

**FACTORS INFLUENCING INFORMATION AND  
COMMUNICATION TECHNOLOGY INTEGRATION IN  
SECONDARY SCHOOLS: A CASE OF KITUI WEST  
SUBCOUNTY, KITUI COUNTY, KENYA**

**NANCY MUKAI MUTHAMI**

**A Research Project Report Submitted In Partial Fulfillment of the  
Requirements for the Award of Degree of Master of Arts in Project Planning  
and Management of The University of Nairobi**

**2017**

**DECLARATION**

This research project report is my original work and has not been submitted or presented for an academic award in any other university.

**Signature**.....

**Date**.....

**NANCY MUKAI MUTHAMI**

**L50/82075/2015**

This research project report has been submitted for examination with my approval as university supervisor.

**Signature**.....

**Date**.....

**DR. ANGELINE MULWA**

**DEPARTMENT OF OPEN LEARNING PROGRAMMES,**

**UNIVERSITY OF NAIROBI.**

## **DEDICATION**

I dedicate my work to my beloved parents Mr. Benedict Mwalika, Mrs. Jane Muthami, and my loving husband Mr. Micah Rayrus, for their moral support and understanding my study time.

## **ACKNOWLEDGEMENT**

I am grateful to the almighty God for giving me the grace and health to do this work. I also appreciate my able supervisor Dr. Angeline Mulwa for her valuable guidance through all the steps of this work.

I owe my gratitude to my fellow course mates especially the group discussion mates Ann and John whom we have walked together in the journey offering each other both material and moral support.

Much acknowledgement also goes to my lecturers Dr. Angeline mulwa Dr. Florence Itegi among others in this course for their tireless efforts to impart the necessary knowledge in me that enabled me to go through the course.

To my family members, I owe this work to you. My father Mr. Benedict Mwalika, my mother Mrs. Jane Muthami, husband Micah Rayrus, brothers and cousins for your moral and monetary support.

To all of the aforementioned, I say may God bless you abundantly.

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	ii
<b>DEDICATION</b> .....	iii
<b>ACKNOWLEDGEMENT</b> .....	iv
<b>LIST OF TABLES</b> .....	ix
<b>LIST OF FIGURES</b> .....	x
<b>ABBREVIATIONS AND ACRONYMS</b> .....	xi
<b>ABSTRACT</b> .....	xii
<b>CHAPTER ONE: INTRODUCTION</b> .....	1
1.1 Background of the Study.....	1
1.2 Statement of the problem .....	3
1.3 Purpose of the study .....	4
1.4 Objectives of the Study .....	4
1.5 Research Questions .....	5
1.6 Significance of the study.....	5
1.7 Limitations of the study.....	5
1.8 Delimitation of the study.....	6
1.9 Assumptions of the study. ....	6
1.10 Definition of significant terms .....	7
<b>CHAPTER TWO: LITERATURE REVIEW</b> .....	8
2.1 Introduction .....	8
2.2 Information and communication technology (ICT) and ICT Integration .....	8
2.3 Teachers' perception and ICT integration in secondary schools .....	8
2.4. Availability of infrastructure and ICT integration in secondary schools. ....	16
2.5 Availability of human resource and ICT integration in secondary school.....	24
2.6 Theoretical Framework: Theory of Domestication.....	25
2.7 Conceptual framework .....	27

2.8 Chapter summary .....	29
<b>CHAPTER THREE: RESEARCH METHODOLOGY .....</b>	<b>30</b>
3.1 Introduction .....	30
3.2 Research design.....	30
3.3 Target Population .....	30
3.4 Sample and Sampling Techniques .....	31
3.5 Data Collection Instruments.....	31
3.6 Validity of Research Instrument .....	32
3.7 Reliability of the instruments .....	32
3.8 Data Collection procedures .....	33
3.9 Data analysis Techniques .....	33
3.10 Ethical consideration.....	33
3.11 Operational definition of variables.....	34
<b>CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION ...</b>	<b>36</b>
4.1 Introduction .....	36
4.2 Questionnaire Return Rate .....	36
4.3 Demographic Data.....	37
4.3.1 Education Level .....	37
4.3.2 Years of Experience.....	37
4.3.3 Distribution of Respondents by Gender .....	38
4.4 The influence of Teacher’s Perception on ICT integration.....	39
4.5 The influence of Availability of infrastructure on ICT integration.....	41
4.6 The influence of Availability of Human Resource on ICT integration.....	45
<b>CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND</b>	
<b>RECOMMENDATIONS .....</b>	<b>47</b>
5.1 Introduction .....	47
5.2 Summary of Findings .....	47
5.2.1 Teachers’ Perception and ICT integration.....	48
5.2.2 Availability of Infrastructure and ICT integration.....	48
5.2.3 Availability of Human Resource and ICT integration.....	48
5.3 Discussion of Findings .....	49

5.3.1 Teacher’s Perception and ICT Integration.....	49
5.3.2 Availability of Infrastructure and ICT Integration .....	50
5.3.3 Human Resource Availability and ICT Integration .....	51
5.4 Conclusions of the Study.....	52
5.5 Recommendations of the Study.....	53
5.6 Suggestions for Further Study .....	55
<b>REFERENCES</b> .....	56
<b>APPENDICES</b> .....	60
Appendix I: Introduction Letter .....	60
Appendix II: Questionnaire for Teachers .....	61





## LIST OF TABLES

Table 3.1: Operationalization of Variables .....	34
Table 4.2: Level of Education.....	37
Table 4.3: Years of Experience .....	38
Table 4.4: Gender of the Respondents .....	38
Table 4.5: Teachers Perception.....	39
Table 4.6: Availability of ICT Infrastructure Statement.....	42
Table 4.7: Conditions of Access to ICT Infrastructure .....	43
Table 4.8: Availability of Human Resources for ICT Integration .....	45

## LIST OF FIGURES

Figure 1: Conceptual framework.....	28
-------------------------------------	----

## **ABBREVIATIONS AND ACRONYMS**

**CAL-** Computer Assisted Learning

**CAI-** Computer Assisted Instruction

**CD-ROM-** Compact Disk Read Only Memory

**DVD** – Digital Versatile Disc

**ICT-** Information and communications technology

**PC-** Personal Computer

**SDG-** Sustainable Development Goals

**TSC-** Teacher Service Commission

**LAN-** Local Area Network

**WIFI-** Wireless Fidelity. A facility allowing computers, smart phones and other devices to communicate with one another wirelessly

## ABSTRACT

Educational attainment is recognized as one of the fundamental indicators of development of a nation. The present world cannot think of development of a country without Technical Education and Training. Yet, there is lack of information on several aspects of the use of Information and Communication Technology among teachers. The purpose of this study was to investigate the factors influencing Information and Communication Technology integration in secondary schools, a case of Kitui west Sub County in Kitui County. Specifically the study objectives were; to establish the teachers' perception in using Information and Communication Technology, establish the influence of availability of computer resources on integration of; and establish the influence of availability of human resource in using Information and Communication Technology in secondary schools in Kitui West Sub County, Kitui County. The study used descriptive research design. The target population was teachers from 1 national school, 1 extra county school, 7 county schools and 24 sub county schools found in Kitui west Sub County. This entailed 358 TSC employed teachers and approximately 250 BOM employed teachers. It employed simple random sampling techniques to obtain 100 teachers these secondary schools. Data was collected using questionnaires administered using random and simple techniques to the teachers. Collected data was organized, coded and analyzed using Statistical Package for Social Sciences and presented in frequency and percentage tables. The study was important in helping improvement of Information and Communication Technology integration in secondary schools. It would also have an impact on further activities in the region that underlie the achievement of Sustainable Development Goals. The study would also provide the educational leaders with better practical and scholarly knowledge base to improve secondary schools in combination with their own local educational strategies. The study found out that teachers' perception towards information and communication technology was positive. This was attributed to the advantages it had when integrated in learning as observed from the students' performance. The study also found out about inadequate availability of infrastructure for information and communication technology. The study further found out inadequate availability of human resource and how it influences Information and Communication Technology integration in learning and teaching in secondary schools. The study suggests and recommends that; Basic infrastructure acquisition and support guidelines be availed to schools, adequate human resources should be provided and that teachers should be encouraged to develop positive attitude towards Information and Communication Technology integration.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

According to Harrison, Rainer and Hochwarter (2009) the desire of countries to be globally competitive, grow economically and improve their social conditions has created a renewed interest for increased investment in educational improvements and enhanced application of ICT in learning institutions. The ability to use digital technology, communication tools, or networks appropriately to solve information problems in order to functioning an information society is currently well recognized as the key pillar of Information and Communication Technology (ICT). Georgia (2011) has it that, Globally ICT knowledge has been viewed as to fundamentally affect the way humans do their work, learn and even develop their economies. Over the last decades, there has been exponential growth in the use of ICT, which has made impacts both on society and on peoples' lives. It is therefore not surprising to note that increasing attentions are being put into the use of ICT in education all over the world. According to Plomp, Brummelhuis and Rapmund,(1996): there are three general objectives of ICT in education i.e. the use of ICT as an object of study, the use of ICT as aspect of discipline or profession, and the use of ICT as a medium for teaching and learning.

The use of ICT in education sector is currently the lowest in Africa, and the in the entire Sub Saharan Africa, where it lags behind most of the countries in the developed world. Attempts to assess the utilization of ICT in Africa has been hampered by insufficient empirical data to indicate any impact of ICT, on sector productivity and lack of cross country evidence. In some cases the evidence has been inexistent due to recent developments, the rapid revolutions on ICTs and methodological challenges that include a deficiency of assessment variables and models of

causality. Most of the studies have focused on information infrastructure issues, while few have been undertaken to measure the extend of ICTs in Africa, particularly in education.(Kenya School Net, 2009)

Kenya has developed policies to guide the integration of ICT into economic, social and educational programmes. In Kenya, the first stakeholders driven ICT policy was approved by the cabinet in January 2006 and an ICT policy document published through the Kenya Government Gazette notice of number 24 in March 2006 (KIC, 2006). The main theme of this policy was to develop a “Prosperous ICT driven society” that recognizes and puts ICT at the center of economic development. According to Liverpool, 2009; Hennessy and Onguko, 2012), A summary of literature indicate that in Kenyan schools, the process of integration of ICT has previously been slow despite the evidence that the situation is has been improving in the last few years.

Schools are increasingly being equipped with computers for teaching and learning and administrative purposes, connectivity is improving and students are enthusiastic about using computers for learning, despite the lack of equipment available. Nevertheless, access and usage of ICT, like the electricity supply itself, remain rather sporadic (David, Mbowa and Paul, 2003), which appears to contribute to the limitation and adoption of e-learning in the schools.

The concept of e-learning simply means electronic learning. The use of e-learning in pedagogical spheres date back to 1993 Graziadei (1993) demonstrated online computer delivered lecture, tutorials and assessment project using, VAX notes conferencing and assorted software which allowed teaching and learning to take place in virtual setting. According to Leach and Moon, (2010) The e-learning encompass the delivery of learning, training or educational programmes via electronic means using computer or other electronic devices such as CD-ROM or DVD to

provide training, educational or learning materials. It is based on embracing all forms of electronic devices that are employed in teaching and learning situation to make learning easy. The devices include computer and other audio visual facilities. The most popular e-learning device is the computer. Computer can be used in teaching and learning in Computer Assisted Learning (CAL) and Computer Assisted Instruction (CAI), which covers different subjects and topics, teacher made packages or improvised instructional packages.

Teacher education programs in Kenya have struggled with selecting and implementing the most effective strategies on how to prepare pre –service teachers to integrate e-learning in their future lessons. Many programs have attempted to develop teachers’ e- learning skills through introductory educational technology course. By taking an ICT course, teachers are expected to transfer knowledge and skills to their future classrooms in using e-learning (Brush et al ,2003). However the evidence suggests that teachers do not feel prepared to effectively use e-learning in their classrooms(Drent and Meelissen, 2008) these studies indicate the importance of teachers’ education should not only focus on how to use technology, but also how technology can be used for teaching and learning.

Currently information on the integration of ICT in the learning institutions in Kenya is unknown especially in secondary schools of Kenya. It is on the above basis that this study is sought to determine the adoption of ICT in secondary schools in Kitui west Sub County in Kitui County.

## **1.2 Statement of the problem**

Despite efforts by the government of Kenya to inculcate ICT in education sector, there is substantial evidence that it has not yielded much fruits. There have been challenges like lack of qualified teachers on the integration of ICT. According to (Afe, 2002; Olakulehim, 2007) it has

been observed that the African education system is lacking competent teachers generally and in the integration of ICT to be particular. This is one of the challenges among many.

The integration of ICT in learning institutions is currently not clearly understood. However informal reports indicate that in many of the learning institutions, the integration of ICT has not been satisfactory. This information is not verified through research findings. (Nyamanga 2009) , in his research said that career paths including sciences, mathematics, information and technology continue to be poorly pursued by the institutions that shy away from the integration of ICT. None of the current research has been done in exploring the factors affecting the integration of ICT in secondary education in Kitui County- Kitui West Sub County.

### **1.3 Purpose of the study**

The purpose of this study was to investigate the factors influencing the ICT integration into the secondary schools in Kitui West Sub County in Kitui County.

### **1.4 Objectives of the Study**

The specific objectives of the study were as follows:

1. To establish the influence of teachers perception on ICT integration in secondary schools in Kitui West sub county, Kitui County.
2. To establish the influence of availability of infrastructure on ICT integration in secondary schools in Kitui West sub county, Kitui County.
3. To establish the influence of availability of human resource on ICT integration in secondary schools in Kitui West sub county, Kitui County.



## **1.5 Research Questions**

1. What is the influence of teachers' perception on ICT integration in secondary schools in Kitui West sub County in Kitui County?
2. How does the availability of infrastructure influence the ICT infrastructure in secondary schools in Kitui West Sub County in Kitui County?
3. What is the influence of availability of human resource in the ICT integration in secondary schools in Kitui west Sub County in Kitui County?

## **1.6 Significance of the study**

The importance of this study is to provide information to members of the scholastic community regarding the knowledge gap on why there is low usage of ICT in secondary schools. This is important in that it would help in making decisions in education regarding ICT integration.

The study is also not only going to be useful to secondary school stake holders i.e. the staff in the ministry of education, down to the secondary school principals and teachers, but also it would have impact on further activities in the region that underlie the achievement of the SDG'S.

The study provided educational leaders with better practical and scholarly knowledge base to improve schools in combination with their own local educational strategies.

## **1.7 Limitations of the study**

The researcher had a few limitations in carrying out the study. The researcher had to control them to avoid their influence in the study finding. The researcher was not able to guarantee response biasness in the answers given. Even though the respondents were assured that their identity remains anonymous, respondents might have not given socially correct responses

The researcher used sample schools to make generalizations of the entire Kitui West Sub County. This was a challenge caused by time constraints.

The time within which the research was carried out was short. There were also financial constraints whereby there were no sufficient funds for transport, printing and processing of data, research assistance among other expenses.

### **1.8 Delimitation of the study**

Scope of the study was limited geographically to secondary schools within Kitui West Sub County Kitui County. The study again targeted only the secondary school teachers. The study did not capture the students who may in one way or the other influence the ICT integration process in the secondary schools.

Since the efforts by the stakeholders in education are to have ICT integrated in all levels of education, the content of the study was limited to the ICT integration in the secondary schools. Again, the time of the study was limited to four months.

### **1.9 Assumptions of the study.**

The study was based on the following assumptions; all factors not included in the study remain constant, all the respondents gave honest and sincere answers.

The study also assumed that the results obtained from the study can be generalized to represent the situation in the entire Kitui County.

It was also assumed that the researcher would have no control over the responses by the respondents who may give responses which are not genuine to please the researcher.

### **1.10 Definition of significant terms**

<b>ICT</b>	Information and communication technology. The technology and tools used to transfer information and speed up communication processes.
<b>ICT integration</b>	Use of ICT to introduce, reinforce, supplement and extend skills. In the case of this study, it entails introduction of information and communication technology in secondary schools.
<b>ICT Infrastructure</b>	Infrastructure are the resources such as building or equipment required for an activity. ICT infrastructure therefore refers to resources necessary for integration of ICT in learning institutions such as electricity, computer laboratories, computers, internet connectivity among others.
<b>Teachers' Perception</b>	perception is a belief or opinion, often held by many people and based on how things seem. Teachers perception therefore refers to the belief or opinion of teachers towards the integration of information and communication technology in learning in the secondary schools.
<b>Human Resource-</b>	human resource is personnel of a business or organization, regarded as a significant asset in terms of skills and abilities. In the case of this study, human resource entails teachers who are trained in information and communication technology and also computer laboratory technicians.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter endeavors to review the related literature on the general issues of integration of ICT in learning institutions in education within the society, including the global and historical context of ICT integration. The methodology that will be used for this literature review is a systematic search on the internet resources, abstracts and databases including Eric, British Library Direct, Academic Search Elite, Libris, Questia and journal sources such as Emerald, Sage etc. Google Scholar will also be used. Searches from relevant websites, online reports will also be used.

#### **2.2 Information and communication technology (ICT) and ICT Integration**

There is no firm agreement on the definition of ICT, as these technologies evolve almost daily. Here it is assumed that ICT includes but not limited to, personal computers, laptops, printers, LCD projectors, palm devices, iPods, fax machines, cell phones, internet, and intranet. This includes the ability to use technology as a tool to research, organize, evaluate and communicate information and the possession of a fundamental of the ethical or legal issues surrounding the access and use of information. This definition encompasses three areas of ICT literacy, namely cognitive, technical and social. It recognizes that in the technologically connected world, one does not live in isolation and therefore needs ‘soft’ as well as ‘hard’ skills to confidently, reliably and responsibly use ICT.

#### **2.3 Teachers’ perception and ICT integration in secondary schools**

The use of ICT has been an important topic in education over the last two decades with studies showing that ICT can enhance teaching and learning outcomes. For example, in education,

scholars have documented that the use of ICT can improve students' conceptual understanding, problem solving, and team working skills (Culp, Honey and Mandinach, 2005; Gerban, 1992; Tao and Gunstone, 2009; Toomey and Ketterer, 1995; Zhou, Brouwer, Nocente and Martin, 2005). As a result, most curriculum documents state the importance of ICT and encourage schoolteachers to use them. However, teachers need to be specifically trained in order to integrate ICT in their teaching (Batane, 2004; Jacobsen, Clifford and Friesen, 2002; Markauskaite, 2007; Mitchem, Wells and Wells, 2003; Yildirim, 2000).

Although schools and teachers are known to be resistant to innovation and change (Kearsley, 2004), the proliferation of ICT is beginning to affect how teachers teach (Reid, 2002). One of the current issues about the use of ICT in Canadian schools is how it is integrated into the curriculum (Plante and Beattie, 2004). Since the curriculum documents provide arguments for introducing ICT in the school setting, schools expect that graduates from teacher education programs have a reasonable knowledge of how to use ICT (Montgomery and Irvine, 2001). Most current teachers' preparation and subsequent in-service courses were devised in reference to traditional educational technology and settings. Thus, [the participants in these courses] are not familiar with the processes, interaction patterns, features and possibilities of technology-mediated educational transactions.

It seems that effective development of teachers' ICT proficiency is not a straightforward process, but is the one that asks for a careful, multilayered approach. First, a needs assessment is important to find out what ICT skills and knowledge teachers need at schools.

Second, designers of teacher education programs should know the teachers' perceptions of ICT and their attitudes toward ICT integration into curriculum (Murphy, 2000). This is because these attitudes and perceptions are instrumental in how future teachers will use ICT in their teaching

(Sasseville, 2004). Although there is a great deal of research on technology and teacher education, because of specifics of various teacher education programs, changes in population trends, and rapid technology advancements, there is a constant need for more research about the role of ICT in teacher education programs in this specific context. Third, teacher education programs need to take into account the two typical arguments in favor of the ICT appropriation in schools. One argument emphasizes the importance of technological skills. Supporters of this argument urge teacher education programs to provide future teachers with as many technological skills as possible. The other argument accords a more important role to developing teachers' perspectives of and pedagogical knowledge about technology integration. Proponents of the latter argument believe that content-related technology knowledge is the most important factor for technology integration in teaching. This knowledge is referred to as technology pedagogical content knowledge (TPCK) (Mishra and Koehler, 2006). The institutions that uphold the teacher education programs need to be aware of these two competing arguments and use the opportunity to build a balanced ICT program for teachers.

In the empirical study on teachers, Zogheib (2003) investigated the relationship between their attitudes (confidence in their own ability to use the Internet and liking of the Internet); achievement-related and value-related motivational beliefs about the Internet; and their perceived likelihood to use the Internet in instruction. The author examined the achievement related beliefs within a motivational framework that described teachers' actual knowledge and perceived experience about the Internet. Value-related beliefs encompassed six measures for which the Internet would be valuable: personal needs, future career goals, a partner, children, future students, and society in general. Likelihood of using the Internet in instruction focused on teaching needs, students' learning, and differential access to resources.

Overall, three out of the four independent variables were significant for future Internet use: attitudes, perceived experience, and perceived values. Value-related beliefs were the most dominant predictors of almost every item of Internet use. Perceived experience was a significant predictor only for teachers creating a homepage for students to use. An attitude (confidence and liking of the Internet) was only a significant predictor when teachers' access was restricted to the school. Surprisingly, actual knowledge was never a main predictor of future Internet use. Zogheib concluded that the computer course "provided [teachers] with a clear and effective plan [on] how to use the Internet in the classroom". It appears that the course was not the problem, but the problem was in the lack of opportunities for teachers to use the Internet during teaching practice due to associate teachers' lack of experience in that domain. Zogheib finished the report with recommendation that faculties of education should focus on ensuring that computer-related knowledge is "translated into practical applications in classroom settings".

In the next study, Zogheib (2006) investigated computer use among teachers in view of their experience with technology, demographic factors, motivation for use, personality factors and learning styles. Data collection in this explanatory mixed-method design study was done through conducting a survey and interviews. The quantitative part of the study indicated that female teachers use computers less than their male counterparts. Data revealed that those teachers, who do not speak English at home, use computers more than others. In the interviews teachers reflected on the "computer training" course that was then part of the teacher education program and is also the topic of the study described in this paper. Teachers stated that the course was informative but that it started from the wrong assumption that participants had some previous computer technology training. Those who were advanced computer users did not find the course too difficult, while those who were in initial stages of technology use thought they would have to

re-teach themselves if they ever intended to use the programs briefly described in class. One of the suggestions was to have class assignments focus more on practical issues than on evaluating and critiquing articles.

The twelve interviewees criticized the whole teacher education program for not providing enough computer experience. This experience was mainly limited to using the text editors or online searches. The participants stated that very few professors in the program encouraged the teachers to use computers. This whole issue was compounded by similar and even worse experiences in the teaching practicum: associate teachers did not use computers and appeared disinterested in integrating technology in their classes. There was a discrepancy between computer skills of associate teachers and their students who knew “a lot more” (Zogheib, 2006). Further major findings in the Zogheib (2006) study were that the Primary/Junior teacher education program lacks computer training, that other programs need extended time for the computer course and that the course should consist of two stages. The first stage should provide the basic skills training, while the second stage should be about pedagogy related to use of these skills.

Qureshi (2004) investigated correlations between university students’ demographic characteristics (gender, age, marital status, employment status, student status, and number of dependents), their prior online/computer experiences, preferred learning styles, motivation, and elements of the online course design, as independent variables, and their satisfaction with the online course components, as dependent variable. Although the teachers were not included in this study, its results may be relevant for this research. Qureshi recommended that a specific course design model should be used for the Web-based environment. The individual



characteristics of students, their learning preferences and previous experience with technology and online learning should be taken into account in designing the online courses.

Also, adequate technical support appeared to be relevant for students' satisfaction with online courses. Through a concurrent mixed-model approach, Magliaro (2006) investigated whether variables such as: gender, age, ethnic origin, previous undergraduate degree, division, computer experience, use of software packages, computer training, computer ownership and socio-economic status have a statistically significant impact on the computer self-efficacy beliefs of teachers. In addition, Magliaro used open-ended questions to explore teachers' computer self-efficacy results by examining their past technological interaction experiences and beliefs based on the four sources of self-efficacy (performance accomplishments, vicarious experiences, verbal persuasion, and emotional arousal). Magliaro reported a significant difference among the study participants with respect to their undergraduate degree (in favour of participants with a Science degree), division and previous experience with computers and software packages. However, there was no noted significant difference across genders (Magliaro and Ezeife, 2007).

In addition to research done elsewhere, these four studies in particular informed the research and the methodological approach used in this study. Consequently, the authors developed a survey instrument having in mind possible triangulation of the final results. The intent was to provide a "big picture" of the findings along the common themes in all the above mentioned studies, with the aim to infer conclusions that will potentially affect the decision-making procedures in teacher education programs. The forces driving the implementation of eLearning in the commercial world are now widely recognized and accepted across virtually all industry sectors. Many even speak of the Merrill Lynch e-learning "megatrends" (Learn frame, 2001), such as the changing demographics resulting from the aging of the baby boomers and a reduced "knowledge half-life",

(so that many books are out-of-date before they are printed) which, together with the rapid expansion of technology, force firms and their employees into ongoing lifelong learning and training activities. At the same time, organisations are witnessing a number of the benefits of e-learning, such as cost savings, and increased flexibility and productivity (Hall, 2001). Organisations in both public and private sectors increasingly view continuous learning as the key to maintaining their competitive advantage (Goldstein and Ford, 2001). E-learning is considered the appropriate solution to the call for a just-in-time accessible, ubiquitous approach to providing learning at a lower cost (Borotis and Poulymenakou, 2004). Because the ways in which the online curriculum is delivered are new – and very different from the traditional approach – however, a major factor influencing the success of e-learning is teacher training. Instructors must themselves be educated in how to take advantage of these updated teaching methods. “An ineffective teacher can waste the time of 30 or 40 students. But bad teaching online can touch thousands.

A significant body of literature (see, for example, Heinrich, 1995; Fullan, 1994; Wang, 2002) supports the view that the way teachers teach is a product of their own schooling, training and experiences. It is unreasonable to expect teachers to change their existing pedagogical approaches if they have not been provided with sufficient and appropriate training in how to integrate ICT (Information and Communication Technology) and new teaching technologies into their instruction programs.

Readiness is defined as being “prepared mentally or physically for some experience or action” (Webster’s New Collegiate Dictionary). Borotis and Poulymenakou (2004) define e-learning readiness as “the mental or physical preparedness of an organization for some e-learning experience or action”. E-Learning readiness assessment helps an organization to design e-

learning strategies comprehensively and to implement its ICT goals effectively (Kaur and Abas, 2004). Learners must also be “e-ready” so that a coherent achievable strategy, tailored to meet their needs, may be implemented (infodev, 2001). In sum, e-Learning readiness assessment provides key information to organizations to supply solutions which can cater to the specific needs of each learning group (McConnell International, 2000).

Before implementing e-learning programs, therefore organizations need to expand the usual needs assessment process by creating a high-level requirements document that includes: 1) objectives (macro organizational objectives and micro target learner population objectives) an e-learning readiness score) a list of advantages and potential obstacles to e-learning adoption; and a list of possible e-learning configurations (Chapnick, 2000). Chapnick designed a model for measuring the e-learning readiness of an organisation by answering the questions on Can we do this? If we can do this, how are we going to do it? And what are the outcomes and how do we measure them?

His proposed model groups different factors into eight categories: Psychological readiness- this factor considers the individual’s state of mind as it impacts the outcome of the e-learning initiative. This is considered one of the most important factors and has the highest possibility of sabotaging the implementation process. Sociological readiness-this factor considers the interpersonal aspects of the environment in which the program will implemented.

Environmental readiness-this factor considers the large-scale forces operating on the stakeholders both inside and outside the organization. Human resource readiness-this factor considers the availability and design of the human-support system. Financial readiness-this factor considers the budget size and allocation process. Technological skill (aptitude) readiness-this factor considers observable and measurable technical competencies. Equipment readiness-This

factor considers the question of the proper equipment possession. Finally, content readiness-this factor considers the subject matter and goals of the instruction.

Most of the existing e-readiness instruments were not developed for use in primary or secondary schools – the majority of these having been constructed for business organisations, universities or higher education institutions (Borotis and Poulymenakou, 2004; Chapnick, 2000; Hoban, Lawson, Mazmanian, Best and Seibel, 2005; Rosenberg, 2000). As e-learning is being launched in Hong Kong's schools at the system level, there is a clear need to develop a framework for e-learning readiness which is specifically designed for the needs of primary and secondary schools.

An additional factor to be taken into consideration is a body of research findings which link gender differences to levels of computer acceptance (Yuen and Ma, 2002; Russell and Bradley, 1997) – an issue which is also relevant to teachers' e-learning readiness. In his research into 462 middle and high school students, Young (2000) found significant gender differences in attitudes to computers. The male domain scale showed that boys were more likely to have claimed computers as a male area. Russell and Bradley (1997) found that male teachers reported significantly greater confidence with computers than did female teachers; and recommended that the design of teacher professional development should take gender differences into account, allowing for the particular needs of female teachers.

#### **2.4. Availability of infrastructure and ICT integration in secondary schools.**

The efficacy of ICT in higher education has been proved beyond reasonable doubt. It has been known to enhance educational opportunities of individuals and groups constrained from attending traditional universities as well as use of computers as tutors for drills and practice as well as instructional delivery (Potashnik & Capper 1998 and Font, 2002 in Umoren 2006). The

unfortunate thing is that, ICT resources are beyond the reach of teacher educators and as such, they cannot access them for the purpose of instructional development.

Not much was found on studies available on ICT availability and accessibility in colleges of education by teacher educators, but studies cited here were done in secondary schools by Pelgrum 2001, in Idoko and Ademu 2010, Eriba and Adeju 2004, in Idoko and ademu 2010, both found out that ICT availability often been one of the most important obstacles to technology adoption and integration in learning. They indicated that there is urgent need for more computers if a country is to successfully integrate ICT in public secondary schools.

Ezeoba 2007, carried out an investigation of ICT availability in schools in Onitsha on a hundred nursery school teachers which revealed that the media availability was less than 20% over 59%. It also found out that the degree of utilization in instructional delivery was that teachers used mostly books and over 60% did not use ICT resources at all.

Idoko and Ademu 2010 in an investigation of the challenges of ICT for teaching/learning as perceived by agricultural science teachers in 210 secondary schools from 3 educational zones in Kogim state also found that ICT facilities were not available in secondary schools.

Similarly Fakeye 2010 also investigated English language teachers knowledge and use of ICT, in Ibadan South west L. G. A. of Oyo state and found that availability of computers and their connectivity to the internet was nonexistent in virtually all the schools studied and utilization, which is dependent on availability, and because availability is poor, thus, usability was also found to be poor.

These findings have been made elsewhere but not in Kitui west. This study is therefore necessary to see the extent to which ICT resources are available and accessible for use in instructional delivery by teacher educators in Kitui West.

Pozo and Stull (2006) highlighted the importance of teachers' academic backgrounds and courses learned at the university in success of teachers in understanding and practice of e-learning. The teacher understanding also depends on which subjects they teach at the school (Dhariwal, 2010). According to Haveman and Wolfe, 1995, The teachers who come from underprivileged academic environments have worse understanding in ICT. Bratti et al. (2007) show that the differences in teachers' understanding can be explained by the differences between the areas in academic terms of structures, type of institutions and the individual characteristics of the teacher.

On examining the determinants of the teachers' understanding on an introductory finance course, Didia and Hasnat (1998), found that subject studies, as a measure of maturity, had a significant influence on teachers understanding. Reid (1983) focused his study on an introductory university economics course and also found that prior knowledge of the course was a significant variable, with teachers with prior knowledge performing better. Jaggia and Kelly-Hawke (2009) included variables concerning school inputs and teachers' academic background in order to test whether these two variables influence teachers understanding. They found that higher levels of education in some course did not have any consistent relationship with teachers understanding of some courses in ICT. However, academic background was clearly very important in explaining differences in learning outcomes. There seems to be a very close link between the ICT revolution and the academic variables.

Academic structure, social environment and related variables are not sensitive to ICT, yet

ICT may act on secondary education and contribute to better achievement. However, ICT may have an impact on Teachers' motivation. Becker (2000) found that ICT increases student engagement, which leads to an increased amount of time Teachers spend working outside class.

The modern teachers are essentially in a different situation from previous generations, with the large majority of Teachers having ICT skills that are of a different type from their teachers' (and parents'), often better and wider; even the time spent using a computer efficiently supports the improvement of ICT skills. It is obvious that for the younger generation using ICT is easy and ordinary, characterizing a life-style consisting of the functions of both working and learning, as well as functions of leisure time, like gaming or uploading and listening to music. Nardi(2009) call this phenomenon 'information ecology', by which they mean a system of people, practices, values and technology in a certain environment. In such an "ecosystem", technology is not in the centre but it is integrated into the existing practices and manners, and users and tools form a wide variety, complementing each other. There is a cultural gap between Teachers and teachers in terms of the digital world, and, as mentioned in Pedersen et al. (2006), very few teachers know what is going on in the digital world of a 13-year-old student (Ilomäki and Rahikainen, 2001). This differentiation and Teachers' ICT competence are challenges for teachers because the digital skills are nowadays basic skills, such as reading and writing (Pedersen et al., 2006). Digital skills divide into very different sub-skills of which only some are important and used in school. As presented above, Teachers' informal learning of ICT and experiences in using ICT are far more attractive than the school can typically offer.

Consequently, teachers face few challenges in using ICT in school. Moreover, there is probably in every school a group of Teachers with high-level expertise in ICT. These “student experts” have the kind of adaptive expertise which is useful in novel situations with technology: they learn quickly in practice, they have networks to help and give guidance, they are committed, and they are not afraid to face challenges. Only seldom can these Teachers gain from the ICT use in school, although they could be an important source of help and support at school level.

There is no need to over-romanticize the younger generations’ ICT competence but it should certainly have an effect on classroom practices and on the teacher’s role, and as such, it is a challenge to teachers; in general, a challenge that is not met, as e.g. when Erstad (2007) describes the different strategies that teachers used when facing Teachers’ better ICT competence. Some teachers competed with Teachers, to some it was a challenge for their didactic and subject-oriented skills, while others teachers simply ignored computers.

Especially Internet services challenge previous practices of working and learning. Weller (2007) suggests that the essence of the Internet is in robust, decentralized, and open communication; these technological features have also become social features and influenced the social values of the net. Many virtual communities have adopted these, but, as Weller says, these elements do not characterize learning communities, not even e-learning communities. Yet, the new generation of learners will become used (and some of them already are) to these features and they demand them also in the learning communities. The challenge is how to integrate the technological possibilities, the sophisticated communication strategies of the learners used to the Internet, and the formal structures of learning organizations.

There are some characteristics in teachers’ ICT skills which are essential when thinking about the use in school. Teachers’ ICT skills are often learned in informal learning contexts, at home



and with friends; this concerns boys especially (reported in several studies, see e.g. Eurydice, 2005). In their study, Ruthven et al., (2005) say that sometimes this informal learning means insufficient or odd ways of working, and that especially the information processing skills need support: Teachers' searching procedures are inefficient and they need more systematic guidance to develop these. Similar findings were reported, for example, in a study on sixth grade children studying science (Wallace, Kupperman, Krajcik, and Soloway, 2000): Teachers were not very effective in finding useful information (but Teachers were well engaged and involved in the inquiry and search activities). In another study on literacy skills of sixth grade children (Bowler, Largeb, and Rejskindc, 2001), the researchers found that fact finding skills were inadequate, and efficient use of the web implied a background of knowledge about computers and inquiry.

Teachers did not understand their role as knowledge makers and the need for responsible use of information. As the authors say, understanding that one must back up statements and opinions with reliable proof should be seen as a life skill, but such understanding was missing. They emphasized further that the needs and abilities of grade-six Teachers do not match the design of the Web. As a matter of fact, information searching in the Internet is not easy for older Teachers, either, as studies among upper secondary school Teachers and experienced adult graduate student Internet users showed (Kiili, Laurinen and Marttinen, 2009; Nachmias and Gilad, 2012). Most of the upper secondary school Teachers only seldom evaluated the credibility of information, and the evaluation of relevance was more important than the evaluation of credibility. Some Teachers did not find relevant and correct information, although teachers were not aware of this and they trusted the Teachers' information skills too much (Kiili, Laurinen and Marttinen, 2009).

Similarly, the search processes of adults were ineffective and often unsuccessful (Nachmias and Gilad, 2002). Lallimo, Lakkala and Paavola (2004) present in their reviews that the starting point for effective information-seeking with technological support is embedded in a sound theoretical understanding of the information seeking process, as it is intertwined with meaningful pedagogical practices. The authors put the question whether ICT presents totally new challenges for Teachers' information-seeking skills, or is it more a question of supporting teachers' basic information-seeking skills regardless of the technology.

The academic context of the learner may also affect ICT adoption at school. In affluent settings, many learners have access to computers at home, and should therefore be confident with the use of the technology within the schooling environment (Muller et al, 2007). In contrast, many learners in schools in disadvantaged areas do not have these amenities at home and, therefore, are less familiar with their use. Such learners will have a low propensity to the use of the computers (Bovee et al, 2007). This agrees with Chigona et al (2010) when they report that most of the learners in disadvantaged schools do not have computers at home so that they (learners) are introduced to such technologies for the first time at school.

Similarly, educators who come from less privileged academic settings are less likely to have computers at home. Because they are less likely to constantly use a computer, their skills are less advanced compared to more regular users. A key role of education is to empower teachers with skills and attitudes that are essential to their success in our knowledge society future. Cuttance (2001) suggests that new ways of thinking and solving problems in supportive classroom learning environments require well-developed motivation, self-regulation strategies and meta-cognitive capacities to engage Teachers successfully.

A central aim is to ensure teachers, such as those in the middle-years, acquire essential information skills (Barratt, 1998) appropriate to the knowledge society, and to nurture modes of learning, or learning styles, such as visual, auditory and kinesthetic (Hinkley, 2001) to maximize the learning potential of individual Teachers. This means that a new challenge confronting education is concerned with meeting the needs of all Teachers: personalized learning where learning is designed around Teacher's needs (Hargreaves, 2004). Hargreaves

(2004) highlights the importance of 'nine gateways' to personalizing learning-curriculum, workforce, organization, student voice, mentoring, advice and guidance, new technologies (ICT), assessment for learning and learning to learn, with each potentially "enhancing student motivation and commitment to learning" This paper is concerned with two of the aforementioned gateways to personalizing learning: student voice the use of new technologies (ICT).

It would be meaningless to say we are personalizing learning unless we involve them in the process" (Hargreaves, 2004:10). Practices that focus on designing curriculum experiences have been encouraged as central features of reform initiatives to improve the quality of learning in schools. The use of student voice benefits teachers and therefore possible changes to teaching practice and curriculum experiences. In this context, this paper considers student voice from middle-years Teachers (early adolescents), Years 5 to 9, from Victorian Government schools. The voice of Teachers is able to make a significant contribution to what they regard are important factors, particularly with the use of ICT, that affect learning.

Furthermore, the need to consider personalized learning adds to the importance of identifying with Teachers in an effort to improve student teachers understanding.

## **2.5 Availability of human resource and ICT integration in secondary school**

Kotsik, B. (2001), observed that in ICT integration, teachers have been polarized in their acceptance of new technologies. Whilst some have enthusiastically integrated computers and the Internet into the classroom, others have been cautious in their welcome, and yet some have rejected the technologies. There is a level of justifiable cynicism based on the previous experience of computer-based applications, such as Computer-Assisted Learning. Ironically, some enthusiasts have inadvertently damaged the reputation of ICTs by poor classroom practice – using the technology for the sake of its novelty.

He further observed that with the inevitable proliferation of ICTs in classrooms, the role of a teacher must change based on four key reasons including; The role of a teacher must change because ICTs will cause certain teaching resources to become obsolete. ICTs may also make some assessment methods redundant. In ICT environment, online tests can easily be used, instantly providing a teacher with a wide range of information associated with the learner's score; the role of a teacher must change in the sense that it is no longer sufficient for teachers to impart content knowledge only. It will be crucial to encourage critical thinking skills, promote information literacy, nurture collaborative working practices, and prepare children for a new world; The Internet is a network of networks providing opportunities for inquiry-based learning where teachers and students are able to access the world's largest information archives and that teachers must begin to reappraise the methods by which they meet children's learning needs and match curricula to the requirements of a human thought.

Other studies indicate whether provided by in-school staff or external service providers or both, technical support specialists are essential to the continued viability to ICT use in a given school. While technical support requirements of an institution depends ultimately on what and how

technology is deployed and used, general competencies that are required would be in the installation, operation and maintenance of technical equipment (including software), network administration and network security. Without on-site technical support much time and money may be lost due to technical breakdowns.

In the Philippines for example, one of the major obstacles to optimizing computer use in high schools has been lack of timely technical support. In some extreme cases involving schools in remote areas, disabled computers take months to be repaired since no technician is available in the immediate vicinity and so the computers have to be sent to the nearest city, hundred Kilometers away.

## **2.6 Theoretical Framework: Theory of Domestication**

Domestication is described as the process of technology adoption into everyday life. The concept of domestication was originally adapted from other disciplines such as anthropology and consumption studies, as well as from the media studies considering the context in which ICTs were experienced by the people using them (Haddon, 2006). According to Haddon (2006) the framework looks beyond the adoption and use of ICTs (as well as gratifications or benefits) to ask what the technologies and services mean to people, how they experience them and the roles that these technologies can come to play in their lives. The processes observed in this framework are about how individuals encounter technologies and deal with them, sometimes rejecting them and at other times accepting them (Haddon, 2006). Domestication consists of three main processes namely Commodification, Appropriation and Conversion (Frissen, 2000). Some researchers split the appropriation stage into Objectification and Incorporation stages, thus making four stages (Habib, 2004).

Commodification (also known as imagination) refers to the way a technological product is designed and is given an image by the users as it emerges into the public space. At this stage symbolic and functional claims about the product are noted. The images could be a result of an advertising campaign. The product is evaluated on how well it would fulfill the consumers' perceived needs (Habib, 2004). In the case where the consumer has a choice of adopting, the commodification process may affect his/her decision to acquire the product. Once purchased by an individual or an organisation, the product or object goes through a process of appropriation. At this stage the product is possessed by the owner and becomes authentic. When looking at appropriation, the objectification process is considered to examine how the product finds space and enters the geographical area of the owners.

Objectification does not necessarily mean the product is accepted by the potential adopters. Products entering the school sphere may not be immediately integrated into its pedagogy. The product is then incorporated into the daily routines of its owners. Incorporation begins by first integrating the product in temporal structures both formally (in the work schedules) and informally (in the routines and habits). In the conversion stage, the adopters of the innovation show their adoption by displaying it to the outside world physically or symbolically (Habib, 2004). In case of ICT for curriculum delivery, the display could be by individual teachers within a school environment or by the entire school as an adopter displaying to other schools. The first two stages of the domestication process are equivalent to what is normally referred to as adoption in most adoption frameworks (Pedersen and Ling, 2003). Thus, it is noted that the domestication framework allows for investigating the processes beyond the acquisition of the technology. In this review the research employed domestication framework as the lens to understand: how the educators in schools in disadvantaged communities are domesticating ICTs

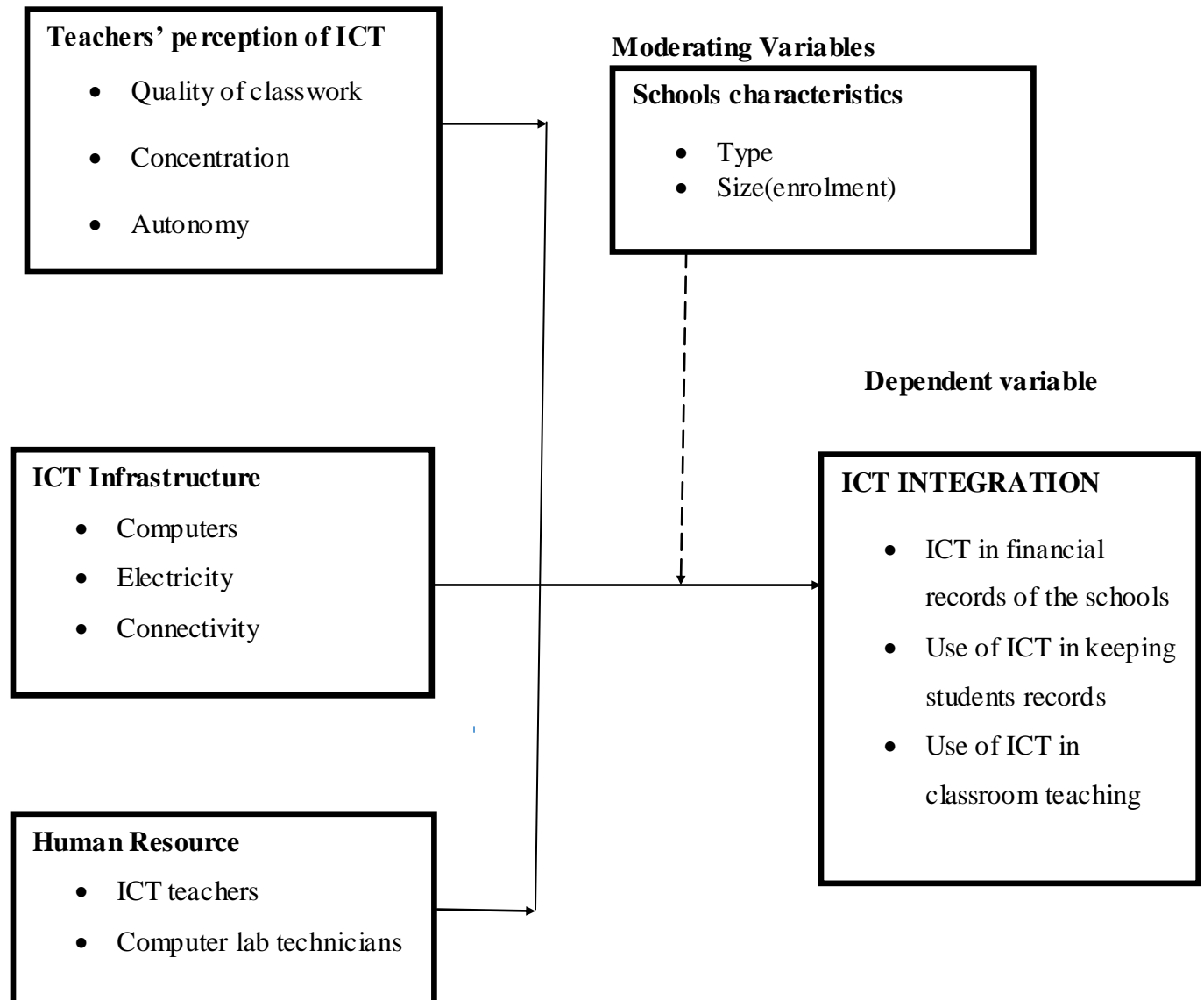
in their pedagogy; the factors affecting integration of ICTs in the schools The domestication framework has been used to study the adoption processes of a variety of technologies including personal computers, televisions and mobile phones (Perdesn and Ling, 2003).

Again it should be noted that although the framework is mainly used to study person or household adoption of technology, others recommend that it can also be used to study organizational domestication of technology-For instance, Habib (2005), used domestication theory to study the adoption of learning management system at a university.

## **2.7 Conceptual frame work**

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure subsequent presentation, Reichel and Ramey, (1987)

## Independent Variables



**Figure 1: Conceptual frame work guiding the current study**

Figure 1: describes the relationship between the variables in the study; that is the independent variables and the dependent variable. Integration of ICT in the secondary school is the dependent variable. The independent variables are; the teachers' perception on integration of ICT in secondary schools, availability of infrastructure in secondary schools and the availability of human resource on integration of ICT. There will be moderating variables which include schools characteristics.



**Teachers' perception in integration of ICT-** ICT over the last two decades the use of ICT in education to enhance learning outcome has become important. The teacher's perception towards the integration of ICT in learning influences how the integration of ICT in learning is to take place.

**Availability of infrastructure-** Integration of ICT requires accessibility of infrastructure like electricity, computer laboratories, computers, internet connectivity among others. The availability of the aforementioned influences how integration of ICT takes place.

**Availability of human resource-** in order to be able to be able to integrate ICT in learning, teachers need to be knowledgeable on the use of ICT, there should also be technicians who should help in the technical bit of the ICT. Their provision influences how integration of ICT IS to take place.

## **2.8 Chapter summary**

It is clear from the literature reviewed, and suggested by this study, that teacher intrinsic factors may impact on whether and perhaps how they use ICTs in classrooms. Aspects such as perceived usefulness, benefit or advantage, ease of use, and the ability and confidence to use ICTs, appear to be critical elements. This chapter on literature review leaves no doubt that all the factors affecting adoption of computer especially among tertiary college students should be perceived as a unit within a system for successful educational performance and qualifications. What is quite apparent is that these factors are quite many and it is only by delineating them well can specific data be obtained and analysed. However, the determination of attitude, perception and ability without using the pre-tested instruments as a foundation is deemed to fail.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

Methodology refers to the system of methods or procedures used in sampling and collecting data required for a particular research. It is also the application of the principles of data collection methods and procedures in any field of knowledge. This section describes research design, target population, sampling design and sample size, data collection methods, validity and reliability of research instruments and data analysis technique.

#### **3.2 Research design**

In this study, a descriptive research design was adopted. This design involved collection of data to obtain information that discloses existing phenomenon by asking the respondents questions. It adopted a descriptive approach since its concern is to describe the conditions that exist within the whole population (Mugenda and Mugenda, 1999). Data was collected by administering questionnaires to teachers with an aim of determining the relationship of the independent variables: teachers perception, availability of infrastructure, availability of human resource and their influence to ICT integration in secondary schools in Kitui west sub county in Kitui county, Kenya.

#### **3.3 Target Population**

According to Mugenda & Mugenda (2003), a target population is that population to which a researcher wants to generalize the results of the study. The target population was secondary school teachers from the 1 national school, 1 extra county school, 7 county schools and 24 subcounty schools which are found in Kitui West sub county. This entailed 358 TSC employed

teachers, and approximately 250 BOM employed teachers in Kitui west sub-county, Kitui County.

### **3.4 Sample and Sampling Techniques**

Mugenda and Mugenda (2003) recommends that a sampling frame is required before sampling in order to select a representative sample of 10-30% when the elements in the sample are more than 30. Singh (2007) defines a sampling frame as a list of entities from which sampling units are selected for observation in the study. This section describes the sample size and sampling procedure that was employed for this study. Systematic random sampling was used to select 100 teachers from 20 secondary schools where 5 teachers were randomly selected from every school.

### **3.5 Data Collection Instruments**

The main instrument for data collection was questionnaires. The teachers' questionnaire was used to gather information from the teachers' demographics, levels of specialization and teachers' background. Questionnaires gave respondents freedom to express their views or opinion and also to make suggestions. It was also anonymous. Anonymity helps to produce more candid answers than is possible in an interview. The questionnaires had five sections. Section A was on demographic information of the respondents, section B, C, D and E was on information concerning the factors influencing ICT integration in secondary schools with a focus on teachers' perception, availability of infrastructure and availability of human resources respectively. This instrument was used to collect data from the target population because of their ability to cover a large population within a short time (Mutai, 2006).

### **3.6 Validity of Research Instrument**

Validity is the degree to which the results obtained from the analysis of the data actually represents the phenomena under study. If such data is a true reflection of the variables, then inferences based on such data will be accurate and meaningful. The instrument was rated in terms of how effectively it sampled significant aspects of the purpose of the study. The content validity of the instrument was determined whereby the researcher discussed the items in the instrument with the supervisor, lecturers from the department and colleagues.

### **3.7 Reliability of the instruments**

Koul (1993) states that the reliability of a test refers to the ability of that test to consistently yield the same results when repeated measurements are taken of the same individual under the same conditions. Basically, reliability is concerned with consistency in the production of the results and refers to the requirement that, at least in principle, another researcher, or the same researcher on another occasion, should be able to replicate the original piece of researcher and achieve comparable evidence or results, with similar or same study population.

To establish the reliability of the questionnaire the researcher through a pilot process used split half method which involved administering the questionnaires which was subjected to a pilot study utilizing a sample of 3 randomly selected respondents. The data values collected were operationalized and the numerical scores were split into two using odd number items and even number items to get two sets of values which were correlated using Spearman's Rank correlation coefficient. A correlation of 0.75 was sufficient enough for these questionnaires to have high pretest reliability.

### **3.8 Data Collection procedures**

Data was collected from the respondents in the Public secondary schools in Kitui west Sub-county Kitui County. The sample was determined through random sampling techniques. The data was collected by the researcher so as to get first-hand experience in conducting the study. The researcher identified research assistants and trained them on data collection techniques. With the help of the research assistants, the researcher collected data from the sampled members. The researcher obtained permit to carry out the research from the National Council of Science, Technology and Innovation.

### **3.9 Data analysis Techniques**

Data was analyzed descriptively. Data analysis was facilitated by use of SPSS (Statistical Package for Social Sciences version.17.0) Computer Package. Quantitative methods of data analysis employing descriptive statistics was employed in analyzing quantitative data where frequencies and proportions were used in interpreting the respondent's perception of issues raised in the questionnaires so as to answer the research questions. Descriptive statistics such as frequency distribution, percentages and weighted means were calculated.

### **3.10 Ethical consideration**

Ethics involves the study of right and wrong conduct. Proper care was taken to ensure that all information from the respondents was treated with maximum anonymity. To increase the degree of confidence among the respondents, no names or personal identification details were required for the purpose of filling in the questionnaires. The sources of data and other information for literature review were acknowledged effectively in the study.

### 3.11 Operational definition of variables

There are two variables that were considered in this study, the independent and dependent variables. The information is shown in the table below.

**Table 3.1: Operationalization of Variables**

Objectives	Variables	Type of Statistic	Indicators	Measurement scale
To determine how teachers perception influences integration of ICT in secondary schools, Kitui west sub county	<b>Independent</b> Teachers perception on ICT integration <b>Dependent</b> ICT integration in secondary schools	Descriptive	- Quality of classwork - level of concentration by students -level of autonomy by students	Nominal  ordinal
To establish how availability infrastructure influences integration of ICT in secondary schools, Kitui west sub county	<b>Independent</b> Availability of infrastructure to integration of ICT <b>Dependent</b> -ICT integration in secondary schools	Descriptive	-availability of computer laboratory and computers in the school -Availability of internet connectivity in the school. -Availability of electricity in the particular secondary schools.	Nominal  ordinal

<p>To establish the influence of the availability of human resource to ICT integration in secondary schools, Kitui west sub county</p>	<p><b>Independent</b>  -Availability of human resource to ICT integration in secondary schools  <b>Dependent</b>  ICT integration In secondary schools</p>	<p>Descriptive</p>	<p>-availability of ICT teachers employed by the TSC  -Availability of computer laboratory technicians  -Availability of teachers</p>	<p>Nominal  ordinal</p>
--	--	--------------------	---	---------------------------------

## **CHAPTER FOUR**

### **DATA ANALYSIS, PRESENTATION AND INTERPRETATION**

#### **4.1 Introduction**

This chapter provides an analysis of the data collected, their interpretation and presentation. It gives a detailed analysis of the coded data in tabular form showing their frequencies and percentages. Interpretation of the analyzed data is also provided. The chapter also provides details on the response rate, demographic characteristics and information on the study variables as collected from the field. The data collected using questionnaires was analyzed using the Statistical Package for Social Sciences (SPSS).

#### **4.2 Questionnaire Return Rate**

The purpose of this study was to investigate the factors influencing the ICT integration into the secondary schools in Kitui West Sub County in Kitui County. The research targeted 100 respondents who in one way or the other were involved in ICT integration programs in the school. Out of the 100 questionnaires which were administered, only 83 were returned which represented 83% response rate. This is a satisfactory response rate to be able to make conclusions for the study. According to Mugenda & Mugenda, (2003), a response rate of 50% is adequate for analysis and reporting, a response rate of 60% is good and a response rate of 70% and over is very good. This implies therefore that the achieved rate was representative of the target population and was adequate and good enough to enable the researcher generate a conclusive report.



### 4.3 Demographic Data

The research focused on four aspects of the respondents' demographics; level of education, experience in work and their gender. The following section presents demographics of the respondents under study.

#### 4.3.1 Education Level

A majority (69%) of the respondents were degree holders, (17.3%) were diploma holders while 13.6% of the members were masters' degree holders. Table 4.2 represents the educational level of the respondents.

**Table 4.2: Level of Education**

<b>Level</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
Degree level	56	69.1
Masters level	11	13.6
Diploma level	14	17.3
<b>Total</b>	<b>81</b>	<b>100</b>

The level of education and training of the respondents was necessary in enabling them to be able to plan, design, implement and sustain the ICT integration process. This reflects better ability to make quality ICT integration decisions since members should fully understand this process.

#### 4.3.2 Years of Experience

Various members had served in school for different lengths of time in terms of years. It was found that most of those involved in the ICT process in the schools, which is 57.8% of the respondents had served between 4 years to 6 years in school.

**Table 4.3: Years of Experience**

<b>Years of Experience</b>	<b>Frequency(f)</b>	<b>Percentage (%)</b>
Less than 3yrs	21	25.3
Between 4yrs-6yrs	48	57.8
More than 6yrs	14	16.9
<b>Total</b>	<b>83</b>	<b>100</b>

This meant that majority of members had experience in ICT program and therefore could competitively recommend the areas for adjustment if need be. More than 25% of members had served for less than three years while 16.9% of members had served for a period exceeding 6 years in the process. The participation of respondents in ICT integration process would not only update their skills as well as how to handle the process with integrity but also on emerging issues and the changing trends in the field of technology.

#### **4.3.3 Distribution of Respondents by Gender**

On the gender of respondents, 59% of the respondents were male while 41% of the respondents were female.

**Table 4.4: Gender of the Respondents**

<b>Gender</b>	<b>Frequency(f)</b>	<b>Percentage(%)</b>
Male	49	59.0
Female	34	41.0
<b>Total</b>	<b>83</b>	<b>100.0</b>

Gender mainstreaming in school members was also a variable which was captured in the questionnaire. From the data, male gender was more trusted to handle ICT matters as displayed in the table 4.4.

#### 4.4 The influence of Teacher’s Perception on ICT integration

To ascertain the perceptions of teachers on the use of ICT in secondary school, a five point scale was used. Teachers were provided with statements and asked to choose the level of agreement by indicating that they: Strongly Agree=4, Agree=3, Disagree=2 or Strongly Disagree=1. The findings are summarized in Table 4.5.

**Table 4.5: Teachers Perception**

Statement	N	Mean	Std. Deviation
Students concentrate more on their learning when ICT is integrated in; their lessons	83	3.35	.8180
Students feel more autonomous in their learning with ICT	81	3.32	.78783
Students understand more easily when ICT is integrated in their learning	78	3.38	.80953
Students remember more easily what they have learnt when ICT is integrated	83	3.72	.45029
ICT facilitates collaborative work between students	83	3.68	.46664
ICT improves the class climate (students more engaged, easier control of the class)	83	3.72	.45029
Valid N (listwise)	76		

Results from Table 4.4 support the use of computers improves classroom climate and that students remember more easily what they have learnt when ICT is integrated as displayed by a mean of 3.72 each. ICT facilitation of collaborative work between students was accounted for by the mean of 3.68. This may be because they are in support of the policy and are willing to implement it. Additionally teachers are certain that using computers and internet enhances students' concentration on their learning (mean 3.35). Students also feel more autonomous in their learning with ICT as indicated by a mean of 3.32. Easy understanding was also enhanced through integration of ICT in learning (mean of 3.38).

From these findings, majority of the respondents felt that students can concentrate more on their learning when ICT is integrated in their lessons. Most of the respondents attributed this to the fact that learners tend to be more attentive when they are actively involved in the process of learning like it is in the case where ICT is integrated. This provokes the positive attitude of teachers towards ICT integration.

Most of the respondents also felt that students become more autonomous in their learning when ICT is integrated. They attributed this to the fact that when students are involved in doing activities when learning, they tend to develop confidence hence autonomy. This explains the positive attitude of teachers towards ICT integration in secondary schools.

Majority of the respondents also felt that students tend to remember easily what they have learnt when ICT is integrated in learning. They attributed this to the fact that the more senses are used in learning, the easier it becomes to remember. This provokes more teachers towards positivity to ICT integration in secondary schools.

It was also evident from the findings that ICT facilitates collaborative work between students and also improves classwork. The respondents attributed this to enjoyable learning when ICT is integrated. This in return provoked a positive attitude by teachers towards ICT integration in secondary schools in Kitui West Sub County.

Generally from these findings also it is evident that respondents were positive towards the ICT integration in secondary schools.

The certainty of the teachers shows that the use of ICT accords them some gains which drive towards adoption of ICT in administration. The findings also reveal that perceptions of teachers on the use of ICT tools in secondary school administration is generally positive, with the teachers welcoming it for speed and convenience.. Using ICT, the school administration can document all filed or boxed information for speedy access. With a networked system every teacher can access relevant information conveniently at the comfort of the staff room.

#### **4.5 The influence of Availability of infrastructure on ICT integration**

The researcher sought to find out issues regarding availability and access to ICT infrastructure and their influence on ICT integration into teaching and learning. The following statements relating to ICT infrastructure adequacy and internet connection installation were provided to the respondents. Table 4.6 shows the responses.

**Table 4.6: Availability of ICT Infrastructure Statement**

<b>Statement</b>	<b>Yes (%)</b>	<b>No (%)</b>
Students are equipped with enough computers and/ or internet	0	93.2
Are the computers in your school connected to LAN/WIFI/ internet	21.7	78.3
Only the teacher uses a computer and/ or internet	17.4	82.6
Both the teacher and students use computers and/ or internet	11.6	88.4
Has the school provided you with a laptop or tablet PC for your use this year?	6.2	93.8

The study reveals that students are not equipped with enough computers and internet as displayed by 93.2% of the respondents. Another 78.3% indicated that connection of computers to LAN/WIFI/ internet was also inadequate. The study also reveals that 82.6% said no, meaning that not only the teacher uses a computer or internet in the school. Only 17.4% said yes that both the teacher and students uses computers and or internet as indicated in the table 4.5. Concerning whether the school has provided teachers with a laptop or tablet PC for your use this year, 6.2% indicated yes while 93.8% indicated no.

From these findings it is evident that there are no enough computers. Some respondents also reported that they totally do not have computers in their schools even to do vital tasks like typing and processing of exams. This forces the school to incur extra costs of processing exams from

cyber cafes. This qualifies an evidence that infrastructure is very vital for ICT integration in secondary schools in Kitui West sub county

Additionally the respondents also felt that internet connectivity to the available computers was very vital. This was supported by their feeling that it would help them get teaching materials online, for example K.C.S.E past papers, additional notes from Google, they can share ideas with teachers countywide concerning their subjects especially through Telegram and whatup groups. Lack of internet connectivity in these schools therefore, is really a negative influence towards ICT integration in secondary schools in Kitui West Sub County.

Additionally, the respondents were asked on which conditions they had access to various ICT tools in teaching in their classes. Their responses were recorded in Table 4.7 as follows.

Table 4.7: Conditions of Access to ICT Infrastructure

Statement	No		Access on		Permanent	
	Access		demand		access	
	F	%	F	%	F	%
Desktop computer without internet access	49	69.0	11	15.5	11	15.5
Desktop computer with internet access	52	73.2	15	21.1	4	5.6
Non- internet connected laptop, tablet PC or notebook computer	45	70.3	12	18.8	7	10.9
Interactive white board	55	83.3	11	16.7		
Computer laboratory	56	75.7	4	5.4	7	9.7

Table 4.7 shows that 69% of the respondents had no access to desktop computer without internet while 15.5% each had access on demand and had permanent access respectively. Also, 73.2% had no access to desktop computer with internet access, 21.1% had access on demand while 5.6% had permanent access. Additionally, 70.3% had no access to non- internet connected laptop, tablet PC or notebook computer, 18.8% had access on demand and 10.9% had permanent access. The findings further indicate that 83.3% and 16.7% had no access and had access on demand respectively to interactive white board. Finally, 75.7% of the respondents had no access to computer laboratory, 5.4% had access on demand while 9.7% had permanent access.

From the above findings it is evident that internet connectivity is significantly lacking in secondary schools in Kitui West Sub County, hence significantly influencing ICT integration in the secondary schools in Kitui West Sub County.

The respondents also noted with a lot of concern that where there were computer laboratories, they were only used by computer teachers and students who take computer studies as a subject. This denies the other teachers who teach other subjects access to computers. Students who don't take computer studies as a subject are also denied that access to computers. This has really affected ICT integration in secondary schools since computer is now conceived as a thing of those who take Computer studies hence undermining the efforts to ICT integration in secondary schools in Kitui west Sub County.

The respondents also felt that the available computer laboratories were small in size. They noted that they were so small that they would not even accommodate the computer studies students. This is really a challenge and influences so much on ICT integration in secondary schools in Kitui West sub county since it denies all students an access to the computer laboratories.



#### 4.6 The influence of Availability of Human Resource on ICT integration

The third research objective sought to establish the availability of human resource on ICT integration in secondary schools in Kitui West sub county, Kitui County. The data collected was analyzed and the results obtained by cross tabulating them with the respondents' response and the results were summarized in Table 4.8.

**Table 4.8: Availability of Human Resources for ICT Integration**

Statement	Yes (%)	No (%)
In your school there are computer teachers employed by the TSC	10.4	89.6
There is a computer laboratory technician in your school	5.0	95.0
As a teacher you have attended a course on internet use and general applications in ICT in the past two years	18.2	81.8
As a teacher you have attended an induction course on use of computer equipment in the past two years	10	90
As a teacher you have attended subject specific training on ICT integration in teaching in the past two years	15.6	84.4

The data obtained revealed that 89.6% of the schools did not have computer teachers employed by TSC while only 10.4% of the schools had. Another 95.0% said that there was no computer laboratory technician in their school 81.8% said they had not attended course on internet use and general applications in ICT the past two years. The study further showed that only 10% of the respondents had attended an induction course on use of computer equipment in the past two years while 90% had not attended such induction course. As concerning training on ICT integration in teaching, only 15.6% had attended such training while 84.4% had not attended.

From the findings, it is evident that there are only a few teachers of ICT in secondary schools in Kitui West Sub County. This influences the ICT integration since it is very difficult to achieve ICT integration without the teachers in place.

There was also evident lack of computer laboratory technician in most schools. This is very dangerous since in most cases respondents felt that whenever they use ICT in classroom teaching they end up wasting a lot of time dealing with the technical bit of the computers other than the targeted classwork. This technical bit would have otherwise been done by the computer lab technician hence enhancing ICT integration. It is therefore evident that computer laboratory technicians are very vital in ICT integration.

Majority of the respondents also reported that they had not attended an induction course on ICT use in the past two years. This greatly affected their ability to integrate ICT in secondary schools in Kitui West Sub County.

The respondents also noted with a lot of concern that they had not received an induction course which was subject specific to help them integrate ICT in their teaching. Most teachers especially in Kiswahili felt that a serious training was required to help them integrate ICT in this subject they taught since it was a requirement.

**CHAPTER FIVE**  
**SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND**  
**RECOMMENDATIONS**

**5.1 Introduction**

This chapter presents and discusses briefly the summary and the findings of the study. The chapter further makes conclusions and recommendations based on the findings of the study as well as suggestions for further studies.

**5.2 Summary of Findings**

The position taken by Information and Communication Technology (ICT) in education sector is critical for enhancing teaching and learning. ICT has seamless potential to integrate; political, economic and social aspects of developing economies thus demolishing the barriers created by time and distance. However despite recognition of its role by government through national ICT policy, e-government and ICT for education strategies in improving effectiveness and efficiency in service delivery, its adoption in secondary schools has taken a snail's pace. This study investigated the factors influencing the ICT integration into the secondary schools in Kitui West Sub County in Kitui County. The data was analyzed using Statistical Package for Social Sciences (SPSS) whereby Descriptive Statistics such as frequency distributions, percentages, means and standard deviations were utilized. This study was guided by three important research questions.

### **5.2.1 Teachers' Perception and ICT integration**

From the analyzed data related to this objective, majority of respondents supported that the use of computers improves classroom climate and that students remember more easily what they have learnt when ICT is integrated as displayed by a mean of 3.72 each. ICT facilitation of collaborative work between students was accounted for by the mean of 3.68. Additionally teachers were certain that using computers and internet enhances students' concentration on their learning. Students also felt more autonomous in their learning with ICT and that their easy understanding was enhanced through integration of ICT in learning

### **5.2.2 Availability of Infrastructure and ICT integration**

This objective sought to determine how availability of infrastructure influences the ICT infrastructure in secondary schools in Kitui West Sub County in Kitui County. The study reveals that students are not equipped with enough computers and internet as displayed by more than 93% of the respondents and that connection of computers to LAN/WIFI/ internet was also inadequate. The study also reveals computer usage among the teachers was low where the school has not provided teachers with a laptop or tablet PC for their use. The study also revealed that most teachers had no access to desktop computers, internet as well as computer laboratory which was represented each by a percentage of more than 60.

### **5.2.3 Availability of Human Resource and ICT integration**

Finally the study also wanted to find out availability of human resource in the ICT integration in secondary schools in Kitui west Sub County in Kitui County. Concerning this, 89.6% of the schools did not have computer teachers employed by TSC, 95.0% said had no computer laboratory technician in their school while 81.8% of the teachers had not attended course on internet use and general applications in ICT the past two years. Additionally, the study further

showed that only few respondents had attended an induction course on use of computer equipment as well as ICT training in the past two years.

### **5.3 Discussion of Findings**

The purpose of this study was to investigate the factors influencing the ICT integration into the secondary schools in Kitui West Sub County in Kitui County. This section reviewed each objective in relation to the findings and other related literature.

#### **5.3.1 Teacher's Perception and ICT Integration**

From the research findings, teachers' perception of ICT integration has a bearing on the extent of their integration of ICT in teaching and learning. Perception of ICT integration can contribute up to 6.9% of ICT integration in teaching and learning. According to Carlson and Gadio (2002), teachers are the key to whether technology is used appropriately and effectively. Therefore, training interventions that focus on promoting ICT integration in teaching and learning should incorporate components that promote positive teacher perception of ICT integration. This perception also tends to vary among teachers teaching different subjects with science and mathematics teachers having highest positive perception maybe due to higher competency skills as observed in the study.

The findings also reveal that perceptions of teachers on the use of ICT tools in secondary school administration is generally positive, with the teachers welcoming it for speed and convenience. These findings concur also with Hayes (2007) who argues that school administrators view ICT as godsend due to its ability to support their administrative and management duties, the level to

which ICT infrastructure has reduced administration and management workload is extensive. Using ICT, the school administration can document all filed or boxed information for speedy access. With a networked system every teacher can access relevant information conveniently at the comfort of the staffroom

### **5.3.2 Availability of Infrastructure and ICT Integration**

In Kitui West Sub County, ICT infrastructure influenced ICT Integration in teaching and learning since the analysis showed that schools did not have adequate resources and this factor influenced ICT Integration. This is as confirmed by Olatunde, (2010) who asserted that resources are vital factors that make a system function. It is the provision of these resources that determine the success or achievement of the set goals of the system (Olabanji & Ekundayo, 2010). It was not that computer as ICT tools were often used to carry out their functions but generally applied in administrative duties. The overall use of ICTs was notable. This is in tandem with Kathy et.al (2008), who said that ICTs are becoming more popular, allowing communication even with users. It also enables sharing of files, comments on changes and posting relevant requests for information leading to efficiency in communication with stakeholders. This is in line with Oladapo (2006) that organizations are able to access and exchange information where there is internet connectivity.

As most schools are not designed to include ICT, redesigning takes time and expense (Eadie, 2000). Even the physical security of hardware and software and of students taking computers home have provided challenges for the physical structures as well as the practices of most schools. The process of redesigning the classrooms to accommodate ICT Integration has turned

out to be a major hurdle for many schools and as a result barred many schools from achieving ICT Integration.

### **5.3.3 Human Resource Availability and ICT Integration**

Human resource capacity in Kitui West Sub County generally lacked in terms of training in ICT. The use of computers and ICTs for delivery of instructions and enriching the learning processes was clearly not widespread in the area. Effective teaching practices ensure effective learning takes place which generally results in independent, self-motivated learners ( Waimsley, 2010). Cradlers (2002), gave some requirements for effective use of ICT in education and among them were providing both in-service and pre-service training, providing time for teachers to plan and learn how to integrate technology and providing for ongoing technical support for technology use. Clearly a vast majority of the respondents who participated in this study indicated there being a great need to enable their capacity in terms of training. For teachers who are already in the education system, in-service training would greatly improve their capacity in the handling of the ICT integration.

However, it's worth noting that ICTs impacts positively on teaching and learning processes in Public Secondary Schools, even though the impacts have not been maximized. This may be attributed to the fact that most school leaders, Heads of departments as well as subject teachers as end users to ICT lacked adequate training on ICT use. Teachers need to continually work at updating their skills and knowledge in the operation and use of ICT. This is in addition to their need to be up-to-date with the curriculum content pedagogy. It is therefore important that they be supported very carefully in practical and motivating ways. A number of other studies have found

out that, personal access for teachers to a computer for the purpose of preparation and planning is one of the strongest influences on the success of ICT training and subsequent classroom use (Office for Standards in Education, 2002).

The research also indicated that teachers have low competence in ICT in teaching and learning. This is consistent with Preston (2000) who concluded that lack of technical support to be key inhibitor to the use of ICT in classroom. Consequently, the school management, education managers and policy makers should be made aware of this low competence of teachers in ICT as it is likely to derail the government policy of full integration of ICT in education.

#### **5.4 Conclusions of the Study**

The study that was carried out to investigate the factors influencing the ICT integration into the secondary schools in Kitui West Sub County in Kitui County. Based on the study findings, it can be concluded that.

The perceptions of teachers on the integration of ICT in secondary schools are generally positive, with the teachers hailing its use for speed and convenience. Despite the challenge of inadequate facilities, teachers are enthusiastic and eager to use ICT in the learning process though they feel that they require further training in ICT and technical support skills.

The study also concludes that inadequate ICT Infrastructure and inaccessible use of tools influenced the ICT Integration in learning. The researcher further concludes that the pace of ICT integration in secondary schools in Kenya is very slow, as characterized by inadequate infrastructure, lack of psychological and technical readiness and insufficient policy guidelines. This study investigated the availability of resources and facilities for ICT integration in the



secondary school curriculum in Kitui County in Kenya. The findings indicated that most schools were connected to electricity. However, majority of the schools lacked ICT resources such as laptops, computers, whiteboards, CD-ROMs and anti-viruses.

One of the main problems affecting ICT integration in the schools in the Sub County is the lack of internet connectivity in the schools. Laptops were available in some of the schools but were not being used by teachers in direct instruction. They were mainly used in the storage of school records, teacher plans, and examination questions and for examination registration exercises. It can also be concluded that human resource capacity significantly influenced ICT Integration in teaching and learning. This is because the implementers (teachers) lacked adequate ICT skills.

### **5.5 Recommendations of the Study**

It is evident that ICT integration into teaching and learning in public secondary school plays a major role in the teaching and learning institutions. In practice ICT integration has not had much support in capacity building. The study found out that ICT Integration in teaching and learning is a continuous process but not an occasion. Therefore, following the findings of this study the researcher recommends that:

1. That training interventions for teachers be organized in the use of ICT tools in teaching and learning. These training interventions should focus on promoting ICT integration in teaching and learning and should incorporate components that promote basic competence in use of ICT tools as they form the foundation for ICT integration in teaching and learning. Such trainings should be subject specific and have a component that would assist in changing the low perception of teachers on ICT integration.

2. The Teachers Service Commission County Director should organize an ongoing training for the Principals, Heads of Departments and other teachers in order to have their capacity built over a long duration but not on a one off workshop. The Counties, also, should consider acquiring ICT infrastructure for the school in their regions. It is important to carry out training needs assessment before carrying out training on the principals and teachers to conduct ICT integration. The training will raise the levels of ICT Literacy among the teachers for purposes ICT integration in teaching and learning in public secondary schools. Since various types of training have different level of influence in performance, it is always important to rank trainings in order of influence and concentrate more on those that have highest performance output.
3. School administrators should take keen interest in encouraging all members of teaching and non-teaching staff to have the right perception and make use ICT in teaching and learning process. They should ensure that they organize ICT training programmes meant to equip all members of their administrative structure with ICT related skills to be able to apply ICT dynamically in various areas of administration.
4. From the research findings and the conclusions the study recommended that the school community and the government should partner in provision of ICT resources to facilitate integration of ICT in the primary school curriculum in the schools. The vision of the Government of Kenya is to facilitate ICT as a universal tool for education in schools. In order to achieve this vision, all schools require adequate resources and facilities for ICT integration in the curriculum.
5. This study recommends to the ministry of education to improve the current ICT strategy for education to make it a three tier policy frame work to address specific needs of

individual levels of institutions., with first tier being the policy for tertiary institutions, second for secondary schools and finally for primary schools. These levels in education sector have different needs, both in their core duties, infrastructure and human capacity requirement and thus need to have specific targets, mechanisms and timelines addressed separately for Education Sector to attain any tangible and observable ICT diffusion levels.

### **5.6 Suggestions for Further Study**

The ICT integration in teaching and learning is of critical importance in a school set up. This study was conducted on public secondary schools. The researcher recommends the following:

- i. Similar study to be carried out in the County involving Factors Influencing ICT Integration in Private Secondary Schools for comparison purposes.
- ii. Similar study should be carried out in other sub counties in other Counties for comparison purposes.

## REFERENCES

- Adeya, N. (2002). ICTsand Poverty: (A Literature Review), UNESCO. Retrieved from <http://www.idrc.ca/en/e-v-24718-201-1> on 20th March 2012
- Afshari M., Bakar K. A., Bahaman W. S. L., Samah A.& Fook F.S. ( 2006 ): School Principal as a Change Facilitator in ICT Integration, Faculty of Educational Studies, Universiti Putra Malaysia pg.645-650
- Amutabi N. (2010), *Political cost of ICT in learning in Kenya*. Journal of educational management.
- APR/MAY 2011): Second annual progress report on the Implementation of the First Medium Term Plan 2008-2012) Kenya Vision 2030 .Government printers, Nairobi
- Athanasios Nikas (2003). *Network Information Infrastructures in the construction Industry: Emergence and impact on work and management arrangements*. Department of Management Science and Technology: Athens University of Economics and Business
- Avgerou C. (2001). The significance of context in information systems and Organizational Change. *Information Systems Journal*. Volume 11, Issue 1, January 2001, Pages 43 – 63.
- Ayere M. A., Odera F. Y. and Agak J. O.(2010): E-learning in secondary Schools in Kenya: A Case of the NEPAD E-schools. *Educational Research and Reviews* Vol. 5 (5), pp. 218-223, retrived from <http://www.academicjournals.org/ERR2> on 22nd March 2012
- Balanskat, A., Blamire, R., & Kefala, S. (2006). The ICT impact report: A review of studies of ICT impact on schools in Europe, Brussels: European Schoolnet. Retrieved 2nd April 2012 from [http://ec.europa.eu/education/pdf/doc254\\_en.pdf](http://ec.europa.eu/education/pdf/doc254_en.pdf)
- Barak, M. (2006): Instructional principles for fostering learning with ICT: Teachers' perspectives as learners and instructors. *Education Information Technology*, 11:121 -135, DOI 10.1007/s 11134-006-7362-9.
- Bartolini M. and Borba M. (2010), *The Roles of Resources and Technology Education*. ZDM Mathematics Education.
- Bell J. (2005) *Doing your Research Project*. Berkshire: Open University Press.
- Best K. and Kahn J. (1998). *Research in Education*. Boston.
- Bingimlas K. A. (2009): Barriers to successful ICT integration of ICT in in teaching and learning environments. ( A review of Literature). RMIT University, Australia.
- Blass E. and Davis A. (2003). Building on Solid Foundations: Establishing criteria for e-learning development. *Journal of Further and Higher Education*, 27 (3).
- Borg, and Gall (1987). *Educational Research. An introduction* (5th edition) New York Longman
- Brock, C. J. (2000). *Surviving Change: A Survey of Educational Change Models*, Syracuse, NY: ERIC Clearing House on Information and Technology

- Broos, A. (2010), Information and Communication Technologies (IT) in schools. *Cyber psychology and behavior*
- Brown, C. (2002), *Electronic Portfolios in Education- distinguishing between the process and product*. Chesapeake, VA:AACE.
- Bulgelman y. (2006) *Information, Society and Technology*. New York.
- Carlson, S.& Gadio C. T. (2002): Teacher professional development in the use of technology. Paris and Washington, DC
- Carlson, S.& Gadio C. T. (2002): Teacher professional development in the use of technology. Paris and Washington, DC
- Creswell, J. W. (2009): *Research design: Qualitative, quantitative, and mixed approaches* (3rd ed.). Thousand Oaks: Sage
- Cartelli A. (2006), *Teaching in the knowledge society: new skills and instruments for teachers*. Information science publishing: Hershy, USA.
- Cawthera, A. (2001), *computers in secondary schools in developing countries: costs and other issues*. Department for international development (DFID) UK.
- Clariana B. and Schultz W. (2011), Content achievement in computer –based instruction. *Journal of computers and science teaching*.
- Cohen G., Salomon I. & Nijkamp P. (2002). Information Communications Technologies (ICT) and transport: does knowledge underpin policy? *Telecommunications Policy* Volume 26, Issues 1-2 , February-March 2002, Pages 31-52.
- Collins B. A., Kass H. and Kieren T. (2009), National trends in computer use among Kenyan tertiary college students: implications for cross- cultural analyses. *Journal of Research on Computing in Education*.
- Collins B. and Jung S. (2008), *uses of information and communication technologies in teacher education*. London: RoutledgeFalmer
- Cox, M. (2000): Information and communications-technologies: their role and value for science education. In "Good practice in science teaching: What research has to say". Open University Press, p. 190-207
- Dalton. D. W. (1989). Computers in the schools: A diffusion/adoption perspective. *Educational Technology*, 29 (11), 20-27
- David k. Mbow A. and Paul R. (2003) *Application of ICT in secondary schools: A Kenyan experience*. Schoolnet Africa (online)
- Davis J., Foxall G. and Pallister J. (2002). *Beyond the intention-behavior mythology: An integrated model of recycling*, *Marketing Theory* 2 (1), pp.29-113.
- Decosas L. (2001) Computer attitudes as a function of age, gender and attitude, and developmental status. *Journal of Educational Computing Research*.

- Dugdale S. and Mi- Kyung J. (1998), computer course enrolment, home computer access, and gender: Relationships to high school students' success with computer spreadsheet use for problem solving in pre-algebra. *Journal of educational Computing Research*.
- Duncan, N.B. (1995). *The Invisible Weapon: A Study of Information Technology Infrastructures as a Strategic Resource*. Dissertation, Texas A&M University.
- Duncombe, Richard, and Heeks, Richard (1999), *Information, ICTs and Small Enterprise: Findings from Botswana*, Institute for Development Policy Management, University of Manchester, United Kingdom: Manchester
- Eadie, G.M. (2000). *The impact of ICT on schools: classroom design and curriculum delivery*: Winston Churchill Memorial Trust.
- Earl, M.J. (1989). *Management Strategies for Information Technology*. United Kingdom: Prentice-Hall.
- El-Shinnawy, M., and Vinze, A. S. (1997), Technology, culture and persuasiveness: A study of choice-shifts in group settings. *International Journal of Human-Computer Studies*, 47, 473-496.
- Ely, Donald P. (1999) Conditions that facilitate the implementation of education technology innovations. *Educational Technology*, 38(6), 23-26.
- European Commission (2005): Implementing the Education and Training 2010 Work Programme. European Commission. Retrieved on 20th February 2012 from [europa.eu.int/comin/education/news/what/index\\_en.html](http://europa.eu.int/comin/education/news/what/index_en.html)
- Farrel G.(April 2007): Survey of ICT and Education in Africa: Kenya Country report.
- Fishbein M. and Ajzen, I., 1989. *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Fraser J (1986), Perceptions of classroom climate in a communicative computer supported approach in writing instruction. *Journal of research and development in education*.
- Friedman. A., et al.( 2009):National educational technology standards and technology beliefs and practices of social studies faculty: Results from a seven-year
- Gachomba, P. K., (2012) Constraints experienced by secondary schools' principals in public procurement and their implications on financial management in Kiambu West District, Kenya. Retrieved from <http://irlibrary.ku.ac.ke/etd/handle/123456789/2987>
- Gareis K. (2006), *Benchmarking lifelong learning and E- learning in regions: measuring what really counts*, paper for the E- challenges 2006 Conference, 25-27 October, Barcelona. <http://www.euser-eu.org>.
- Gattiker U. (2009), *where do we go from here? Direction for future research and managers*. In U. Gattiker (Ed), *women and technology*. New York: Walter de Gruyter.
- Georgia H. (2011), *Teens and Technology: Preparing for the future*, New Directions for Youth Development.

- Guha S. (2007) Are we all technically prepared? Teachers Perspectives on the causes of comfort or discomfort in using computers at elementary grade teaching. *Annual meeting of the national association for the education of young children Atlanta GA*
- Harrison W., Rainer K. and Hochwarter A. (2009), Gender differences in computing activities. *Journal of Social Behavior and Personality*.
- Hayes, D. N. A. (2007). ICT and learning: Lessons from Australian classrooms. *Computers & Education*, 49, 385-395.
- Helios (2005), Is learning improving access to learning opportunities? Helios thematic report No. 1 May 2005, MENON Network EEIG, Brussels.
- ICT in Education in Kenya, accessed on 10th February 2012 from [http://inforesources.assystuc.com/infodevfiles/resource/InfodevDocuments\\_409.pdf](http://inforesources.assystuc.com/infodevfiles/resource/InfodevDocuments_409.pdf)
- Kenyanya, N., Francis, W., & Onyango, O., (2010) *Evaluation of the influence of the Public Procurement Regulations on the procurement practices among secondary schools in Mosoch division of Kisii County, Kenya* aibuma2011\_submission
- Kothari R. (2005), *Research Methodology: Methods and Techniques*. Daryaganj, New Delhi: New Age International (P) Ltd.
- Liverpool L. S. O. (2009), *Information and Communication technology in teacher education*. In teacher education in Nigeria: Past Present and Future- Proceedings of the First Teachers' Summit. Kaduna: National Teachers' Institute.
- Mishra p. and Koehker m. (2006), *Technological pedagogical Content Knowledge: a framework for teacher knowledge*. Teachers college record.
- Mugenda O.M. and Mugenda A.B. (1999) *research methods- Quantitative and Qualitative Approaches*. Nairobi: Act Press.
- Mugenda, O.M. and Mugenda, A.G. (2003). *Research Methods: Quantitative and Qualitative Approaches*: Nairobi. Acts Press
- Okwako K. (2006), *Teachers discovering computers- integrating technology into the classroom*, Boston, MA.
- Oladapo, A. (2006): *Impact of ICT on professional practice in Nigerian Construction Industry*. Obafemi Awolowo University, Ne-ife Osan state.
- Oxford English Dictionary Online (2007) Oxford University Press.
- Preston, C. Cox, M. & Cox, K. (2000). *Teachers as innovators: an evaluation of the motivation of teachers to use Information and Communications Technology*. Report summary. South Croydon, Miranda Net.
- Rogers, E.M. (2003). *Diffusion of innovations*. 5th edition. The Free Press. New York.

## **APPENDICES**

### **APPENDIX I: INTRODUCTION LETTER**

NANCY M. MUTHAMI

P.O. BOX 432,

KITUI.

Dear Sir/Madam,

#### **RE: RESEARCH QUESTIONNAIRE**

I am a student at the University of Nairobi pursuing a Master's degree in Project Planning and Management. My research project title is "Factors influencing ICT integration in secondary schools: A case of Kitui West Sub-county, Kitui County, Kenya".

In order to gather data for the research, I have prepared a questionnaire to be filled in secondary schools within Kitui West Sub-county. I kindly request your assistance in this academic endeavor by filling this questionnaire. I would like to emphasize that your responses are extremely valuable to me and I would greatly appreciate you answering all the questions.

I assure you that the information provided here will be held in anonymity.

Thank you in advance for your cooperation.

Thank you.

NANCY MUKAI MUTHAMI



## APPENDIX II: QUESTIONNAIRE FOR TEACHERS

This questionnaire is intended to help establish the factors influencing the ICT integration in secondary schools in Kitui West, Sub County in Kitui County. Kindly complete the questionnaire by honestly indicating your response either by writing or putting a tick ( ) where applicable. Your identity will be treated with a lot of confidentiality. Do not write your name anywhere on this sheet.

### SECTION A: RESPONDENTS DETAILS

In this section, you are kindly requested to provide your personal information by Ticking(✓) where appropriate.

1. What is your highest level of education achieved (please tick appropriately)
  - a) Diploma level [ ]
  - b) Degree level [ ]
  - c) Masters level [ ]
2. How long have you served in the school? (please tick appropriately)
  - a) Less than 3yrs [ ]
  - b) Between 4yrs-6yrs [ ]
  - c) More than 6yrs [ ]
3. Gender of the respondents.
  - a) Male [ ]
  - b) Female [ ]

## SECTION B: ICT INTEGRATION

B1. In this section you are kindly requested to answer appropriately by ticking appropriately:

Statements	Please tick appropriately	
	YES	NO
ICT is used to keep financial records in your school		
Your school has an active e-mail account which is used for communication to parents		
ICT is used to compile students results in your school		
As a teacher you use ICT to keep record of work covered		
As a teacher you use ICT to prepare schemes of work.		
Computer is taught as subject in the school you teach		
As a teacher you integrate ICT during classroom teaching		

## SECTION C: TEACHERS PERCEPTION IN ICT INTEGRATION

C1. In this section, you are kindly requested to give your response about your perception of ICT adoption in secondary schools by ticking (√) where appropriate.

Aspect	Please tick appropriately			
	Strongly disagree	disagree	agree	Strongly agree
a) students concentrate more on their learning when ICT is integrated in their lessons				
b) students feel more autonomous in their learning with ICT				
c) students understand more easily when ICT is integrated in their learning				
d) students remember more easily what they have learnt when ICT is integrated				
e) ICT facilitates collaborative work between students				

f)ICT improves the class climate (students more engaged, easier control of the class)				
---	--	--	--	--

**C2. Kindly give brief answers to the following questions in relation to teachers perception towards ICT integration.**

a) What do you think about learners concentration when ICT is integrated, and what do you attribute your suggestion to?

.....

.....

.....

.....

b) What do you think about learners autonomy in their learning with ICT, and what do you attribute your suggestion to?

.....

.....

.....

.....

c) What do you think about learners understanding when ICT is integrated in learning, and what do you attribute to your suggestion?

.....

.....

.....

.....

d) What do you think about learners ability to remember when ICT is integrated n learning, and what do you attribute your suggestion to?

.....

.....

.....

.....

e) What do you think about the classroom climate interms of class control when ICT is used in learning, and what do you attribute your suggestion to?

.....

.....

.....

.....

**C3. To what extend do you agree or disagree with each of the following statements about ICT integration in secondary schools. Tick where applicable.**

Statements	Please tick appropriately			
	Strongly agree	Agree	Disagree	Strongly disagree
<b>ICT s should be used by students to:</b>				
• Do exercises and practice				
• Acquire information				
<b>ICT integration in teaching and learning positively impacts on students:</b>				
• Motivation				
• competence in learning				

<ul style="list-style-type: none"> <li>• success</li> </ul>				
<ul style="list-style-type: none"> <li>• higher order thinking skills (critical thinking, analysis, problem solving)</li> </ul>				

**SECTION D: AVAILABILITY OF INFRASTRUCTURE TO ICT INTEGRATION**

In this section you are kindly requested to give your response concerning the availability of infrastructure to ICT integration by both teachers and students (tick where appropriate). If your response is NO in any of the questions in D1 Skip to D3.

D1. Kindly tick appropriately

<b>Statement</b>	<b>YES</b>	<b>NO</b>
Is there electricity in your school		
Do you have a computer laboratory in your school		

**D2.** When you use computers and/ or internet during class teaching in front of the students, which equipment is available? Tick **yes** or **no** for each.

<b>Statements</b>	<b>Please tick appropriately</b>	
	<b>YES</b>	<b>NO</b>
Students are equipped with enough computers and/ or internet		
Are the computers in your school connected to LAN/WIFI/ internet		
Only the teacher uses a computer and/ or internet		
Both the teacher and students use computers and/ or internet		

Has the school provided you with a laptop or tablet PC for your use this year?		
--	--	--

**D3. Kindly give brief responses to the following questions concerning availability of ICT Infrastructure.**

a) Other than classwork, how can availability of ICT Infrastructure (computers specifically) help you improve your work? .....

.....

.....

.....

.....

b) How do you or would you use internet/WIFI/LAN provided or if provided by the school to improve your work?

.....

.....

.....

.....

.....

.....

**D4. Under which conditions do you have access to the following in teaching in your class?**

<b>Statements</b>	<b>Please tick where appropriate</b>
-------------------	--------------------------------------

	No access	Access on demand	Permanent access	Other
Desktop computer without internet access				
Desktop computer with internet access				
Non- internet connected laptop, tablet PC or notebook computer				
Interactive white board				
Computer laboratory				

**D5. Kindly give brief answers to the following questions in relation to access of ICT infrastructure in your school.**

- a) What can you say about the computer laboratory in your school in relation to ICT integration in your school?

.....

.....

.....

b) What other ICT infrastructure do you feel would be vital if provided for enhancing ICT integration in secondary schools?

.....

**SECTION E: AVAILABILITY OF HUMAN RESOURCE ON ICT INTEGRATION**

**E1. In this section you are requested to answer questions regarding to availability of human resource on integration to of ICT**

ASPECT	Please tick appropriately	
	YES	NO
In your school there are computer teachers employed by the TSC		
There is a computer laboratory technician in your school		
As a teacher you have attended a course on internet use and general applications (word processing, spreadsheets, presentations, databases etc.) in ICT in the past two years		
As a teacher you have attended an induction course on use of computer equipment (interactive white board, laptop) in the past two years		
As a teacher you have attended subject specific training on ICT integration in teaching (tutorials, simulations, etc.) in the past two years		



**E2. Kindly give a brief answer to the following question in relation to availability of human resource for ICT integration.**

a) What can you recommend to be done to improve human resource for ICT integration?

.....

.....

.....

.....

.....

.....

**Thank you very much for participating in this study**

**God Bless You So Much.**