer</td>
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<td>9. iPads</td>
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<td>10. Mobile Phones</td>
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<td>C. OTHERS</td>
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<tr>
<td>1.</td>
<td>Chalkboard</td>
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<td>2.</td>
<td>Wall maps</td>
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<td>3.</td>
<td>Charts</td>
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<td>4.</td>
<td>Globes</td>
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<td>Models</td>
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<td>6.</td>
<td>White boards</td>
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<td>7.</td>
<td>Others (specify)</td>
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APPENDIX F

LETTER OF INTRODUCTION

Alice Omariba
Kenyatta University
Department of Educational Communication & Technology
P.O. Box 43844 – Nairobi

THRO’
The County Education Officer
Kiambu County
P.O. Box - Kiambu.

Dear Sir/Madam,

TEACHERS’ PREPAREDNESS IN INTEGRATING INFORMATION COMMUNICATION TECHNOLOGY IN PUBLIC PRIMARY TEACHER TRAINING COLLEGES IN KENYA.

I am a postgraduate student of Kenyatta University pursuing a degree in Educational Communication & Technology Department [com-tech]. I am conducting a study on the above stated topic in Kiambu County, Central Region – Kenya. I hereby kindly request you to fill the questionnaire items as honestly as possible and to the best of your knowledge. The responses shall be absolutely confidential and anonymous given no name shall be required from the respondents.

Thank you in advance

Yours sincerely,

Alice Omariba.
APPENDIX G

RESEARCH CLEARANCE PERMIT

CONDITIONS:

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do so may lead to the cancellation of your permit.

2. Government Officers will not be interviewed without prior appointment.

3. No questionnaire will be used unless it has been approved.

4. Excavation, mining and collection of biological specimens are subject to further permission from the relevant Government Ministries.

5. You are required to submit at least two (2) hard copies and one (1) soft copy of your final report.

6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

CONDITIONS: see back page
APPENDIX H

RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT
MISS. ALICE OMARIBA
of KENYATTA UNIVERSITY, 0-1000
THIKA, has been permitted to conduct
research in Kiambu, Murang'a, Nyeri
Counties

on the topic: TEACHERS
PREPAREDNESS IN INTEGRATING
TECHNOLOGY IN PUBLIC PRIMARY
TEACHER TRAINING COLLEGES IN KENYA
for the period ending:
31st December, 2015

Permit No.: NACOSTI/P/14/4519/2565
Date of Issue: 15th July, 2014
Fee Received: Kshs. 2000

Director
National Commission for Science,
Technology & Innovation

[Signature]

Applicant’s

[Signature]

Executive Secretary
National Commission for Science,
Technology & Innovation

[Signature]