AN ASSESSMENT OF THE BARRIERS TO SUCCESSFUL INTEGRATION OF ICTs IN PUBLIC TERTIARY TECHNICAL TRAINING INSTITUTIONS

(A SURVEY OF TERTIARY TECHNICAL INSTITUTES IN NYERI COUNTY)

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MAY, 2013
DECLARATION

I declare that this research project is my original work and has not been presented for a degree award in any University or for any other award. Other people’s ideas or thoughts cited are duly acknowledged.

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DEDICATION

This research study is dedicated to the loving memory of my mother Millicent Gathigia who was with me when I started this programme but, was promoted to glory in July 2012 in the course of writing my proposal for this project. It is also because of her will and resolve to see me succeed and scale through life’s hurdles. She is the pillar of my strength and the will to persist. In addition I dedicate it to my trio family for their unmatched support morally, spiritually and emotionally and for the sacrifice they make to enable me go this far. I value and cherish you dear ones (Claire H, Linet, Lorna), you are God- sent angels and may the favour of our Lord remain with you always.
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DEFINITION OF TERMS

Barrier

A barrier is anything that prevents/ inhibits or impedes effective ICTs application when it is economically and socially beneficial.

Information Communication Technologies

The ICT tools that are applied to enhance processes and Systems performance

Integrate

To make or be made into a whole; incorporate or be incorporated.

Pedagogy

The study of being a teacher or the process of teaching. The term generally refers to strategies instruction, or a style of instruction.

Service Delivery

Service delivery refers to provision of goods/products and services to clients

Successful Integration

Full incorporation or implementation of a process(es) into a system.
ABBREVIATIONS AND ACRONYMS

CAI ----------Computer Assisted/Aided Instruction
CAM ----------Computer Aided Manufacture
EMIS ----------Education Management Information System
HoD ----------Head of Department (respondent)
ICT ----------Information Communication Technology
ICTs -------Information Communication Technologies / (tools)
TVET --------Technical, Vocational Education and Training
TTI ----------Technical Training Institutes
MoHEST ------Ministry for Higher Education Science and Technology
MOE --------Ministry of Education
ODL --------Open and Distance Learning
TIVET ------Technical Industrial and Vocational Training Institutions
TNA --------Training Needs Assessment
VLE --------Virtual Learning Environment
ABSTRACT

The development of modern society is increasingly science and technology-based powered and driven, and more focus is being placed on technical and vocational education and training (TVET) programs. Use of Information and Communication Technologies (ICTs) in the learning-teaching process makes learning more effective. The best way to take advantage of ICT is its integration into the learning-teaching process. This study sought to identify barriers to successful integration of ICTs in tertiary technical training institutes in Kenya in regard to enhanced service delivery of the human resource. The study was conducted in two public tertiary technical institutes in Nyeri County namely Nyeri Technical Training Institute and Mathenge Technical Institute. The objectives of the study were to ascertain the effects of computer culture, assess the effects of communication infrastructure, establish the effects of knowledge and skills, and ascertain the effects of resistance to change on ICTs integration in TVETs. The study adopted descriptive research design. The study targeted 200 respondents who are administrators, Heads of Departments, ICT specialists and Trainers where the population was sampled through proportionate stratified random sampling and a sample size of 99 was obtained. The researcher used a structured questionnaire for data collection and data was analyzed using descriptive analysis and content analysis and presented using frequency tables, charts and bar graphs. The study found that all the four variables used in the study had a significant influence on the success or failure of ICTs integration to varying degrees in public tertiary technical institutes in Nyeri county. Telecommunication Infrastructure barrier had the highest effect (77.0%) on ICTs integration. Knowledge and skills as a barrier was also found to have a high effect (73.9%) on successful ICTs integration. In addition, Resistance to change had a significant effect (70.8%) on integration whereas Computer culture as a barrier had the least effect (58.6%) on ICTs integration compared to other variables. The study recommends that proper and adequate training, funding, improved ICT infrastructure and sensitization of the policy strategies and of the benefits will improve integration of ICTs in public TTIs. Further it recommends that integration should be done in a transparent manner to eliminate suspicion. That, employees should be well trained and inducted on their job placement to minimize on user intimidation and device complexities. They should also be encouraged and enlightened on overall importance of ICTs integration to help remove fear of job loss and eliminate the resistance to Change on technological dynamism.
CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Kenya is geared towards becoming a middle income economy and eventually a knowledge society by implementing Vision 2030. Kenyan education and training institutions should play a central role in creating a human resource base to enhance science and technology industrialization, and thus aid the development of a knowledge economy. Educators and policy makers believe that Information and communication technologies are of supreme importance to the future of education and in turn for the country at large (Ayot et al 1989).

The rapid growth in Information Communication and Technologies (ICT) have brought remarkable changes in the twenty-first century, as well as affected the trends in our educational system. Therefore, there is a growing demand on educational institutions to use ICT to teach the skills and knowledge students need for the 21st century thus realizing the effect of ICT on the workplace and everyday life (Lewis, 2003).

Earle (2002) linked ICT integration with the concept of wholeness, when all elements of the system are connected together to become a whole. For instance, the two important elements of teaching and learning which are content and pedagogy must be joined when technology is used in lesson. In other way, if students are offered series of websites or ICT tools (such as CD ROMs, multimedia and others) then the teacher is not integrating ICT into teaching since he/she is not tackling the pedagogical issues. Similarly, Williams
(2003) described ICT integration as the means of using any ICT tool (Internet, e-learning technologies, CD ROMs and others) to assist teaching and learning. For the purpose of this study, Williams' definition of ICT integration is adopted. The Major objective is that developing skills, knowledge and understanding in the use of ICT prepares learners to use technologies in their everyday lives. ICT tools enable people to access, share, analyze and present Information gained from a variety of sources and in many different ways. Given that the Technical Industrial Vocational Education Training (TIVET) sub-sector is critical to the development of industry required human capacities, high quality training services must be delivered by the sector to enhance the productivity and competitiveness (Kerre, 1991).

According to Ayot, et al (1989) good and competitive TIVET systems in developing and emerging economies provide highly skilled labor to attract direct foreign investments. Hence the need to enhance skills of graduates of the TIVET systems through provision of quality training services that are markedly enhanced by ICT tools. Some of the benefits of utilizing ICT for training include enhanced access to technology, greater equity, and an improvement in the quality of education management.

The complexity of integrating Information and Communication Technologies (ICT) in education demands careful planning and execution. ICT integration in TIVET must consider ICT use in specific skill areas because technological innovations and developments in industry today are ICT biased and demand graduates competent in the use of ICT tools (Earle 2002). This requires trainers and trainees to have the necessary
skills to support the use of ICT for teaching and learning. Specialized ICT skills are required in the work place for production and communication, and are seen as an essential complement to traditional content knowledge, in courses such as engineering, science, and accounting.

There is also a requirement for a comprehensive, holistic and realistic strategy to be developed with all key stakeholders. Such a strategy should address issues of student and Instructor ICT competencies; curriculum and assessment integration; content development and delivery; pedagogical approaches; leadership and management; linkage to industry for relevance; institutional capacities to use ICT effectively; monitoring and evaluation; and utilization of appropriate technologies (Dunbar. 2002). A public tertiary institution can be described as an institution of higher education maintained at the expense of, serving for or for the use of a community. (Adapted from the New Collins Concise English Dictionary). In Nyeri county Mathenge and Nyeri TTI’s are the only technical tertiary institutes in this category and hence their choice for this study.

**Tertiary Technical Institutes in Nyeri County**

Nyeri Technical Training Institute (NTTI) is a middle level national Technical Learning Institute. It is established under the Ministry for Higher Education Science and Technology (MoHEST). It offers a variety of courses to K.C.S.E graduates at Diploma, Certificate and Craft levels. The academic departments comprise of; Applied Sciences, Automotive Engineering, Business, Electrical and Electronics, Health Sciences,
Information Communication Technology (ICT), Institutional Management, Liberal Studies and Mechanical department

NTTI is among the latest institute in Kenya to get ISO 9001:2008 certifications. ISO 9001:2008 is an internationally-recognized standard for quality management, ensuring that organizations have proven processes in place to meet customer requirements. The accreditation is granted independently and signifies the high quality of the participating organization's work.

Mathenge Technical Training Institute is a middle level Training Institute that was established in the early 1980s on a harambee spirit. The Institute is currently under the MOHEST. It offers courses leading to the award of Diploma Certificate, Craft Certificate and Artisan Certificate in various technical and business disciplines. The Institute is situated on 16 acres within the Central Highlands in the slopes of Aberdare Ranges in Mahiga Location, Othaya Division 18 Kilometers from Nyeri town. This offers a pleasant surrounding, conducive to academic work. Though small in terms of infrastructure, the Institute has adequate and quality resources for effective service delivery that permits it to meet its national development needs as well as remain competitive in a technological international market, supports comprehensive and continuing vocational technical training, and encourages and stimulates employment creation through self employment in both the formal and non-formal sectors. For some time it has been the best in the Republic in terms of performance in examinations.

Technical Vocational Education and Training (TVET) is one of a recognized and effective process by which quality, up-to-date, information literate and knowledgeable
workers are prepared, trained or retrained worldwide. UNESCO and ILO (2002) defined TVET as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. In a nutshell, TVET prepares human resources for the ever changing world of work. In that, for effective participation in the world of work the study of technologies and related sciences as reflected is of paramount significance that can be realized with adequate ICT integration in TVET institutions.

Kerre (1991) suggested that from a global perspective the framework for technology education for any given nation must be drawn from within: A widely recognized and acceptable national conceptualization of the role of technology and national development, the need to compete favorably in an international market, the elements of technology education curriculum and the emphasis to be given in the school curriculum, a clearly defined and articulated vocational and technical training system that responds to the needs of society, industry and individuals. The other is a clearly defined national policy framework that has legislative backing, identifies and encourages the development of appropriate technologies which will enable the nation

1.2 Statement of the Problem

Information and Communication Technology (ICT) is profoundly affecting every aspect of human activity. Its greatest potential lies in human resource development. TVET is
one of a recognized and effective process by which quality, up-to-date information, literate and knowledgeable workers are prepared, trained or retrained worldwide.

Similarly the government is well aware of the potential of ICTs to help address some challenges in aspects of management, administration and service delivery and of ICTs broader roles in human development and in the development of a knowledge-based economy. This is clear from official statements and documents such as the national plans (Kenya Vision 2030, Poverty Reduction Strategy, and National ICT4D Policy) and education sector plans, which all emphasize the role of ICT in education and in the world of work. (Rojewski, 2009).

Vision 2030 places great emphasis on science, technology and innovation in general and TVET in particular as the vehicle for socio-economic and technological transformation, where human capital has become the most critical element in achieving a competitive advantage. ICT drives the new economy and human capital is its fuel. The development and integration of ICTs into TVET have been one of the major area emphasized by UNESCO, due to the fact that ICT tools are becoming inexpensive, reachable and interactive, (UNESCO, 2006). Their application into all levels of education is expected to be imperative in making educational results labour-market oriented, and in the transformation of contents, methodology, as well as promoting information literacy which is essential for national development (Kenya National Bureau of Statistics, 2007).

The relevance of ICTs in TVET cannot be exhausted by studies available in the knowledge based society. In spite of these potentials the adoption and integration of ICTs in TVET remains low within UNESCO’s Member States (UNESCO 2006). In spite of numerous studies revealing the extent to which ICTs are applied at different educational
specializations, literature on the effective integration of ICTs into Technical and Vocational Education and Training (TVET) field is scarce and needs further exploration. (Zhang & Aikman, 2007). To compete successfully in a fiercely competitive global economic environment a highly skilled and educated workforce with aptitude and skills in the application of ICTs in everyday life is essential. According to Oparanya (2009) the state of ICTs integration in different TVET institutions is very low and requires investigation to identify the obstacles. This survey focuses on the barriers to the successful integration of ICTs in TVET institutes and hence bridge this knowledge gap.

The MoHEST vision is to facilitate ICT as a universal tool for education and training, while its mission is to facilitate effective use of ICT to improve access, learning and administration in delivery of education programmes and services (Sessional paper no.1, 2005). Studying the obstacles to the use of ICTs may assist educators to overcome the barriers and become successful technology adopters in the future. The basic assumption indicates that administrators and trainers have a strong desire to integrate ICT into education; but that, they encounter several barriers ranging from cultural orientation in computers, infrastructure among others (omolayole, 2002).

The above scenario therefore gives a strong case and ground to attempt to fill the gap that exists in the obstacles that inhibit successful integration of ICTs in TVET as perceived by the actual players, management and other personnel. The researcher considers it necessary to undertake this study in order to offer a continual review and assessment on how the barriers are impeding on effective ICT adoption and integration and hence come up with recommendations.
1.3 Research Objectives

1.3.1 General Objective

The purpose of this study was to assess the barriers to successful integration of ICTs in tertiary technical training institutes.

1.3.2 Specific Objectives

The study aimed at achieving the following objectives

(i) To establish the effect of computer culture on successful ICTs integration.

(ii) To determine the extent to which telecommunications infrastructure impedes on ICTs integration.

(iii) To find out the effect of knowledge and skills on successful ICTs integration.

(iv) To determine the effects of resistance to change on successful ICTs integration.

1.4 Research Questions

The study addressed the following questions:-

(i) How does computer culture level act as a barrier to successful ICTs integration?

(ii) How does telecommunication infrastructures act as a barrier to ICTs integration?

(iii) How has lack of appropriate knowledge and skills been a barrier to successful ICTs integration?

(iv) How is resistance to change a barrier to successful ICTs integration?
1.5 **Significance of the Study**

The purpose of this research was to explore the barriers to successful ICTs integration within the context of tertiary technical training institutes. There is a positive relationship between ICT tools applications and organisational competency Earle (2002). For TVET policy makers the study would offer guidelines to the human resource decision makers on how to improve on ICTs implementation for increased productivity. It would add value and enlighten the policy makers and curriculum implementers on the effects of various barriers to ICT integration. There is need therefore to understand the divergent spectrum of barriers that impede on ICTs integration in TVETs.

This study would be of significance to TVETs in that recommendations arrived at will guide the policy makers and management to appreciate the importance of putting up mechanisms of enhancing ICT integration. The trainers would also benefit from the findings of the study in that corrective measures will be put in place and policies formulated to harness integration. The study will also act as a source of reference materials to future researchers who would wish to do a deeper study into this area. The future of education is heavily dependent on ICTs; Internet access helps productivity, innovation and entrepreneurship to flourish; ICTs are useful for job search by youths; and ICTs are essential for the knowledge era (Odera, 1992).

1.6 **Scope of the Study**

The research was carried out in two public tertiary technical training institutes within Nyeri county namely: Nyeri Technical Training Institute (NTTI) and Mathenge Technical
Training Institute (MTTI) respectively. These tertiary institutes in Nyeri County were used as a representative, Kothari, (2004) of all similar institutes in the country. While any other county in the country would have been picked as a representative, the researcher selected Nyeri County based on ease of accessibility of data required since the researcher is stationed in Nyeri and hence convenience purposes.

1.7 Limitations of the Study

The researcher experienced certain challenges in the course of conducting the study. The limitations were on delayed response by respondents in filling-in the questionnaires. Some respondents being unwilling to give much response and for this, the researcher explained to the respondents the sole purpose of obtaining the data. Other challenges were on the unwillingness of the management and some trainers to disclose full information. However to minimize these limitations, the researcher built confidence in the respondents, by indicating from the onset of data collection that the information so obtained will be used for academic purposes only, as well as by maintaining clarity and objectivity element in the questions.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents the concept of Information Communication Technology tools (ICTs) and captures review on past theories by other researchers on the area of ICTs integration. From the literature review, the researcher will be able to develop a conceptual framework where the relationship between the independent variables and the dependent variable is shown.

2.1.1 Integration of ICTs

Integration means unification into a whole. As Earle (2002) stated, integration of ICT is not a product but a process. Integration of ICT into learning institutes means using ICT effectively and efficiently in all dimensions of the processes including the necessary infrastructure, teaching program and teaching-learning environment. The use of ICT in training is very important for providing opportunities for students to learn to operate in an information age. Since confidence, competence and accessibility have been found to be the critical components of technology integration in institutes, ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided to teachers. No single component in itself is sufficient to provide good teaching (Gardner, 1994). However, the presence of all components increases the possibility of excellent integration of ICT in learning and teaching opportunities.
2.1.2 Barriers

Studying the obstacles to the use of ICT in education may assist educators to overcome these barriers and become successful technology adopters in the future. This study will provide an analysis of the relevant literature that aims to present the perceived barriers to technology integration in education. The basic assumption indicates that administrators and trainers have a strong desire to integrate ICT into education; but that, they encounter many barriers (Pelgrum, 2001). The major barriers are lack of confidence, lack of competence, and lack of access to resources.

Studying the obstacles to the use of ICT in learning and teaching environments is crucial because this knowledge can provide guidance for ways to enhance technology integration and encourage greater use of ICT. Identifying the fundamental barriers may assist teachers and educators to overcome these barriers and become successful technology adopters (Becta, 2004). Based on this analysis, the study provides recommendations on improving ICT integration in TVETs.

2.1.3 Information Communication Technology tools

The term information technology evolved in the 1970s. Its basic concept, however, can be traced to the World War II alliance of the military and industry in the development of electronics, computers, and information theory (Newhouse, 2002). Information and Communications Technology, usually called ICT, is often used as a synonym for Information Technology (IT) but is usually a more general term that stresses the role of
telecommunications (telephone lines and wireless signals) in modern Information technology. ICT consists of all technical means used to handle information and aid communication, including computer and network hardware as well as necessary software. There is an overwhelming awareness that there are great potentials in the availability and use of information and communication technologies. Information and communication technologies are composed of such tools which enables accessing, obtaining, recording, organizing, using and presenting information electronically and telecommunication tools like telephones, faxes, modems and computers, which enables accessing and using information possible (UNESCO, 2002). ICTs can be grouped into three categories:

2.1.3.1 Computers and Internet

Information technology uses computers, which have become indispensable in modern societies to accept data, process and generate information as well as save time and effort. CAI (computer-aided instruction) The usefulness of computer-aided instruction in which computers are seen as simple replacements for teachers, has been largely discredited, although there appears to still be great interest in CAI in many LDCs where computers are being introduced. Multi-channel learning is a useful concept, the emerging practice of ‘multi-channel learning’, which focuses on enriching the educational experience by engaging all ways to connect learners with information, knowledge, and stimulation, and to mediate those interactions, Lucy, (1991) provides valuable insight into how blended learning approaches can be delivered and tailored in areas of great resource scarcity.
2.1.3.2 Broadcast Technologies

Tele-communications technologies which include telephones -with fax and the broadcasting of radio and television, often through satellites. Radio and television have a much greater penetration than the Internet throughout much of the developing world, and the substantial gap is not expected to be closed soon (Lewis, S. 2003). Educational initiatives that utilize radio and television typically have quite high initial start-up/capital costs, but once they are up and running, on-going maintenance and upgrade costs are much lower (making initiatives utilizing radio and TV for distance learning in the educations sector particularly appealing for donor support in many cases). These are seen as less 'revolutionary' ICTs in education, as their usage is seen as reinforcing of traditional instructor-centric learning models, unlike computers, which many see as important tools in fostering more learner-centric instructional models. In some cases, Tully (2003) where markets have been liberalized, ICTs are used to distribute educational content regionally within a country.

2.1.3.3 Networking Tools and Handheld devices

Networking technologies, of which the best known is the internet, but which has extended to mobile phone technology, Voice Over IP telephony (VOIP), satellite communications and other forms of communication. A dependable information system is essential, Lucy (1991) for efficient management and operation of the public and private sectors. For efficient performance, ICT use in every sector shall have to be accelerated in terms of information generation, utilization and applications. Newhouse (2002) asserts that poor choices of hardware and software and a lack of consideration of what is suitable for teaching are problems facing many teachers.
Handheld devices use is receiving serious widespread attention (including personal digital assistants and mobile phones) in education. It is common knowledge that technology changes rapidly and newer, more cost effective and more powerful technologies will continue to emerge of potential use in training. At the same time, evidence shows that, once installed in institutes, ICTs continue to be used for the life of the functioning of the technology, Similarly, Cox et al. (1999) found that the majority of teachers agreed that insufficient ICT resources in the school and insufficient time to review software limits successful use of ICT.

2.2 Theoretical Literature review

This study adopts an integrated theoretical framework. It facilitates a conceptualization of the intersections of ICTs, regional integration, and socioeconomic development to integrate research efforts and inform policy making, by reviewing the relevant theories of integration and development, and the theoretical linkages between ICTs and socioeconomic development.

2.2.1 Comparative Regional Integration

Theoretical and practical approaches to regional integration are largely based on the European experience since the 1950s (Laursen, 2004). The model, for example, posits that nation-states undergo a series of linear steps, beginning with lower level economic integration and advancing to the integration of monetary systems and fiscal policies. According to Gardner (1994) political integration naturally follows economic integration. The more the economy is integrated the greater the demand for closer collaboration and
coordination in other areas of the sociopolitical system. Given that other regions are more loosely integrated, or practice open regionalism (Murphy, 2006).

2.2.2 Functionalism

The earlier theory of functionalism, had as well the goal of political integration, with the rationale of achieving peaceful relations among warring nation-states, but with this global community emerging through "an administrative network which better serves human needs" (Pentland, 1973). Mittrany suggested that this network would be driven by technological advances and the functional need to cooperate. Functionalism, therefore, provides some tentative explanation of how ICTs might enhance an understanding of regional economic integration processes in Africa and South America.

The functionalist model of integration explicitly downplays the role of national governments but assumes that the most significant actors are technocrats and citizens who, in utilizing networks of communication and transportation, cooperate and integrate the systems across borders. It is then assumed that creative association and cooperation in problem-solving provides a learning-situation in which participants are gradually weaned away from their allegedly irrational nationalistic impulses toward a self-reinforcing ethos of cooperation (Pentland, 1973). Also, a functionalist approach does facilitate an examination of integrative schemes aimed at infrastructure development. It can transcend infrastructure to reflect the ways in which citizens and groups interact to achieve and utilize the expected outcomes of integrative schemes than a closed region such as the European Union (Pelgrum, 2001).
Despite the weaknesses in the earlier theoretical assumptions, compelling arguments remained for assuming that new communication technologies hold the key to socioeconomic development of many societies. For instance, advocates of ICTs point to how the Western world experienced the impact of industrial technology and found it to be an indispensable tool of development. The belief then was that if industrial technology aided the socioeconomic growth and development of Western nations, it should also propel socioeconomic growth in developing nations. As Ashby et al (1980) explained: Industry, especially capital goods industry, was viewed as the leading growth sector of the economy. As the rural individual was perceived to be traditional, it followed, according to the dominant Western perspective that the first objective in any program of development will be to transform traditional societies to modern ones.

Against this background, a major question arises: do new ICTs hold the key to the transformation of developing societies? In other words, do they (ICTs) challenge or reinforce the old paradigms of development? Kryish depicted the technology as revolutionary, predicting that traditional methods of work, play, learning, and commerce would be transformed; that people would carry out their activities in the comfort of their homes, and that the new technologies would provide answers to myriad of problems (Kryish, 1994).

2.2.3 ICT Status in Kenya

Telecommunication services in Kenya were introduced in 1977 and managed as part of a regional network with neighbours Tanzania and Uganda. Since then, the ICT sector has been continuously growing, greatly influenced by global trends. The fastest growing and
most popular ICT in Kenya is mobile phones. At present, there are three mobile service providers who have enabled various mobile services (such as mobile banking). The reliance on mobile communication and services was well reflected during the election chaos in January 2008 where people used pre-paid phone cards as a currency by trading them for food and medicine (Zephoria, 2008). In fact, the number of mobile subscribers increased from 9.3 million in 2007 to 12.9 million in 2008 (Oparanya, 2009).

Currently, the Kenyan government considers the adoption of ICTs as a key step in bridging the digital divide (Wims & Lawler, 2007). The government has stated that the achievement of an information-based society is one of the main priorities in order to realise national development goals and objectives for wealth and employment creation (Poghisio, 2008). Similarly, information literacy is a concept that has been recognised as a development enabler in Kenya.

The government considers education for acquiring ICT skills in order to create dynamic and sustainable economic growth (Wims & Lawler, 2007). The quality and efficiency of ICT application in Kenya can only be achieved by means of capacity building through research and development, which are elements of information skills.

Ayoo and Otike (2002) take a very critical stance and maintain that the formulation of an information policy in Kenya is hampered by the lack of information skills, mainly among top policy makers, which results in making the wrong choices of ICTs. Information policy should be supported by providing education, running literacy programmes and training with the participation of all information stakeholders: the government as information generating organ.
Historically Kenya has always prioritized education and training at all levels as it is considered the foundation for social and economic development. The goal of education and training is to build the human resources necessary for national development and wealth creation. However, the government is faced with many challenges in realizing this goal; challenges which may be broadly categorized under the banners of access, quality, equity and relevance.

2.3 Empirical Literature Review

In an analysis of the technological adaptation process of, Gillespsie, (2006) explains that new technology may create change in society, and that the direction of change is determined by the nature and function of that technology in the adopting culture. The use of ICT promotes development and improves services in any organisation. It brings changes in today's business environment. In an academic environment, it speeds up information delivery, facilitates teaching, learning and research. In spite of the above observation about the potentials, and benefits of using ICT, the level of awareness and use in TVET appears to be very minimal (Kerre, 1991). Organisational, environmental and cultural factors stand against the good and perceived will of the use of ICTs.

This study provides an analysis of the relevant literature that aims to present the perceived barriers to technology integration in education. The basic assumption indicates that administrators and trainers have a strong desire to integrate ICT into education; but that, they encounter many barriers. The major barriers are lack of confidence, lack of competence, and lack of access to resources. Since confidence, competence and accessibility have been found to be the critical components of technology integration in
institutes, ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided to teachers. No one component in itself is sufficient to provide good teaching. However, the presence of all components increases the possibility of excellent integration of ICT in learning and teaching opportunities.

Omolayole (2002) points out three strong reasons that stand against the effective use of ICTs. Each of the factors she has mentioned has a resultant effect on availability and use of ICT. The factors are: low level of computer culture: poor telecommunications infrastructure; and general lack of awareness. Another constraint that affects the use of ICTs in technical training institutes is lack of appropriate skills and knowledge. When trainers are not computer savvy, utilizing the facility would be a problem. In other words, having a good background in computer skill makes the use of computers in work places very practicable. Lack of awareness on the other hand makes availability impossible. Institute managers must be aware of the advantages of using ICTs in institutes and information sector. Training workers on the use of computers and other related technologies for services in any organisation is very important. A well trained worker can perform effectively and efficiently in his/her work place than one who is not trained at all.

2.3.1 Computer Culture

In Africa, despite worthy investments on ICT in some countries, users are afraid to do more than send e-mail (Owen Jr., 1995). Furthermore, technology changes more rapidly than predicted, but people change more slowly (Owen, 1995). From a cultural perspective, a major inhibitor of the adoption of new ICTs is the presence of legacy or traditional teaching
approaches. A constraint that affects the use of ICTs in technical training institutes is lack of appropriate orientation efforts to the use of computers to the majority of learners in the course of their foundational training. It means that majority of the ICT tools and equipment remains a strange phenomenon to the trainees and trainers as they may not have encountered their use in the course of their learning (Beggs, 2000).

The use of ICT in training is very important for providing opportunities for students to learn to operate in an information age. Studying the obstacles to the use of ICT in education may assist educators to overcome the barriers and become successful technology adopters in the future. The basic assumption indicates that administrators and trainers have a strong desire to integrate ICT into education; but that, they encounter a barrier on the cultural orientation in computers (Beggs, 2000). This is displayed by lack of confidence, lack of competence, and lack of proactive approach. Since confidence, competence and accessibility have been found to be the critical components of technology integration in institutes, ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided to teachers.

Working with ICTs is often difficult, simply because ICTs are new, and because individual and social routines have to be established in using them. Additionally, the use of ICTs is complicated because it involves not only the use of alternative tools for dealing with old, conventional problems but also expectations that these technologies will help in meeting new challenges. A variety of action plans may have been developed to effectively integrate ICTs in education programs, but many barriers still exist in practice.
No one component in itself is sufficient to provide good teaching. However, the presence of all components increases the possibility of excellent integration of ICT in learning and teaching opportunities (Gardner, 1994).

2.3.2 Telecommunication Infrastructure

A related study undertaken by Akbaba-Altun (2006) states there are general computer integration issues such as too few computers, slow Internet connections, insufficient software in the native language, and a lack of peripheral equipment at schools. According to Osborne and Hennessy (2003), the limitations on access to hardware and software resources influenced teachers' motivation to use ICT in the teaching. Without both good technical support in the whole-school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT (Lewis, 2003).

The vision of the MoHEST is to facilitate ICT as a universal tool for education and training. In order to achieve this vision every educational institution, teacher, learner and the respective community should be equipped with appropriate ICT infrastructure, competencies and policies for usage and progress. It calls for recognition of the fact that ICT provides capabilities and skills needed for a knowledge-based economy. It also calls for transforming teaching and learning to incorporate new pedagogies that are appropriate for the 21st century. MoHEST's mission is to facilitate effective use of ICT to improve access, learning and administration in delivery of education programmes and services (Sessional paper no.1, 2005).
The Education policy framework plan envisages use of digital components to improve access and quality in the delivery of education in Kenya. The major challenge in respect to this component is limited digital equipment at virtually all levels of education.

In addition, it is noted that there are a number of challenges concerning access and use of ICT in Kenya. These include high levels of poverty that hinder access to ICT facilities, limited rural electrification and frequent power disruptions. Where there is electricity, hindrances to application of ICT include high costs of Internet provision, costs associated with digital equipment, inadequate infrastructure and support.

The major challenge in respect to this component is inadequate connectivity and network infrastructure. As reported in the ICTs in Education Options Paper,(2005), one of the main problems is limited penetration of the physical telecommunication infrastructure into rural and low-income areas. Specifically, the main challenge is limited access to dedicated phone lines and high-speed systems or connectivity to access e-mail and Internet resources. The EMIS Survey (2003/2004) indicated that over 70% of technical institutes and a much larger proportion of secondary and primary schools require functional telephones. Indeed, many parts of Kenya cannot easily get Internet services because of the poor telephone networks. About 90% of secondary schools need to establish standard Local Area Networks (LANs) in order to improve sharing of learning resources.

Alternative and appropriate technologies for access to Internet resources, including wireless systems remain quite expensive. Indeed, a small proportion of schools have
direct access, through Internet Service Providers (ISPs), to high-speed data and communication systems.

Pelgrum (2001) found that in the view of primary and secondary teachers, one of the top barriers to ICT use in education was lack of technical assistance. In Sicilia’s study (2005), technical problems were found to be a major barrier for teachers. These technical barriers included waiting for websites to open, failing to connect to printing, malfunctioning computers, and teachers having to work old computers. Technical barriers impede the smooth delivery of the content or the natural flow of the classroom activity.

Korte and Hüsing (2007) argued that ICT support or maintenance contracts in educational institutes help teachers to use ICT in teaching without losing time through having to fix software and hardware problems. Moreover, the IT classrooms at schools are placed in existing older classrooms that were not designed according to the needs of IT classrooms at schools, so there is a need for future schools designed with adequate wiring, ergonomics and security in IT classrooms (Earle, 2002). With limited access to electricity and phone lines, few people in Kenya have a computer at home. Radio and television access is much better. On the other hand, mobile phones are commonplace and the number of Internet users is increasing rapidly due to the number of Internet cafés, shops, and access centres that are available, particularly in urban areas. Because English is widely used in Kenya, usage may be affected since most sites on the Internet are in English.
2.3.3 Knowledge and Skill

Skills development is another important area in which ICT could be used effectively. Attempts are being made to strengthen the ICT framework for Technical and Vocational Education (TVET). The emerging discourse on the role of skill development in addressing poverty and developmental issues indicates the potential role of ICT4D. King and Palmer (2007) argue that skill systems, particularly TVET, left to the market will tend to favour non-poor and more-educated: Worldwide it seems to be the case that the more educated are the ones who get most access to further training. Those with minimum education levels do not get access to skills training. The Commonwealth of Learning has initiated activities to strengthen the role of integrating prior learning into the formal skill development process.

The delivery of quality TVET is dependent on the competence of and adequate teacher; competence measured in terms of theoretical knowledge, technical and pedagogical skills as well as being abreast with new technologies in the workplace. The confidence should be cultivated through proper and adequate technological training and refresher courses as technology change rapidly. Dunbar (2002) sees this as a contextual factor in training institutes. Beggs (2000) asserts that trainers fear of failure causes a lack of confidence. It makes them feel anxious about using ICT in their training as they feel incompetent in its application. Competence, confidence and experience with technology influence a teacher/trainer's motivation to use ICT in the class (Cox, Preston, and Cox 1999; Hennessy, 2003). Those who confidently use technologies in their training understand its usefulness and impact on their performance as well as being helpful in their personal work and hence the
need to extend its application in the future. Competence may differ from region to region whereas it is a main factor to the acceptance and adoption of ICT (Pelgrum, 2001).

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' readiness are key factors in implementing new ICTs. Becta (2004) says that many trainers who do not consider themselves to be well skilled in using ICTs feel anxious about trying it in front of learners who perhaps know more than they do. Effective training in the use of modern technology in the classroom helps to increase the trainer's efficiency in using and integrating ICT in education effectively. The training includes training in basic skills in using technology as well as training in the integration of those technologies into interactive and effective teaching.

2.3.4 Resistance to change

The shift to technology-based learning may represent resistance to change from traditional pedagogical methods to more innovative, technology-based teaching and learning methods, by both students and academics (Fourth, 2005). It may be seen as a threat to job loss for some stakeholders, thus resulting in resistance to embrace the innovation. Adopting ICTs for teaching and learning will not result in job loss, however there will be a change in the instructor's role, moving from teaching to facilitating and guiding the learning experience. Lewis (2003,) noted that there is a potential loss of work if the scenario of teacher-less
classrooms comes anywhere near reality. Secondly, technology by its very existence and its degree of present and predicted permeation of education and training, throws all existing methods up to scrutiny. The case studies of online learning conducted by Curtin (2002) also confirmed this problem: where the institutional constraints are not addressed, case studies suggest that online delivery is likely to remain an island of innovation in a sea of resistance.

Watson (1999) argued that integrating ICTs into educational settings requires change and different personnel will handle this type of change differently. According to him, considering different teachers’ attitude to change is important because their beliefs influence what they do in classrooms. Becta (2004) claims that one key area of trainers’ attitude towards the use of technologies is their understanding of how it will benefit them and their learners and result in better performance. It is important that administrators and trainers in TVETs be open minded towards new ways of teaching and learning. According to Earle (2002) the change from a present level to a desired level of performance is facilitated by encouraging forces such as the power of new developments, rapid availability of information, creativity, internet access, or ease of communication, while it is delayed by discouraging forces such as their expertise and lack of support.

2.4 Conceptual Framework

In the proposed study successful ICTs integration have been used as the dependent variable while the Independent variables are the barriers to successful ICTs integration. Management and leadership styles are the intervening variables as illustrated in the framework.
INDEPENDENT VARIABLES

Low level of computer culture and conservative attitudes
- lack of appropriate orientation
- cultural adaptation
- Limited access and equity

Inadequate Telecommunications Infrastructure
- few computers
- Insufficient software
- slow internet connections
- inadequate peripheral equipment

Lack of knowledge and skills
- theoretical knowledge
- technical skills
- Pedagogical skills

Resistance to change
- Threat to job loss
- Fear of new methods
- Uncertainty of future

DEPENDENT VARIABLE

Successful ICTs Integration
- increased ICT Labs
- ICT compliant competent trainers
- fiber optic connectivity

INTERVENTING VARIABLE

Leadership style

Source: (Researcher, 2013)
CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction
This chapter discusses the research methodology used in the study. It focuses on the target population and the procedure of collecting data. It also assesses the validity and reliability of instruments as well as on data analysis and presentation.

3.1 Research Design
The study used descriptive research design, which entailed the process of collecting data in order to test hypothesis or to answer questions concerning the current status of the subjects in the study. It determines and reports the way things are and also attempts to describe such things as behaviour, attitudes, values and characteristics (Mugenda and Mugenda, 1999). This design was used because this research investigates the barriers on ICTs use in order to improve productivity in tertiary technical institutes. This method is preferred because it makes enough provision for protection against bias and maximizes reliability (Kothari, 2003). The findings from the technical institutes in Nyeri County were generalized and applied in all TVETs in Kenya.

3.2 Target Population
The study was done in two public tertiary technical institutes in Nyeri county namely Nyeri TTI and Mathenge TTI which are under the MoHEST. The study population was 200 employees composed of trainers, ICT specialists, Heads of Department and administrators of the respective technical Institutes.
3.3 Sampling technique

The researcher used proportionate stratified random sampling where 50% of the target population was sampled. Data was collected from 99 employees comprising of trainers, ICT specialists, HoDs and administrators in the two tertiary technical training institutes in Nyeri county. The strata's are individually more homogenous than the total population in order to get more precise estimates for each strata which results in more reliable and representative information of the national population, (Kothari, 2004)

**Table 3.1 Sampling frame**

<table>
<thead>
<tr>
<th>Tertiary technical institutes</th>
<th>Population size</th>
<th>Percentage</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathenge Technical Institute</td>
<td>97</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>Nyeri Technical Institute</td>
<td>103</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>50</strong></td>
<td><strong>99</strong></td>
</tr>
</tbody>
</table>

Source: (researcher, 2013)

3.4 Data Collection Instruments

In collecting primary data, the researcher administered questionnaires. The use of questionnaires as an instrument is supported by Peil (1995). They are easy to administer and ensure confidentiality for the respondent as the researcher maintains objectivity. The same is collaborated by Mugenda and Mugenda (2005) who states that questionnaires are an inexpensive way to gather data from a potentially large number of respondents. The questionnaires contained closed ended and few open-ended questions.
3.4.1 Validity and Reliability of Instruments

Validity is defined as the accuracy and meaningfulness of inferences, which are based on the research results (Mugenda, 2005). In other words, validity is the degree to which results obtained from the analysis of data actually represents the subjects under study. According to Borg and Gall (1996), validity is the degree to which a test measures what it purports to measure. To ensure that questionnaires were valid and reliable, the researcher used simple and clear language and terms that were understood by the respondents. The questionnaires were piloted and a number of questions adjusted to improve their understandability and relevance to the objectives of the study. Closed ended questions were mainly used as they have been proven to be most reliable for analysis (Kothari, 2004). The questionnaires were scrutinized for errors and omissions, ambiguity, legibility and relevance. With the expert guidance of my supervisor, the questionnaires' content, structure and sequence was appropriately amended to remove any ambiguities and to enhance content validity.

3.5 Data Collection Procedure

The researcher administered questionnaires to the respondents in the two institutes using drop and pick method. The questions formulated were as self explanatory as possible to ensure understandability and hence no supplementary explanations were required. They were also pre-tested to confirm their clarity (Mugenda, 1999). The questionnaires were issued and respondents requested to fill them accordingly within some stipulated time and then collected immediately.
3.6 Data Analysis and Presentation

This research obtained data that required quantitative, qualitative and inferential analysis. The data collected was validated, screened and then coded. After going through all the questionnaires, uniform categories of responses were identified, classified and entered into appropriate categories. The researcher used descriptive methods to analyze the data obtained. Qualitative data obtained in this study was analyzed by organizing it into similar themes and tallying the number of similar responses. For these, mean and mode were used for summaries and comparisons, (Peil, 1995). Inferential analysis was used in estimation of population values and interpretation (Kothari, 2004).

The frequency, mean and mode of a given phenomena was analyzed and the information presented using frequency tables, percentages, pie charts and graphs. This was applied for quantitative data, whereby the individual counts and total frequencies were shown as proportions of the entire population. Discussions were then made based on the presented information.
CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter focused on data analysis, interpretation and presentation. The purpose of the study was to assess the barriers to successful integration of ICTs in tertiary technical training institutes. The objectives of this study were to determine the effects of computer culture on successful ICTs integration determine the extent to which telecommunications infrastructure impedes on ICTs integration, find out the effect of knowledge and skills on successful ICTs integration and determine the effects of resistance to change on successful ICTs integration. The researcher made use of frequency tables, graphs and percentages to present quantitative data while qualitative data was presented by way of narration and discussion.

4.1.1 Questionnaire Return Rate

The researcher targeted a sample of 99 respondents out of which 84 responses were obtained. This represents an 84.8% response rate. According to Babbie (2002) any response of 50% and above is adequate for analysis thus 84.8% is even better.
Table 4.1: Response Rate

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responded</td>
<td>84</td>
<td>84.8</td>
</tr>
<tr>
<td>Did not respond</td>
<td>15</td>
<td>15.2</td>
</tr>
<tr>
<td><strong>Total Sample Size</strong></td>
<td><strong>99</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Field data, 2013

As indicated in the table above the response rate was 84.8%.

Figure 4.1: Response Rate

Source: Field data, 2013
4.2 Respondents Profile

The following section presents the findings of the characteristics of the study participants namely: gender, age, education level and work experience of the respondents.

4.2.1 Gender of the Respondents

The researcher sought to establish the gender of the respondents and the responses are highlighted in the table below

Table 4.2: Gender of the Respondents (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>44</td>
<td>52.4</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>47.6</td>
</tr>
<tr>
<td>Total Respondents</td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: (Field data, 2013)

From table 4.2 above, 52.4% of the respondents were males while the rest of the respondents were females. Thus majority of the respondents were males. Thus this shows that there was small gender parity between the female and male respondents at the institutions.
4.2.2 Age of the Respondents

The researcher sought to establish the age bracket the respondents belonged to and their responses are indicated in the table below.
Table 4.3: Age of the Respondents (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 30 years</td>
<td>11</td>
<td>13.1</td>
</tr>
<tr>
<td>31 – 40 years</td>
<td>26</td>
<td>31.0</td>
</tr>
<tr>
<td>41 – 50 years</td>
<td>35</td>
<td>41.7</td>
</tr>
<tr>
<td>51 – 60 years</td>
<td>12</td>
<td>14.2</td>
</tr>
<tr>
<td><strong>Total Respondents</strong></td>
<td><strong>84</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: (Field data, 2013)

From table 4.3 above, majority (41.7%) of the respondents indicated they were aged between 41 to 50 years, 31% of the respondents were aged between 31 to 40 years, 14.2% of the respondents were aged between 51 to 60 years and the rest were aged between 20 to 30 years. Thus most of the respondents were aged between 41 to 50 years. This means that indeed given the age group there would be a significant effect on the use of ICTs and its subsequent integration.
Figure 4.3: Age of the Respondents
Source: (Field data, 2013)

4.2.3 Education Level of the Respondents

The researcher sought to establish the education level of the respondents and their responses are indicated in the table below

Table 4.4: Education Level of the Respondents (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>20</td>
<td>23.8</td>
</tr>
<tr>
<td>Higher Diploma</td>
<td>16</td>
<td>19.0</td>
</tr>
<tr>
<td>First Degree</td>
<td>12</td>
<td>14.3</td>
</tr>
<tr>
<td>Masters and above</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>
From the table 4.4 above, 23.8% of the respondents had attained a diploma, 19% of the respondents had attained a higher diploma, 14.3% of the respondents had attained a first degree while the rest had a masters and above. Thus most of the respondents had diploma. This shows that the respondents in the study were well learned and thus would be able to comprehend and provide the relevant information sought by the study.

![Education Level of the Respondents](image)

**Figure 4.4: Education Level of the Respondents**

Source: (Field data, 2013)

### 4.2.4 Duration of Service

The researcher sought to establish the duration the respondents had worked in their respective organizations. They were asked to indicate how long they had been of service in their respective institutions. The responses are indicated in the table below.
Table 4.5 Duration of Service (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 years</td>
<td>22</td>
<td>26.2</td>
</tr>
<tr>
<td>6-10 years</td>
<td>16</td>
<td>33.3</td>
</tr>
<tr>
<td>11-15 years</td>
<td>18</td>
<td>21.4</td>
</tr>
<tr>
<td>16-20 years</td>
<td>28</td>
<td>19.0</td>
</tr>
<tr>
<td><strong>Total Respondents</strong></td>
<td><strong>84</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: (Field data, 2013)

From table 4.5 above, majority (33.3%) of the respondents indicated that they had worked in their respective institutions for 6 to 10 years, 26.2% of the respondents had worked for less than 5 years, and 21.4% of the respondents had worked for 11 to 15 years and the rest for 16 to 20 years. Given the age bracket and the level of education it is not a wonder many respondents would prefer to remain their current jobs for long periods of time.
4.3 Barriers to Successful ICTs Integration in Public Tertiary Training Institute

The researcher sought to establish the barriers to successful ICT integration in public tertiary training institutes. For the below section the respondents were asked to rate their responses using a likert scale of 1 to 5 with 1 being strongly disagree, 2 is disagree, 3 is neutral, 4 is agree and 5 is strongly agree. This section is divided into four parts that is computer culture, ICT infrastructure, knowledge and skills and resistance to change.

4.3.1 Computer Culture

The researcher sought to establish if computer culture had an effect in the integration of ICT in public tertiary training institutes. Respondents were given six statements in line
with computer culture in a bid to establish the effects of computer culture on successful ICT integration. The responses are indicated in table 4.6 below.

**Table 4.6: Computer Culture (n=84)**

<table>
<thead>
<tr>
<th>Category</th>
<th>S.D</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>S.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspicion significantly hinders integration of ICT in tertiary institutions</td>
<td>7.1</td>
<td>6.0</td>
<td>20.2</td>
<td>26.2</td>
<td>40.5</td>
</tr>
<tr>
<td>Lack of appropriate orientation affects integration of ICT in tertiary integration</td>
<td>13.1</td>
<td>17.9</td>
<td>10.7</td>
<td>26.2</td>
<td>32.1</td>
</tr>
<tr>
<td>Device complexities hinders the integration of the ICT in the institution</td>
<td>7.1</td>
<td>8.3</td>
<td>7.1</td>
<td>28.6</td>
<td>48.8</td>
</tr>
<tr>
<td>User intimidation hinders the integration of ICT in public tertiary institutions</td>
<td>6.0</td>
<td>16.7</td>
<td>11.9</td>
<td>34.5</td>
<td>31.0</td>
</tr>
<tr>
<td>Slow technological cultural adaptation hinders ICT integration in public tertiary institutions</td>
<td>11.9</td>
<td>14.3</td>
<td>14.3</td>
<td>26.2</td>
<td>33.3</td>
</tr>
<tr>
<td>Traditional teaching approaches hinder ICT integration in public tertiary institutions</td>
<td>40.5</td>
<td>22.6</td>
<td>13.1</td>
<td>17.9</td>
<td>6.0</td>
</tr>
</tbody>
</table>

S.D=strongly disagree; D=disagree; N=neutral; A=agree; S.A=strongly agree

Source: (Field data, 2013)

On analyzing suspicion factor, 7.1% strongly disagreed while 6% disagreed with the statement making a total of 13.1% of those who disagreed. Moreover 20.2% indicated that they were neutral on the statement. However 26.2% agreed as well as 40.5% strongly agreed that suspicion hinders ICT integration and thus majority of the respondents agreed with the statement that suspicion significantly hinders integration of ICT in tertiary...
institutions (66.7%). As much as there is no much literature to confirm this, respondents indicated their suspicions were mainly surrounding issues pertaining job layoffs in that with the introduction of ICT, staff risked being laid off from their jobs.

On the statement that lack of appropriate orientation affects ICTs integration, 13.1% strongly disagreed and 17.9% disagreed making a total of 31%. Whereas 26.2% agreed and 32.1% strongly agreed with the statement and hence majority of the respondents also strongly agreed with the statement that lack of appropriate orientation affects integration of ICTs in tertiary institutions (58.3%). This is in line with the studies done where the authors (Omolayole, 2002 and Beggs, 2000) noted that administrators and trainers despite having a strong desire to integrate ICT into education they did encounter barriers related to cultural orientation. This confirms Beggs (2000) findings that indeed a constraint that affects us on ICT in technical training institutes was lack of appropriate orientation efforts to the use of computers and other devices.

7.1% strongly disagreed and 8.3% disagreed that device complexities hinders ICTs integration while 7.1% were neutral on the statement. Majority of the respondents also agreed with the statement that device complexities hinders the integration of the ICT in the institution (77.4%) where 28.6% agreed and 48.8% strongly agreed. This is because it involves not only the use of alternative tools for dealing with the old conventional problems but also it is expected to meet new challenges in the future.

On user intimidation, 6% strongly disagreed and 16.7% disagreed making a total of 22.7% of those who disagreed while 11.9% remained at a neutral point. Majority of the respondents (65.5%) agreed with the statement that user intimidation hinders the
integration of ICT in public tertiary technical institutes that is 31% strongly agreed and 34.5% agreed which can be displayed by lack of confidence, lack of competence and lack of proactive approach.

A total of 26.2% disagreed that slow technological cultural adaptation hinders (where 11.9% strongly disagreed and 14.3% disagreed) integration while 14.3% were neutral. Again majority of the respondents that is 33.3% strongly agreed and 26.2% agreed that slow technological cultural adaptation hinders ICT integration in public tertiary institutions (59.5%). This could be partly attributed to the notion that ICT is often difficult simply because ICTS are new and because individuals and social routines have to be established in using them,

However, majority of the respondents strongly disagreed with the statements that traditional teaching approaches hinder ICT integration in public tertiary institutions (63.1%) where 40.5% strongly disagreed and 22.6% disagreed. 13.1% were neutral and only 23.9% agreed with this. This is contrary to the literature which indicated that a major inhibitor of the adoption of new ICTs is the presence of legacy or traditional teaching approaches. However Gardner (1994) notes that it is the presence of all teaching components that increases the possibility of excellent integration of ICT in learning and teaching opportunities.

From the respondents analysis on Computer culture variable, it is clear that device complexities has the highest hindrance (77.4%), followed by suspicion (66.7%) then user intimidation (65.5%). Slow technological adaptation comes fourth (59.5%) and lack of appropriate orientation follows (58.3%). Traditional teaching approaches had the least
hindrance (23.9%) to ICTs integration with majority (63.1%) respondents disagreeing with the statement.

**4.3.1.1 To Establish the Effect of Computer Culture on Successful ICTs Integration**

The researcher sought to establish which cultural factors had an effect on the success of ICT integration and to what extent. A summary of the above factors has been illustrated in the figure below.

![Figure 4.6: Cultural Factors that Affect the Success of ICTs Integration](image)

Source: (Field data, 2013)

From the figure and table 4.6 above, it is noted that suspicion towards ICT, lack of appropriate orientation, device complexities, user intimidation on ICT and technological cultural adaptations had positive significant effect on the success of ICT integration. This is in line with the various findings as noted in the literature. Traditional teaching
approaches had no significant effect on the success of ICT integration. This is in contrast with the findings indicated in the literature review.

Despite its numerous contribution, ICTs full integration into teaching learning process is still in progress (Hayes, 2007). Hayes further stated that trainers slowness to adopt ICT reflects their effort to discern how best to incorporate new technologies into old teaching practices. The Study revealed that, the progress toward full integration of ICTs in education, especially TVET, require additional commitment from teachers (Paryono and Quito, 2010).

4.3.2 ICT Infrastructure

The researcher sought to establish if ICT infrastructure had an effect in the integration of ICT in public tertiary training institutes. Respondents were given six statements in line with ICT infrastructure in a bid to determine the extent to which telecommunications infrastructure impedes on ICTs integration. The responses are indicated in table 4.7 below.
### Table 4.7: ICT Infrastructure (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>S.D</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>S.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ICT policy has a negative impact on ICTs integration</td>
<td>9.5</td>
<td>10.7</td>
<td>17.9</td>
<td>38.1</td>
<td>23.8</td>
</tr>
<tr>
<td>Poor Internet connectivity affects ICTs integration in TVETs</td>
<td>7.1</td>
<td>7.1</td>
<td>4.8</td>
<td>20.2</td>
<td>60.7</td>
</tr>
<tr>
<td>Level of competence of the network administrator affects the integration of ICTS in tertiary institutions</td>
<td>6.0</td>
<td>3.6</td>
<td>6.0</td>
<td>21.4</td>
<td>63.1</td>
</tr>
<tr>
<td>Inadequately equipped computer laboratories hinders ICT integration</td>
<td>8.3</td>
<td>6.0</td>
<td>9.5</td>
<td>34.5</td>
<td>41.7</td>
</tr>
<tr>
<td>Inadequate ICT budget hinders successful integration in the institution</td>
<td>7.1</td>
<td>6.0</td>
<td>3.6</td>
<td>28.6</td>
<td>54.8</td>
</tr>
<tr>
<td>Inadequate ICT equipment in various departments affects the integration in the institution</td>
<td>9.5</td>
<td>3.6</td>
<td>11.9</td>
<td>28.6</td>
<td>46.4</td>
</tr>
</tbody>
</table>

S.D=strongly disagree; D=disagree; N=neutral; A=agree; S.A=strongly agree

Source: (Field data, 2013)

From table 4.7 above, 7.1% respondents indicated that they strongly disagreed and on equal percentage (7.1%) disagreed with the statements that poor internet connectivity affects ICTs integration in TVETs giving a total of 14.2%. Majority (80.9%) agreed with 60.7% who strongly agreed and 20.2% who agreed. Indeed, many parts of Kenya cannot easily get Internet services because of the poor telephone networks according to EMIS Survey (2003/2004). This is the same case in the institutions where internet connectivity was noted to be low also.
Level of competence of the network administrator affects the integration of ICTS in tertiary institutions (84.5%) with 21.4% agreeing and 63.1% strongly agreeing. Those disagreeing were minimal (9.6%) where 6% strongly disagreed and 3.6% disagreed. A further 6% were neutral on this statement. This is in line with the literature that indicated that the delivery of quality TVET is dependent on the theoretical knowledge, technical and pedagogical skills alongside other competencies as well as being abreast with new technologies in the workplace.

Inadequately equipped computer laboratories was also noted to hinder ICT integration (76.2%) with 34.5% who agreed and 41.7% strongly agreed. This is in line with Akbaba-Altun (2006) states that there are general computer integration issues such as too few computers among other issues which could act as a barrier to ICT integration. Besides there were 6% who disagreed and 8.3% strongly disagreed, thus 14.3% disagreed with this statement whereas 9.5% were on neither side.

Inadequate ICT budget, according to the respondents was noted to hinder successful integration in the institution (83.4%) where 28.6% agreed and 54.8% strongly agreed. This could be connected to the EMIS Survey (2003/2004) that indicated that over 70% of technical institutes and a much larger proportion of secondary and primary schools just require functional telephone thus eliminating the need to incorporate an ICT in the annual budgets of the institutions. Still a minimum number (13.1%) disagreed where 7.1% strongly disagreed and 6% disagreed while 3.6% were neutral.

Inadequate ICT equipment in various departments affects the integration (75.0%), with 28.6% agreed and 46.4% strongly agreed and was thus an element that hindered
successful integration of ICT. However a small number disagreed (13.1%) where 3% disagreed and 9.5% strongly disagreed while 11.9% were neutral. This is not only backed by the fact that ICT tools and equipment remains a strange phenomenon to the trainees and trainers but also looking at related studies undertaken by Akbaba-Altun (2006), Osborne and Hennessy (2003), and (Lewis, 2003) that highlight the same fact there are general computer integration issues such as too few computers, limitations on access to hardware and software resources and lack of good technical support in the whole-school resource are a strong influence on ICT integration.

Lack of ICT policy was noted to have a negative impact on ICTs integration (61.9%) with 38.1% agreed and 23.8 strongly agreed as indicated by the respondents. Despite the fact that there is a national ICT policy sessional paper No. 5, there seemed to be lack of ICT policy at the institutional level that could be integrated into the education policy to improve access to learning and administration in delivery of education programmes and services. However there were a few (20.2%) respondents who did not agree with this of which 10.7% disagreed and 9.5% strongly disagreed as well as a 17.9% who were neutral.

From the respondents’ analysis on telecommunication infrastructure variable, it is evident that the level of competence of the network administrator has the highest hindrance (84.5%), followed by inadequate ICT budget (83.4%) then poor internet connectivity (80.9%). Inadequately equipped computer labs come fourth (76.2%) while inadequate ICT equipment in various departments follows (75%). Lack of proper ICT policy as well at 61.9% is a
significant barrier to ICTs integration. This indicates that the state of telecommunication infrastructure in institutions greatly affects successful ICTs integration.

4.3.2.1 To Determine the Extent To Which Telecommunications Infrastructure Impedes on ICTS Integration.

The researcher sought to answer this question by looking at the overall performance of all the six variables identified and analyzed in table 4.7 above so as to establish which variables had an effect and to what extent in the integration of ICT. This is a summary of the above factors as highlighted in the figure below.

![Figure 4.7: Infrastructural Factors Affecting ICT Integration](image)

Source: (Field data, 2013)

From the figure 4.7 above, it is noted that level of competence of the administrators, inadequate ICT budget and poor internet connectivity greatly did affect ICT integration in
tertiary institutions. Again this is in line with the literature in the previous chapters of this study. On the same note, inadequately equipped computer labs and ICT equipment alongside with lack of an ICT policy were noted to have a significant effect on the success or failure ICT integration.

4.3.3 Knowledge and Skills

The researcher sought to establish if knowledge and skills had an effect in the integration of ICT in public tertiary training institutes. Respondents were given four statements in line with knowledge and skills in a bid find out the effect of knowledge and skills on successful ICTs integration. The responses are indicated in table 4.8 below.

**Table 4.8: Knowledge and Skills (n=84)**

<table>
<thead>
<tr>
<th>Category</th>
<th>S.D</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>S.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varying basic computer skills hinders ICT integration in tertiary institutions</td>
<td>2.4</td>
<td>9.5</td>
<td>15.5</td>
<td>42.9</td>
<td>29.8</td>
</tr>
<tr>
<td>Lack of ICT professional skills is an obstacle to the integration of ICTs in tertiary institutions</td>
<td>3.6</td>
<td>7.1</td>
<td>10.7</td>
<td>36.9</td>
<td>41.7</td>
</tr>
<tr>
<td>Ignorance of technological advancement affects the integration of ICTs in tertiary institutions</td>
<td>11.9</td>
<td>6.0</td>
<td>11.9</td>
<td>36.9</td>
<td>33.3</td>
</tr>
<tr>
<td>Lack of relevant skills is an obstacle to ICTs integration in tertiary institutions</td>
<td>3.6</td>
<td>9.5</td>
<td>13.1</td>
<td>38.1</td>
<td>35.7</td>
</tr>
</tbody>
</table>

S.D=strongly disagree; D=disagree; N=neutral; A=agree; S.A=strongly agree

Source: (Field data, 2013)
From table 4.8 above, respondents agreed with the statements that varying basic computer skills hinders ICT integration in tertiary institutions (72.7%) where 42.9% agreed and 29.8% strongly agreed and as King and Palmer (2007) argue that skill systems, particularly TVET, has been left to the market and tend to favour non-poor and more-educated. This clearly draws a line and clearly illustrates that computer skills have been left as a prestige to the rich and educated persons. Of the total respondents 11.9% disagreed, with 9.5 disagreed and 2.4% strongly disagreed. A 15.5% were neutral on this factor.

Ignorance of technological advancement affects the integration of ICTs in tertiary institutions (70.2%) where 36.9% agreed, 33.3% strongly agreed. This put in line with what Beggs (2000) asserts that trainers' fear of failure causes a lack of confidence making them feel anxious about using ICT in their training as they feel incompetent in its application. The ignorance could therefore be as a consequence of lack of confidence and anxiety in the use of ICT. Of those who disagreed (17.9%) 11.9% strongly disagreed, 6% disagreed while a further 11.9% were neutral.

Lack of relevant skills is an obstacle to ICTs integration in tertiary institutions as majority of the respondents (73.8%) agreed with this statement of which 38.1% agreed, 35.7% strongly agreed. This is in line with Becta (2004) that trainers who do not consider themselves well skilled in using ICTs feel anxious about trying it in front of learners who perhaps know more than they do. A small number disagreed (13.1%) where 3.6% strongly disagreed, 9.5% disagreed. An equal percentage (13.1%) was neutral. This is to mean that skills development is important if ICT is to be used effectively.
Majority of the respondents agreed with the statement that lack of ICT professional skills is an obstacle to the integration of ICTs in tertiary institutions (78.6%) where 36.9% agreed and 41.7% strongly agreed, due to lack of confidence that should be cultivated through proper and adequate technological training and refresher courses as technology changes rapidly. However some respondents (10.7%) disagreed with 7.1% disagreeing and 3.6% strongly disagreeing. An equal 10.7% were neutral on the statement.

From the above analysis on Knowledge and skills variable, it shows that that lack of ICT professional skills has the highest hindrance (78.6%), followed by lack of relevant skills (73.8%) then varying basic computer skills (72.7%) and lastly the ignorance of technological advancement (70.2%). This means that lack of appropriate knowledge and skills greatly affects successful ICTs integration in TVETs.

4.3.3.1 To Find out the Effect of Knowledge and Skills on Successful ICTs Integration

The researcher sought to answer this question in this section by looking at the overall performance of all the four variables identified and analyzed in table 4.7 above so as to establish which variables had an effect and to what extent in the integration of ICT. This is a summary of the above factors as has been highlighted in the figure below.
Figure 4.8: Effect of Knowledge and Skills on Successful ICTs Integration

Source: (Field data, 2013)

From the figure 4.8 above, in summary, ICT professional skills, lack of relevant skills, varying basic computer skills and ignorance of technological advancements are a hindrance to ICT integration in tertiary schools as shown by their high percentage scores. While ICTs provide a platform for virtual manipulation of skills, TVET emphasize hands-on experience among learners. As such, the critical challenge lies in the possibility of ICTs to substitute physically trained specialist/instructors and training facilities. In view of the mentioned fact, ICTs can only replace a portion of hands-on experience where manual skills are necessary requirements in teaching and learning process (Zarini et al., 2009). Though ICTs are crucial component that no training programme (TVET) can afford to neglect, face-to-face interaction among learners and between a learner and a trainer equally holds great promise. Teacher training and retraining are major challenges for the integration of technology-based learning since for most teachers ICTs are both
invigorating in their potential and intimidating in the improbability created by the speed of change.

4.3.4 Resistance to Change

The researcher sought to establish if resistance to change had an effect in the integration of ICT in public tertiary training institutes. Respondents were given five statements in line with resistance to change in a bid find out the effect of knowledge and skills on successful ICTs integration. The responses are indicated in table 4.9 below.

Table 4.9: Resistance to Change (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>S.D</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>S.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of commitment impedes the integration of ICTs in tertiary institutions.</td>
<td>9.5</td>
<td>9.5</td>
<td>14.3</td>
<td>32.1</td>
<td>34.5</td>
</tr>
<tr>
<td>Maintenance of the status quo blocks with the integration of ICTs in tertiary institutions.</td>
<td>7.1</td>
<td>4.8</td>
<td>16.7</td>
<td>26.2</td>
<td>45.2</td>
</tr>
<tr>
<td>Presence of redundancy in employees affects the integration of ICTs in tertiary institutions.</td>
<td>9.5</td>
<td>19.0</td>
<td>11.9</td>
<td>22.6</td>
<td>36.9</td>
</tr>
<tr>
<td>Fear of job loss hinders embracing of the ICTs integration in tertiary institutions.</td>
<td>3.6</td>
<td>4.8</td>
<td>7.1</td>
<td>27.4</td>
<td>57.1</td>
</tr>
<tr>
<td>Uncertainty of technological dynamism is an obstacle to the integration of ICTs in tertiary institutions.</td>
<td>3.6</td>
<td>2.4</td>
<td>32.1</td>
<td>35.7</td>
<td>26.2</td>
</tr>
</tbody>
</table>

S.D=strongly disagree; D=disagree; N=neutral; A=agree; S.A=strongly agree

Source: (Field data, 2013)
From table 4.9 above, respondents indicated that they agreed with the statements that lack of commitment impedes the integration of ICTs in tertiary institutions (76.6%) of which 32.1% agreed, 34.5% strongly agreed. This may be seen as a result of threat to job loss for some stakeholders, thus resulting in lack of commitment and consequently resistance to embrace the innovation as Fourth (2005) put it. Among respondents, 19% disagreed of which 9.5% strongly disagreed and 9.5% disagreed. Another 14.3% were neutral as indicated on the table.

Maintenance of the status quo is an obstacle with the integration of ICTs in tertiary institutions (71.4%) where 26.2% agreed, 45.2% strongly agreed as supported by Lewis (2003) who noted that adoption of ICTs for teaching and learning will not only result in job loss, there will also be a change in the instructor’s role, moving from teaching to facilitating and guiding the learning experience resulting into potential loss of work if the scenario of teacher-less classrooms comes anywhere near reality. There are those who disagreed (11.9%) where 7.1% strongly disagreed, 4.8% disagreed whereas 16.7% were neutral.

Presence of redundancy in employees’ affects the integration of ICTs in tertiary institutions (59.5%) with 36.9% strongly agreed, 22.6% agreed. In line with Earle (2002) the change from a present level to a desired level of performance is facilitated by encouraging forces such as the power of new developments, rapid availability of information, creativity, internet access, or ease of communication, while it is delayed by discouraging forces such as their expertise and lack of support. Of the total respondents a
relative number (28.5%) disagreed with the statement, where 19% disagreed, 9.5% strongly disagreed and another 11.9% remained neutral.

Fear of job loss hinders embracing of the ICT's integration in tertiary institutions (84.5%) of which 27.4% agreed, 57.1% strongly agreed. This is also highlighted by authors like Lewis (2003), Fourth (2005), Curtis (2002) and Watson (1999) that indeed fear of job loss had been the greatest resistance to integration of ICT in tertiary training institutes. However a small figure (8.4%) of the respondents disagreed where 3.6% strongly disagreed, 4.8% disagreed. Another 7.1% remained neutral on this statement.

Respondents also agreed with the statement that uncertainty of technological dynamism was an obstacle to the integration of ICTs in tertiary institutions (61.9%) with 35.7% agreed and 26.2% strongly agreed, which according to Earle (2002) the change is from a present level to a desired level of performance which is facilitated by encouraging forces such as the power of new developments, rapid availability of information, creativity and or ease of communication. Of the respondents, 3.6% strongly disagreed and 2.4% disagreed (6%) with this statement. A notable figure of 32.1%, gave a neutral response which could be in line with the dynamism element and thus respondents not being certain of its effect on ICTs integration.

From the above analysis on Resistance to change variable, it shows that fear of job loss has the highest hindrance (84.5%), followed by lack of commitment (76.6%) then maintenance of the status quo (71.4%). Uncertainty of technological dynamism comes fourth (61.9%) and lastly the presence of redundancy in employees follows (59.5%). These percentages
reveal that resistance to change is a factor that equally and significantly affects successful integration of ICTs in TVET institutes.

4.3.4.1 To Determine the Effects of Resistance to Change on Successful ICTs Integration

The researcher sought to answer this question in this section by looking at the overall performance of all the four variables identified and analyzed in table 4.7 above so as to establish which variables had an effect and to what extent in the integration of ICT. This is a summary of the above factors as highlighted in the figure below.

![Figure 4.9: Effects of Resistance to Change on Successful ICTs Integration](image-url)

Source: (Field data, 2013)

From the figure 4.9 above, majority of the respondents indicated that the greatest reason as to why they resisted the integration of ICT in their institution was because they were in fear they would lose their jobs. Other reasons that had high percentages include lack of
commitment, maintenance of status quo, uncertainty of technological dynamism and presence of redundancy in employees all had a significant effect in the integration of ICTs.

4.4 The Mean Percentage Effect of each Variable on ICTs integration

From the figure below, majority of respondents agreed that Telecommunication infrastructure had the highest influence (77.0%) on integration. Knowledge and skills (73.8%) as well as Resistance to change (70.8%) variables had a significant influence on ICTs integration respectively. Computer Culture seemed to have a relative least (58.6%) influence on the successful integration of ICTs in TVETs.

![Mean Percentage Effect of Variables](chart)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer culture</td>
<td>58.6%</td>
</tr>
<tr>
<td>Telecommunication infrastructure</td>
<td>77.0%</td>
</tr>
<tr>
<td>Knowledge and Skills</td>
<td>73.8%</td>
</tr>
<tr>
<td>Resistance to Change</td>
<td>70.8%</td>
</tr>
</tbody>
</table>

Fig 4.10: Mean percentage influence of variables

Source: (Field data, 2013)
4.5 Rating of Current Integration of ICT

The researcher sought to establish how the current integration of ICTs rated. Respondents were asked to rate the current integration of ICT in public tertiary training institutes. The responses are shown in table 4.10 below.

Table 4.10: Rating of Current Integration of ICT (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Average</td>
<td>46</td>
<td>54.8</td>
</tr>
<tr>
<td>Good</td>
<td>34</td>
<td>40.4</td>
</tr>
<tr>
<td>Very good</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Excellent</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total rate Response</strong></td>
<td><strong>84</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: (Field data, 2013)

From the table 4.10 above, majority (54.8%) of the respondents indicated that the current integration of ICT in public tertiary training institute was average, 40.4% of the respondents noted it was good, 2.4% indicated that it was very good and the other 2.4% said it was poor. Thus most of the respondents noted that ICT integration was average.
This means that attempts need to be made to strengthen the ICT framework for Technical and Vocational Education (TVET).

![Rating of Current ICT Integration](image)

**Figure 4.11: Rating of Current Integration of ICT**

### 4.5 Measures taken to Overcome Barriers to the Integration of ICT

Respondents were asked to suggest what measures should be taken to overcome the barriers to the integration of ICTs in public tertiary technical training institutes.

It was also noted that there is lack of appropriate ICT integration policies or rather awareness of such policies and knowledge on basic use of ICT equipment is vital. Technophobia and resistance to change was also noted as the main hindrance to ICT integration. Respondents felt that ICT administrators try to prove that they are the best and trying to keep the knowledge to themselves and security of computer accessories was also paramount resulting to fear of investment. There was also laxity of some employers to invest in ICT due to lack of interest.
The respondents noted that proper training and equipment should be given to the institute alongside with adequate funding for the integration. Respondents indicated that sensitization and induction workshops and training as well as procurement of ICT equipment would boost ICT integration. ICT equipment should be upgraded as inadequate infrastructure hinders proper access to ICT. Respondents also felt that personnel should effectively understand the systems and there should be good remuneration to the ICT personnel.

It was also noted that some respondents felt that computers should be an examinable subject to all trainees those in business and those doing technical courses as there lacks proper ICT syllabus that hinders ICT integration. The government should take part in funding the activities in order to be able to overcome the financial implication that come along with the ICT infrastructure.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presented the discussion of key data findings, conclusion drawn from the findings highlighted and recommendation made there-to. The conclusions and recommendations drawn were focused on addressing the purpose of the study which was to assess the barriers to successful integration of ICTs in tertiary technical training institutes. The objectives of this study were to determine the effects of computer culture on successful ICTs integration determine the extent to which telecommunications infrastructure impedes on ICTs integration, find out the effect of knowledge and skills on successful ICTs integration and determine the effects of resistance to change on successful ICTs integration.

5.2 Summary of Key Findings

The research study found out that majority of the respondents were males, aged between 41 to 50 years and had attained at least a diploma in their education level. Majority of the respondents had been of service for 6 to 10 years in their respective institutions. This indicates that they have adequate knowledge and experience that would enable them respond to the questions given to them. The purpose of the study being to assess the barriers to successful integration of ICTs in tertiary technical training institutes and each of the objectives is discussed in the below sections. A likert scale was used to rate their responses and the findings were later analyzed.
In a bid to answer the objectives, the following findings were deduced in line with the objectives and are highlighted in the following subsections.

5.2.1 Effect of Computer Culture on Successful ICTs Integration

To address the first objective of the study, the researcher sought to find out the effect of computer culture on successful ICT integration. The study established that respondents strongly agreed with the statements that suspicion significantly hinders integration of ICT in tertiary institutions, lack of appropriate orientation affects integration of ICT in tertiary integration, device complexities hinders the integration of the ICT in the institution and slow technological cultural adaptation hinders ICT integration in public tertiary institutions. However they agreed with the statement that user intimidation hinders the integration of ICT in public tertiary institutions and strongly disagreed with the statements that traditional teaching approaches hinder ICT integration in public tertiary institutions.

5.2.2 Extent to which telecommunication Infrastructure impedes on ICTs Integration

To address the second objective that sought to find out the extent to which telecommunication infrastructure impeded on ICTs integration, the study found out that respondents strongly agreed with the statements that poor internet connectivity affects ICTs integration in TVETs, level of competence of the network administrator affects the integration of ICTS in tertiary institutions, inadequately equipped computer laboratories hinders ICT integration, inadequate ICT budget hinders successful integration in the
institution and inadequate ICT equipment in various departments affects the integration in the institution. However respondents agreed with the statement that lack of ICT policy has a negative impact on ICTs integration.

5.2.3 Effects of Knowledge and Skills on Successful ICTs Integration

The third objective sought to find out the effects of knowledge and skills on successful ICT integration and the study found out that respondents agreed with the statements that varying basic computer skills hinders ICT integration in tertiary institutions, ignorance of technological advancement affects the integration of ICTs in tertiary institutions and lack of relevant skills is an obstacle to ICTs integration in tertiary institutions. They however strongly agreed with the statements that lack of ICT professional skills is an obstacle to the integration of ICTs in tertiary institutions.

5.2.4 Effects of Resistance to Change on Successful ICTs Integration

The last objective sought to determine the effects of resistance to change on successful ICT integration and the study found out that respondents strongly agreed with the statements that lack of commitment impedes the integration of ICTs in tertiary institutions, maintenance of the status quo blocks with the integration of ICTs in tertiary institutions, presence of redundancy in employees affects the integration of ICTs in tertiary institutions and fear of job loss hinders embracing of the ICTs integration in tertiary institutions. However, respondents agreed with the statements that uncertainty of technological dynamism is an obstacle to the integration of ICTs in tertiary institutions.
Respondent were asked to rate the current integration of ICT in public tertiary training institutes and the study found out that that the current integration of ICT in public tertiary training institute was average and a good number of the respondents noted it was good and the rest said it was poor.

5.3 Conclusion

The purpose of the study has been to assess the barriers to successful integration of ICTs in tertiary technical training institutes. Looking at the computer culture, the study concludes that suspicion, lack of appropriate orientation, device complexities, user intimidation and slow cultural adaptations hinders ICT integration in public tertiary institutions. Traditional teaching approaches are however, not a barrier to ICT integration. On the ICT infrastructure, ICT policy, poor internet connectivity, inadequately equipped laboratories, level of competence of the network administrator; inadequate ICT budget and inadequate ICT equipment in the various departments were found to significantly affect the success of ICT integration in the tertiary institutions.

Looking at knowledge and skills, the study concludes that various basic computer skills, lack of ICT professional skills, ignorance of technological advancements and lack of relevant skills are an obstacle to ICT integration in tertiary institutions. Finally of the last objective that sought to establish on matters pertaining resistance to change, the study concludes that lack of commitment, maintenance of the status quo, presence of redundancy in employees, fear of job loss and uncertainty of technological dynamism act as obstacles to the integration of ICT in tertiary institutions.
In conclusion, all the four objectives used in the study have been noted to have significant influence on the success or failure of ICT integration to varying degrees in public tertiary technical training institutes in Nyeri County.

5.4 Recommendations

Based on the above observations the study recommends that integration of ICT should be done in the most transparent manner to eliminate suspicion and be coupled with proper employee orientation and proper training so as to minimize the notion of device complexities and user intimidation. The institutes should also have a proper ICT policy and ensure that there is awareness and understanding of it by those involved in particular the trainers, good internet connectivity, invest in ICT equipment and computer laboratories by having proper budgetary allocation of funds and also ensure that the level of competence of the network administrator should be beyond reproach.

Finally the study concludes that the institutes should hire people with proper professional and technological skills. The institute should also hold seminars and workshops to educate their staff on why they need to shed away their ignorance on technological advances, encourage commitment to ICTs adoption, remove fears on technological dynamism and overall the importance of ICT integration in their institutions.

5.5 Areas for Further Research

The researcher recommends that more studies should be carried out on strategies and mechanisms that should be adopted to ensure that there is proper implementation of ICT so as to ensure that it is effectively used in the institutes. More research should be carried
out to establish the role of ICTs in Institutional competency with regard to its human resource and national development. This could shed more light on the demand for new technologies and the measures that need to be put in place so that ICTs adoption in TVETs as well as other training institutes can compare with those of developed countries. A similar study ought to be carried out in looking at various measures and attempts to overcome the barriers of ICTs adoption and full Integration in technical training institutes and to give more insight on how this can be improved.
REFERENCES


Gardner, B. (1994). *Ensuring Successful Information Technology Utilization in Developing Countries.* Garborone, Botswana, 12-20


National ICT Policy- Sessional paper number 5


Letter of Transmittal

Dear Respondent,

I am a student at Kenyatta University undertaking a research study on the ‘Barriers to successful Integration of ICTs in public tertiary Technical Training Institutes.’ (A survey of Technical Training institutes in Nyeri County)

I am glad to inform you that you have been selected to participate in this study. You are kindly requested to sincerely respond to the items in the Questionnaire. I would like to assure you that all information you provide will be used strictly for academic purpose and your identity will not be revealed whatsoever.

Instructions: Please put a tick for the selected option in the provided spaces and comment accordingly as necessary.

Thanks in advance.

Yours Sincerely,

Agnes Mwangi
Research Questionnaire

The researcher is carrying out a study to assess the Barriers to the successful ICTs integration in TVETs in regard to productivity and service delivery in public tertiary technical training institutes in Nyeri county. This questionnaire is designed to obtain responses from employees in tertiary Technical Training Institutes- mainly the Trainers, ICT specialists, HoDs and Administrators respectively. Please answer all the questions as objectively and truthfully as possible. Using a tick, indicate your responses in the boxes provided.

NB: The information supplied in this questionnaire will be for research purposes only. Do not indicate your name.

Name of Institute (optional)

SECTION A: BIO-DATA INFORMATION

1. What is your gender?
   - □ Male
   - □ Female

2. Age bracket (in years)
   - □ 20 – 30
   - □ 31 – 40
   - □ 51 – 6
   - □ 61 – and above

3. What is your educational level?
   - □ Diploma
   - □ Higher Diploma
   - □ First Degree
   - □ Masters and above
   - □ Other (specify) ________
4. How long have you been in service? (years)

- [ ] 0 – 5
- [ ] 6 – 10
- [ ] 11 – 15
- [ ] 16 – 20
- [ ] over 20

5. Which Department do you belong to?

Barriers to successful ICTs integration in public tertiary technical training institutes in Nyeri County

For sections B, C, D and E: tick appropriately using the following scale

*Where: 1= strongly disagree, 2=disagree, 3=Neutral, 4 =Agree, 5=strongly agree*

<table>
<thead>
<tr>
<th>Section A: COMPUTER CULTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Suspicion significantly hinders integration of ICT in tertiary institutions</td>
</tr>
<tr>
<td>2. Lack of appropriate orientation affects integration of ICT in tertiary integration</td>
</tr>
<tr>
<td>3. Device complexities hinders the integration of the ICT in the institution</td>
</tr>
<tr>
<td>4. User intimidation hinders the integration of ICT in public tertiary institutions</td>
</tr>
<tr>
<td>5. Slow technological cultural adaptation hinders ICT integration in public tertiary institutions</td>
</tr>
</tbody>
</table>
Traditional teaching approaches hinder ICT integration in public tertiary institutions

In few words, how else does computer culture affect ICTs integration in TVETs?

SECTION C. ICT INFRASTRUCTURE

Where: 1 = strongly disagree, 2 = disagree, 3 = Neutral, 4 = Agree, 5 = strongly agree

1. Lack of ICT policy has a negative impact on ICTs integration
2. Poor Internet connectivity affects ICTs integration in TVETs
3. Inadequately equipped computer laboratories hinders ICT integration
4. Level of competence of the network administrator affects the integration of ICTS in tertiary institutions
5. Inadequate ICT budget hinders successful integration in the institution
6. Inadequate ICT equipment in various departments affects the integration in the institution.

In your opinion how does ICT infrastructure affect successful ICTs integration?

SECTION D: KNOWLEDGE AND SKILLS

Where: 1 = strongly disagree, 2 = disagree, 3 = Neutral, 4 = Agree, 5 = strongly agree

1. Varying basic computer skills hinders ICT integration in tertiary institutions
2. Lack of ICT professional skills is an obstacle to the integration of ICTs in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

3. Ignorance of technological advancement affects the integration of ICTs in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

4. Lack of relevant skills is an obstacle to ICTs integration in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

5. What is your assessment on appropriate Knowledge and skills and its contribution to ICTs integration.

<table>
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<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

SECTION E: RESISTANCE TO CHANGE

Where: 1 = strongly disagree, 2 = disagree, 3 = Neutral, 4 = Agree, 5 = strongly agree

1. Lack of commitment impedes the integration of ICTs in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

2. Maintenance of the status quo blocks with the integration of ICTs in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

3. Presence of redundancy in employees affects the integration of ICTs in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

4. Fear of job loss hinders embracing of the ICTs integration in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

5. Uncertainty of technological dynamism is an obstacle to the integration of ICTs in tertiary institutions.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>
6 In your opinion how else does resistance to change affect successful ICTs integration?

Section F

How would you rate the current integration of ICT in public tertiary technical training institutes?

Poor □ Average □ Good □ Very Good □ Excellent □

In your own opinion, what measures should be taken to overcome the barriers to the integration of ICTs in public tertiary technical training institutes?

THANK YOU FOR TAKING YOUR TIME TO FILL IN THIS QUESTIONNAIRE
### APPENDIX III

**Table III.1: Time Frame**

<table>
<thead>
<tr>
<th>Month</th>
<th>PROPOSAL WRITING</th>
<th>DATA COLLECTION</th>
<th>DATA ANALYSIS</th>
<th>REPORT WRITING</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Feb 2013</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mar 2013</td>
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<tr>
<td>Apr 2013</td>
<td></td>
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<td>Apr 2013</td>
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Source: (Researcher, 2013)
## APPENDIX IV

Table IV.1: Work Plan

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TIME FRAME</th>
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<tbody>
<tr>
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<td>May – Dec 2012</td>
</tr>
<tr>
<td>Proposal Submission</td>
<td>Feb 2013</td>
</tr>
<tr>
<td>Proposal Defense</td>
<td>Feb 2013</td>
</tr>
<tr>
<td>Corrections on Observations</td>
<td>Feb – March 2013</td>
</tr>
<tr>
<td>Piloting and Adjustments</td>
<td>March 2013</td>
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<tr>
<td>Data collection and Encoding</td>
<td>March 2013</td>
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<tr>
<td>Data analysis and Compilation</td>
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<td>Proofreading and Printing</td>
<td>May 2013</td>
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Source (Researcher, 2013)
### APPENDIX V

Table V.1: Research Budget

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<th>Item</th>
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Source (Researcher, 2013)