

**AN ASSESMENT INTO THE FACTORS AFFECTING THE ADOPTION OF E-
LEARNING IN PUBLIC SECONDARY SCHOOLS IN MAKADARA SUB-
COUNTY, NAIROBI COUNTY**

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Administration (Management Information Systems)**

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DECLARATION AND APPROVAL

DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted for a degree qualification in any other University or institution of learning

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DEDICATION

This project work is dedicated to my mother Mrs. Makori for her unending support and guidance, and for being a source of inspiration in the course of my study.

ACKNOWLEDGEMENT

The journey to this end has been one with many challenges. I could not have made it this far without the support, prayers and guidance of others. I have realized that it is teamwork that got me here. First of all I would like to give my sincere thanks to my supervisors Dr. David M. Mulwa and Mr. Fredrick M. Kalui for their advice, patience supervision and guidance to the right direction, without their help I could not have made it this far. Special thanks also to my mother. Her understanding and love encouraged me to keep going. I appreciate my friends, siblings and colleagues for cheering me on and helping me when in need. Most especially I would like to thank God for giving me the strength, knowledge and wisdom, without God it wouldn't have been a success.

Abstract

The main purpose of the study was to assess the factors affecting adoption of E-learning in public secondary schools in Makadara sub-county, Nairobi County. The specific objectives of the study were to establish the influence of ICT infrastructure and E-learning curricula and design on the adoption of E-learning in public schools in Makadara sub-county, Nairobi County. It was also aimed at examining the effect of teacher's readiness and teachers' ICT skills on the adoption of E-learning in public schools in Makadara sub-county, Nairobi County. The study adopted a survey research design. The study targeted all the head teachers, teachers and deputy head teachers of all public secondary schools in Makadara Sub-county (195 respondents) but sampled 98 of them for this study. Data collected from primary sources was analyzed with the aid of Statistical Package for Social Sciences (SPSS version 22.0). Correlation analysis, Regression analysis as well as descriptive statistics were used to analyze the study variables. The research study established that most schools have low investment in ICT infrastructure due to high costs of computer hardware, software and related accessories. The adoption of E-learning implementations has resulted in the need for development of new skills and competencies among teachers as most teachers who have been teaching in traditional manners are not technologically literate and sometimes may even resist because of the worry about losing their jobs if E-learning is implemented, because of their inadequate skills. The factors affecting the adoption of E-learning significantly influenced the adoption of E-learning and external factors such as the government policies, financial policies and human development hence the hypotheses were rejected.

TABLE OF CONTENTS

DECLARATION	I
COPYRIGHT	II
DEDICATION	III
ACKNOWLEDGEMENT.....	IV
ABSTRACT.....	V
TABLE OF CONTENTS	VI
LIST OF TABLES.....	IX
LIST OF FIGURES	X
LIST OF ACRONYMS	XI
CHAPTER ONE:.....	1
INTRODUCTION	1
1.1 BACKGROUND OF THE STUDY.....	1
1.2 STATEMENT OF THE PROBLEM	3
1.3 OBJECTIVES OF THE STUDY	4
1.4 RESEARCH HYPOTHESES.....	4
1.5 SIGNIFICANCE OF THE STUDY	4
1.6 SCOPE OF THE STUDY	5
1.7 LIMITATION OF THE STUDY	5
1.8 OPERATIONAL DEFINITION OF TERMS	5
CHAPTER TWO:.....	7
LITERATURE REVIEW	7
2.1 INTRODUCTION.....	7
2.2 SECONDARY SCHOOL EDUCATION SUBSECTOR.....	7
2.2 ADOPTION OF E- LEARNING IN PUBLIC SECONDARY SCHOOLS.....	8
2.3 FACTORS AFFECTING THE ADOPTION OF E-LEARNING IN PUBLIC SECONDARY SCHOOLS	9
2.3.1 Technology Infrastructure.....	9
2.3.2 E-learning Curricula.....	12
2.3.3 Teacher Readiness and ICT skills.....	14
2.4 THEORETICAL REVIEW.....	18

2.4.1 Diffusion of Innovation Theory	18
2.4.2 Institutional theory	19
2.4.3 Technology Acceptance Model	19
2.5 EMPIRICAL REVIEW	21
2.7 CONCEPTUAL FRAMEWORK	25
CHAPTER THREE:.....	27
RESEARCH DESIGN AND METHODOLOGY	27
3.1 INTRODUCTION.....	27
3.2 RESEARCH DESIGN.....	27
3.3 LOCALITY OF THE STUDY	27
3.4 TARGET POPULATION OF STUDY	27
3.5 SAMPLE AND SAMPLING PROCEDURES	28
3.6 DATA SOURCES AND INSTRUMENTS	29
3.7 DATA VALIDITY AND RELIABILITY	29
3.8 DATA ANALYSIS AND PRESENTATION.....	30
CHAPTER FOUR:	32
DATA ANALYSIS.....	32
4.1 INTRODUCTION.....	32
4.2 Response Rate.....	32
4.3 DEMOGRAPHIC FACTORS.....	33
4.3.1 Response on the basis of Gender	33
4.3.2 Response on the basis of Age of Respondents.....	33
4.3.3: Highest Level of Education of Respondents.....	34
4.3.4: Respondent Categories	34
4.3.5 Response based on the Period worked in the school	35
4.4 ADOPTION OF E-LEARNING BY THE SCHOOLS	35
4.5 HOW THE PROGRAM IS SUPPORTED.....	36
4.6 CHALLENGES FACED IN THE IMPLEMENTATION OF E-LEARNING	37
4.7 FACTORS THAT AFFECT THE E-LEARNING PROGRAM	38
4.7.1 Factors that affect the E-learning program/Has your school adopted E-learning?.....	39
4.8 ADOPTION OF E- LEARNING IN PUBLIC SCHOOLS	40
4.9 ICT INFRASTRUCTURE.....	41
4.10 E-LEARNING CURRICULA	43
4.11 ICT SKILLS	45
4.12 TEACHER’S READINESS.....	47

4.13 EFFECTS OF FACTORS AFFECTING ADOPTION OF E-LEARNING ON THE ADOPTION OF E-LEARNING.....	49
4.15 HYPOTHESES TESTING	51
REGRESSION BETWEEN VARIABLES	54
CHAPTER FIVE:	56
SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSION AND	
RECOMMENDATIONS.....	56
5.1 INTRODUCTION.....	56
5.2 SUMMARY OF THE FINDINGS.....	56
5.3 DISCUSSION OF THE FINDINGS	57
5.3.1 ICT Infrastructure	57
5.3.2 E-learning Curricula.....	58
5.3.3 ICT Skills	59
5.3.4 Teacher readiness.....	60
5.4 CONCLUSION	60
5.5 RECOMMENDATIONS	61
5.6 SUGGESTIONS FOR FURTHER RESEARCH	62
REFERENCES.....	63

LIST OF TABLES

Table 3.1: Target Population.....	28
Table 3.2: Sample Population	28
Table 4.3: Response rate	32
Table 4: Gender of Respondents	33
Table 5: Age Category	33
Table 6: Level of education	34
Table 7: Respondent Categories	34
Table 8: Years of service/working period.....	35
Table 9: Response on whether their school has adopted e- learning	35
Table 10: How the Program is supported.....	36
Table 11: If the schools face any challenges in the implementation of e- learning.....	37
Table 12: Factors that affect the e-learning program in the schools	38
Table 13: Factors that affect the e-learning program in the schools/adoption of e-learning	39
Table 14: Response on the adoption of e- learning in public schools.....	40
Table 15: Response on infrastructure in the adoption of e- learning in public schools...	41
Table 16: Response on the influence of ICT infrastructure on the adoption of e-learning	42
Table 17: Response on the influence of e-learning curricula on adoption of e-learning .	43
Table 18: Influence of e-learning curricula on adoption of e-learning	44
Table 19: Response on the influence of skills on adoption of e-learning	45
Table 20: Influence of skills on adoption of e-learning.....	46
Table 21: Response on the influence of teacher’s readiness on adoption of e-learning ..	47
Table 22: Influence of teacher’s readiness on adoption of e-learning	48
Table 23: Effects of factors affecting adoption of e-learning on the adoption of e-learning	49
Table 24: Correlation between adoption of e-learning and the variables of adoption of e-learning	51
Table 25: Regression of the dependent variable and the independent variables	54

LIST OF FIGURES

Figure 1: Conceptual framework	25
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LIST OF ACRONYMS

ANSTI	African Network of Scientific and Technological Institutions
BECTA	British Educational Communications and Technology Agency
CAI	Computer-Assisted Instruction
CBT	Computer-Based Training
DEECD	Department of Education and Early Childhood Development
ELS	E-Learning System
HR	Human Resources
IBT	Internet-Based Training
ICT	Information Communication Technology
KESSP	Kenya Education Sector Support Programme
KIE	Kenya Institute of Education
NEPAD	New Partnership for Africa's Development
NetCen	National environmental technology Centre
NRI	Networked Readiness Index
PC	Personal Computer
PEOU	Perceived Ease of Usefulness
PU	Perceived Usefulness
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TEL	Technology-Enhanced Learning
TRA	Theory of Reasoned Action
UNESCO	United Nations Educational, Scientific and Cultural Organizations
USA	United States of America
VLE	Virtual Learning Environments
WBT	Web-Based Training

CHAPTER ONE:

INTRODUCTION

1.1 Background of the study

E-learning entails the provision of the course materials and teaching through web technologies. This could be a stand-alone web-based course or a combination with the traditional face-to-face mode of teaching. Stand-alone web-based course can be defined as that which "might include supplemental material but can be completed entirely without face-to-face interaction with instructor" (Aduke, 2008, p.290-295). Instead of the traditional physical classrooms E-learning offers "virtual classrooms as they are able to group students doing a particular online course from different physical locations but through the web technologies" (Adam, 2003, p.195). E-learning offers flexible access to content and resource via networked information and communication technologies at a place and time convenient to the learner in what has come to be called distributed learning (Naidu, 2006).

In USA over three million students are enrolling in web-based courses, with estimates suggesting that nearly 20 percent of courses in the USA are currently offered at a distance (Ruth et al., 2007). Major corporations and the military have infused their traditional training programs with E-learning initiatives, resulting in millions of dollars in annual cost savings. Given the trend toward E-learning delivery methods, it has become more critical to understand the factors which impact the effectiveness of these emerging delivery methods. E-learning can be defined as "training or educational initiatives which provide learning material in online repositories, where course interaction and communication and course delivery are technology mediated" (Johnson, Hornik, & Salas 2008, p. 357).

A recent study conducted by the Global Information Technology (2005) used the Networked Readiness Index, covering a total of 115 economies in 2005-2006, to measure the degree of preparation of a nation or community to participate in and benefit from ICT developments. Out of the 115 countries surveyed United States of America topped the

list, followed by Singapore, Denmark, Iceland, Finland, Canada, Taiwan, Sweden, Switzerland and the United Kingdom etc. Similarly, a study by Nigerian Information Technology Professionals in America in 2002 indicated that given current ICT penetration it may take some African countries 50 years to catch up with America on the aspect of PC count per household (Yusuf, 2006). The domain of distance education has not been unaffected by the penetrating influence of information and communication technology. Unquestionably, ICTs have impacted the quality and quantity of teaching, learning, and research in distance education. Therefore, ICT provides opportunities for distance education students and academic and non-academic staff to communicate with one another more effectively during formal and informal teaching and learning (Yusuf, 2005).

The Global Information Technology (2005) established that the pedagogical integration of ICT had a positive impact on teaching and learning. Both students and teachers reported that they used computers to access knowledge. In 60% of the institutions, off line resources such as Microsoft Encarta Encyclopedia was used, there was also restricted access to information from online resources in schools that had connectivity. Twenty percent of the institutions were using the cyber-school software to teach science subjects. In cases where the school had no connectivity students reported that they accessed the internet from cyber cafés during school holidays.

Global Information Technology (2005) study further established that teachers used ICTs for pedagogical purposes. Indeed, more than fifty percent (50%) of the courses in the institutions under study were taught using ICTs. Programmes such Microsoft excel were used for academic data analysis, 20% of the institutions used NetCen School Solution to prepare the school time tables. Some teachers reported the use of computers to present work in class using PowerPoint presentations, while 20% the institutions used smart board technology in teaching. Teachers reported use of Ms Word for their day to day and routine work such as making of lesson plans and schemes of work. Students reported that ICTs made learning more interesting and fun, enhanced learning and made them produce better results especially in practical subjects and science congress competitions. They

also used computers to write and present assignments. The students further reported that learning using ICTs enhanced retention.

Various studies have discussed some benefits of e- Learning which is first and foremost capable of reducing the challenge of capacity, equity and access due to the opportunity it provides to “educate and train anyone, anytime, and from anywhere” ; breaks the barriers of times and space; hence making it possible to enroll a large number of learners without restrictions. As explained by (Schrum & Ohler 2005, p.60-83) e- learning significantly challenges the standard onsite educational culture; Instructions delivered are independent of time, location, pace and space; hence learners can still face other commitments and learn at their own pace; the increase in enrolment rates in a distance education system lowers the unit cost per learner; permits the achievement of individual educational objectives at affordable costs, without affecting the normal schedule of learners (Olakulehin, 2008). Nafukho (2007) argued that current developments in technology have an extraordinary potential for transforming education to meet the growing need for customized, on-demand learning.

1.2 Statement of the Problem

One of the key components of the Government’s approach to achieving the stated goal of quality basic education is through provision of secondary education using Information and Communication Technology (ICT). The Sessional Paper No. 1 of 2005, KESSP and Vision 2030 documents underscores the importance of ICT in education in laying a firm base for skills development and innovation for enabling the country to attain a competitive edge (MoE, 2009). Although, in Kenya, ICT has penetrated many sectors including banking, transportation, communications, and medical services, the Kenyan educational system still seems to lag behind (infoDev; 2011). Whereas there are a number of researches done on the introduction, use and the potential impact of the Information and Communication Technology (ICT) on learning especially in the context of the developed countries, there is no evidence of studies done on factors affecting adoption of E-learning in public secondary schools in Kenya. Therefore this study sought to fill this

gap and examine the factors affecting adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County

1.3 Objectives of the study

The general objective of the study was to assess the factors affecting adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County

1.3.1 Specific objectives

- a) To establish the influence of technological infrastructure on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.
- b) To investigate the influence of E-learning curricula on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.
- c) To examine the effect of teacher readiness on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.
- d) To examine the effect of teacher ICT skills on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.

1.4 Research hypotheses

Ho1: Technological infrastructure has no influence on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.

Ho2: E-learning curricula and design has no influence on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County

Ho3: Teacher readiness has no effect on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County

Ho4: Teacher ICT skills has no effect on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County

1.5 Significance of the study

The findings of this study will assist the public secondary schools in Makadara Sub-county in Nairobi County to understand factors affecting the success of E-learning initiatives as well as the various challenges that may be faced in implementing E-learning technologies within the schools.

This study will also assist researchers in the area of E-learning technologies. The study will provide researchers and academicians with a basis upon which further studies on effectiveness and adoption of E-learning in Institutions of Learning can be conducted. It will also serve as a point of reference for the researchers as they conduct studies in this and other related topics.

1.6 Scope of the study

The study focused on the factors affecting adoption of E-learning in public secondary schools in Kenya with reference to public secondary schools in Makadara Sub-county, Nairobi County. The study consisted of all public secondary schools in Makadara Sub-county, Nairobi County as at 31st March 2013. There were 10 public secondary schools as of the date. The target population was drawn from head teachers, deputy head teachers and teachers. The study focused on the influence of ICT infrastructure, E-learning curricula and design, teacher readiness and teacher ICT skills on the adoption of E-learning in public secondary school in Makadara Sub-county, Nairobi County.

1.7 Limitation of the study

There were some respondents who were not willing to provide full information for fear of being reprimanded by their managers for giving out information that they consider confidential. However the researcher assured the respondents of the confidentiality of the information that they provided and sought authority from the management to undertake research.

1.8 Operational definition of terms

E-Learning

E-learning entails providing course materials and teaching through web technologies or in combination with the traditional face-to-face mode of teaching. It can be simply defined as the use of electronic media ICT in education.

ICT Infrastructure

It is the integrated framework upon which digital networks operate (both software and hardware). This infrastructure includes data centers, computers, computer networks, Database Management devices. In information technology, and on the Internet, infrastructure is the physical hardware used to interconnect computers and users. Infrastructure includes the transmission media, including telephone lines, cable television lines, and satellites and antennas, and also the routers that transfer data between disparate transmission technologies.

Curriculum

The content that the school should offer to the student at certification, after qualification. It includes the benchmarks or expectations for teaching and learning, specific instructional methods for the teacher; media and tools that are used for teaching and learning and the reasons for and the methods of measuring student progress

Skills

An ability and capacity acquired through deliberate, systematic, and sustained effort to smoothly and adaptively carryout complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills)

Teacher Readiness

A function of the degree of preparation and the quality of teaching skills acquired by an individual over a given period of time and the degree of training and skills imparted on the individual by an institution on the other.

CHAPTER TWO:

LITERATURE REVIEW

2.1 Introduction

The chapter is organized under a number of subheadings; Secondary school education subsector, adoption of E-learning in public secondary schools, factors affecting the adoption of E-learning in public secondary schools, Important theoretical and practical problems are brought out; relevant literature on the aspects pertaining to the factors affecting adoption of E-learning.

2.2 Secondary School Education Subsector

There are currently over 4000 public secondary schools in Kenya and the recent massive increase in primary school enrolment is putting pressure on the demand for and access to secondary schools. (Republic of Kenya, 2007) The Ministry of Education Science Technology remains concerned with the quality of secondary education which is characterized by poor performance in core subjects such as Mathematics and Science. There are obvious benefits for integrating computers into secondary schools as students at this age need to focus on subject-specific content, greater critical thinking skills, scientific inquiry, and Mathematics, science and languages. Students will benefit greatly with the analytical, creative, and collaborative power of computers to map out and analyze assumptions, present ideas, and participate in projects with peers from around the country and around the world.

In order to increase and improve the use of ICTs in the schools, a range of obstacles that prevent school managers and teachers from using ICTs effectively need to be overcome. The BECTA Report (2003) identifies the key barriers to using computers as: Lack of access to appropriate ICT equipment, Lack of time for training, exploration and preparation, Lack of models of good practice in ICT, Negative attitudes towards ICTs in education, Computer anxiety and a lack of confidence, Fear of change and a lack of personal change management skills, Unreliable equipment and lack of technical,

administrative and institutional support. The BECTA (2003) report further classifies the barriers into the four factors namely a)resource-related factors b)factors associated with training, skills, knowledge and computer experience c) attitudinal and personality factors, and d) institutional and cultural factors. According to the BECTA (2004) report, barriers identified in the literature can be broadly grouped into two levels: those relating to the institutions (school-level barriers) which are first order barriers and those relating to the individual (manager-level barriers) or second order barriers (Siegel, 1999). Although this may be a useful distinction to make in beginning to address the subject, the literature points to a complex interrelationship between school-level and teacher-level barriers, and between the barriers within those levels(Siegel, 1999).

2.2 Adoption of E- learning in Public secondary schools

As explained by Schrum & Ohler (2005) distance education “significantly challenges the standard onsite educational culture pedagogically, organizationally, technologically and financially”(60-83) Flexibility of learning activities: Instructions delivered are independent of time, location, pace and space; hence learners can still face other commitments and learn at their own pace. The increase in enrolment rates in a distance education system lowers the unit cost per learner. Cost effectiveness: permits the achievement of individual educational objectives at affordable costs, without affecting the normal schedule of learners (Olakulehin, 2008).

ICT supports personalization, independent learning and teamwork. Students have indicated that they do assignments more their own way when using a computer and their parents consider that they solve assignments more at their own level. Collaboration between students is greater in project work when they use ICT (Balanskat et al., 2006). Ribeiro Moreira and Almeida (2009) also add that, a large number of special education professionals agree on the fact that ICTs are an important tool for teachers and students to overcome barriers and promote the acquisition of skills. Furthermore, ICT can promote school and social inclusion by diminishing the obstacles for students with Special Education Needs (Becker, 2000)

Sharma (2003) notes that the use of ICT improves the quality of education by facilitating learning by doing, real time conversation, delayed time conversation, directed instruction, self-learning, problem solving, information seeking and analysis, and critical thinking, as well as the ability to communicate, collaborate and learn (Yuen et al, 2003). Casal (2007) mentions that ICTs also provide a platform for sharing information and knowledge and this can be used for the betterment of program delivery in terms of replication of best practices (Mason, 2000). It allows mass customization in terms of content and exams and reduces costs per student making education more affordable and accessible, increasing enrollments, improving course quality (Ozdemir and Abrevaya, 2007).

According to Nwagwu and Ahanihe (2006), efforts to improve ICT access in Africa have been hampered by a number of factors: shortage and high cost of equipment, software and information; the lack of reliable and accessible physical telecommunications infrastructure; telecommunications monopoly, associated with overly restrictive regulations and high costs, Another most serious challenge facing distance education at this level is the need for the integration of new ICT literacy knowledge into academic courses and programs. This is done against the backdrop of the prevailing economic and political environment that may positively or negatively influence ICT adoption in secondary schools

2.3 Factors affecting the adoption of E-learning in public secondary schools

This section looks into the relevant literature on aspects pertaining to the factors affecting the adoption of E-learning in public secondary schools. The section contains four subheadings; Technological infrastructure, E-learning curricula, Teacher readiness and ICT skills.

2.3.1 Technology Infrastructure

Infrastructure for online learning is crucial. Many African countries have a very low base from which to implement ICT interventions in education management in schools. It is estimated that less than 1 per cent of people in Africa uses or have access to the Internet (Bigum, 2000). The figure of 139 students per computer is given for World participants. Listed in order of rank, aspects that inhibit schools from acquiring computers are an

absence of electricity, lack of funding, insufficient building space, lack of available and trained staff, and poor security. In Malawi, where most technology infrastructure is government controlled, very low levels of infrastructure for and use of ICTs are found and many government departments have themselves not yet acquired computers. In sub-Saharan Africa, the low teledensity and high costs of installing and maintaining lines are major barriers. Wireless technology is seen as a possibility for rural schools (e.g. in Lesotho).

Low investment in ICT infrastructure coupled with high cost of connectivity and bandwidth are two major problems that hinder effective use of the resources available on the Internet. In the (ANSTI, 2005) report on science and technology status in Africa, the average staff-Computer ratio for Science and Technology faculties in most African universities was found to be about one computer per two staff members. This ratio could be increased by investing more into computer acquisition through a cost sharing model where staff is assisted to purchase computers through a recovery mechanism. In the same report, it is evident that there is need to improve access to ICT facilities in order to effectively deploy them in institutions of higher learning. The study showed remarkable disparities in the number of computers in each of the 20 universities surveyed from across the African continent. On average the analysis showed that there are about 6.5 computers per basic science course and about 9.1 computers per engineering science course. It was also noted that in general, very few departments provide computers to all of their staff. In fact only 1 out of 3 departments across disciplines had more than half of their staff who had computers in their offices. These statistics point to a situation that require a substantial input of resources in order to achieve an efficient ICT infrastructure and access that will be supportive to the improvement of teaching and learning. These findings can easily be generalised given that Science normally is more ICT- oriented than other subjects.

Schools do not budget adequately for maintaining the use of ICTs, and instead dedicate their ICT budgets, where these exist, to the purchase of computers and software. In schools: the costs of installation, maintenance and expansion remain hidden unlike in the

commercial sector where the capital costs of a PC represent only one fifth of the yearly cost of running that PC' (Farris, 2001). Costs include teacher training, and additional advisory and technical staff as support, both in the technological and pedagogical fields. The Internet for Schools Project in Mozambique, for instance, has both technical and pedagogical coordinators. In addition, hardware, software, telecommunications, infrastructure such as phone lines, and content development have to be budgeted for. Fewer than 5 per cent of South African schools with computers budget for teacher training in the use of ICTs (Higgs, 1997). Initial expenditure has to be considered along with the recurrent costs in order to sustain the use of ICTs in education, in particular the investment in the human capability (Ibid.:46). Budgets tend to derive from fees, fundraising and donations, although in some countries such as Nigeria, government funding is provided. Evidence of the cost effectiveness of spending on ICTs rather than, say, libraries has not yet been established (Higgs, 1997).

Most developing countries face capacity constraints, largely a result of thin-bandwidth and frequent power outages (Oyeyinka & Adeya, 2004). Bandwidth is the scarcest ICT resource in African universities and this is mainly due to vetoes on academic institutions' accessing international circuits and high licensing fees for connecting to advanced circuits for obtaining authorization (Adam, 2003). Adam further reported Jensen's (2002) survey showing that almost 60% of African countries have bandwidth that is less than that of a typical institution in the developed world and added that only six countries in Africa have a reasonable outgoing bandwidth. There are also several factors that hinder the implementation of ICT integration and these include: time to prepare ICT teaching materials was difficult to find because of the loaded curriculum. Converting manual teaching notes to ICT requires both time and skill. Teachers feel that this is also an added load and because there is no special reward and it is not part of the curriculum, there is no motivation. The number of computers was seen as a major barrier in that learners have to share the few that are there when they have classes.

Economic factors ranging from the lack of capacity to pay for costly infrastructure to sustaining computer networks introduced through donor funding weighed on the schools

as their budgets continued to get slashed. Schools face tough economic factors which includes the lack of ability to pay for costly infrastructure, sustaining computer networks introduced through donor support; all of which is weighed on the education institutions as their budgets continued to get slashed (Adam, 2003).

2.3.2 E-learning Curricula

A comparative study carried out by Roda, Angehrn and Nabeth (2001) shows that many of the existing E-learning systems do not seem to take full advantage of the possibilities offered by current technologies essentially because they are designed to reflect the classic, lecture style teaching approach. Roda et al (2001) further add that, E-learning systems should put the user/learner at the centre, and also become a key component for managing individual knowledge capital and competence. According to Webster and Sudweeks (2006), each individual has a learning profile, of which the core constituents are cognitive style, learning style and personality type.

Abouchedid and Eid (2004) acknowledged that teachers have several concerns related to the transition from traditional education to E-learning. The first concern was that administration officials and instructors were not fully aware of or familiar with E-learning content and outcomes, as well as students' first-time experiences with E-learning courses because of a 180-degree shift in the philosophical learning model. The second concern was that there were not enough plans designed to guide educational institutions for a smooth educational transition to E-learning which can cause unwanted consequences such as a possible drop in students' enrollment leading to a drop in school's revenue. The third concern is that governmental officials refuse the idea of converting educational institutions to —no lecture institutions, indicating that E-learning philosophical models will make students independent from their instructors, and the old impression that learning is obtained from the instructor will probably be demolished.

According to Pinheiro (2002), an educational curriculum is a connective link between teacher and student, organized in such a way to achieve goals previously set by the teacher, the learning organization or by the curriculum specialists. Another definition of

curriculum as Todd (1965) stated is the planned educational experiences offered by a school which can take place anywhere at any time. The curriculum in education guide instructors on how to deliver information to students with respect to the amount of information and the time that this information will take to be understood by students. The E-learning curriculum still carries the same definition of Pinheiro (2002), but with extra aspect of E-learning to learn. Learning to learn is an aspect that was found to fulfill the missing component of electronic curriculum; it refers to the capacity of students to learn outside of a paced and structured classroom context (Anderson, 2002).

E-learning course curricula may need to be designed in such a way that is relevant in the quality of information with the outside world because students will use different resources besides their instructor. E-learning course curricula may need to be based on learning approaches other than face-to-face course curriculum, which offers students opportunities to discuss their knowledge related to a certain topic rather than only to listen to the instructor as a provider of information. E-learning curriculum could push students to engage in ways not previously possible in face-to-face curriculum, and create new learning and teaching possibilities that will generate greater outcomes (DEECD, 2008). According to Colvin & Mayer (2008) an E-learning curriculum may help infuse constructivist learning, when students are encouraged to spend more time interacting with each other than simply listening to the instructor, and requires students to work autonomously and concurrently in a competitive environment so that each individual will construct his or her own knowledge based on the interactions that take place during the E-learning course. The E-learning curriculum is an advanced version of the traditional curriculum, because it focuses more on student-centered learning and effective communication skills to ensure that students and their instructor are involved in a productive sharing of information.

Objective E-learning implementation requires a compatible instructional design that can facilitate the delivery of the E-learning materials, as well as produce desired outcomes that can be noticed on students' performance. Magnussen (2008) observed that instructors need to spend more time on the computer to design an E-learning course. Instructors need

to look for suitable ideas that allow them to shift their traditional teaching experiences to an E-learning teaching style. An educator is viewed not as a distributor of content, but as a facilitator of learning (Ruiz, Mintzer, & Leipzig, 2006). In order to create successful E-learning materials, the first step is to analyze the students' backgrounds and qualifications through a small survey or a brief personal introduction. The second step is to design the E-learning materials that are more appealing to students' needs. In E-learning, instructors are able to update materials and resources instantly, track student discussion progress, push the discussion forward by questioning, and inspire students to engage more by introducing new relevant perspectives (Gunga & Richetts, 2007). During the second step, the instructor can determine specific learning objectives, assessment instruments, exercises, outcomes, and E-learning content. The third step is to develop the E-learning materials to achieve the desired outcomes that were defined during the design step.

The fourth step is the implementation process, in which the developed E-learning materials are delivered to students. The delivery process will be different in E-learning than in the traditional face-to-face class, because students will participate in the implementation of materials through posting their discussions with evidence such as Web links to support their points. However, the instructor needs to make sure that student participations are relevant to the class materials. Otherwise, s/he should shift the discussion toward the class subject and push it forward. The fifth step is to examine the effectiveness of the learning materials through a cooperative evaluation among students including their instructor. Students will also recommend improvements to include in future classes (Colvin & Mayer, 2008)

2.3.3 Teacher Readiness and ICT skills

Teachers may need to acquire knowledge and skills in handling information and communication techniques for E-learning courses. As Levinsen (2007) indicated, that instructors may need to have some form of training in communication skills, because it has a strong effect on E-learning courses. Communication skills play an important role in adapting E-learning skills the instructor has to diversify his communication skills, from being only a provider of information to also a facilitator of learning. In order to provide a

quality experience in E-learning courses, instructors may need training sessions to improve their skills and online communication. Levinsen (2007) suggested that proper supervision for instructors who are beginning to use an E-learning course will possibly increase instructor skills, while prioritizing instructors' needs for technical support will speed instructors' familiarity with the use of technical tools. Skills, communication, and technology are three related domains that instructors need to adopt to conduct a good quality E-learning course (Georgina & Hosford, 2009).

The increasing number of E-learning implementations has resulted in the development of new skills and competencies among faculty members, such as learning how to monitor the learning process without a full control over this process, and how to push discussions forward so that students will cover as much information as they can. Traditional skills are essential to E-learning but are insufficient (Gray, Ryan & Coulon, 2004). According to Levinsen (2007) successful design and management of E-learning courses require new skills to overcome major problems such as user needs analysis, instructional design, development of materials, delivery of information, and evaluation of the course. The learner needs can be obtained through a questionnaire or survey at the beginning of the course, used to analyze the learner needs to assist the instructor in providing any support needed to make the E-learning course more appealing to learners. A proper instructional design of the course will probably facilitate the learning process to learners. The development of the content may need to be learner-centered rather than instructor-centered, and the content may need to follow the constructivist approach. The delivery of knowledge is dependent on the content; if the content was designed constructively then learners will participate in the delivery process which will possibly increase the amount of knowledge shared among learners as well as the instructor (Gray, Ryan & Coulon (2004).

In regard to age difference and the implementation of E-learning, Sederberg (2003) indicated that teachers who have been teaching in traditional manners—are not always technologically literate and sometimes resist the innovation of technology and its evolution in education. Teachers are somewhat worried about losing their jobs if E-

learning is implemented, because of their inadequate skills with modern technology in education. Sederberg (2003) also showed that technological departments such as those in computer science and learning technologies tend to be more skillful and computer-savvy, indicating a pre-acceptance of E-learning implementation.

Teachers may need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an E-learning teaching style. Magnussen (2008) brought up a point about instructors needing to spend more time on the computer to design an E-learning course, and this barrier concerns all instructors who are considering E-learning. Another barrier that Sederberg (2003) indicated is that teachers who may not be technological literate and resist the innovation of technology are worried about losing their jobs if E-learning is implemented, because of their inadequate knowledge about modern technology in education.

Costa, McPhil, Smith, and Brisk (2005) recommends that to assure a smooth transition to E-learning, a training course needs to be offered to teachers to provide a complete instructional structure and adequate technical support at the beginning of the training, and then gradually lessen that instructional structure and the support as teachers become more confident with the E-learning characteristics and skills required for teaching (Major & Palmer, 2002). By providing supportive E-learning environments for teachers early on, they can gradually build up personal, long-lasting knowledge on how to teach students using E-learning as a new teaching style (Porter & Donthu, 2006).

Major and Palmer (2006) pointed out that experienced faculty members will probably have more confidence in teaching materials using E-learning than those who have less experience, because experienced faculty members could know their subjects very well and can thrive online. If a transition to E-learning is to occur, teachers' readiness of pedagogical techniques need to undergo beyond the recycling of instructional techniques they experienced as students. Teachers' knowledge of E-learning enables them to incorporate this knowledge into learning subjects, then to pass it on to their students (McDaniel, 2004 cited in Distance Education Report 2004, p.4).

A forward move to continually build up readiness is to establish training courses and E-learning workshops during the training (Merwe & Mouton, 2005). There should also be an orientation or initial training to explain the critical elements skills and needed by faculty members. This orientation would provide knowledge as about how to begin preparing for E-learning (Barron, 2006). The training should take care of a major concern of senior faculty members who are not technologically literate and who therefore resist the innovation of technology; teachers are worried about losing their jobs if E-learning is implemented. Sederberg (2003) suggested that with extensive training, the technological digital divide will be minimized among faculty members and senior faculty members will no longer be concerned about their jobs. The training courses will help instructors understand the basic technological needs for an E-learning course. However, faculty are usually required to learn more about E-learning course design at their own pace, which will offer them a wide range of options to adopt the technical skills of E-learning (Major & Palmer, 2006).

Magnussen (2008) indicated that readiness of teachers may include the need to be updated consistently with evolving E-learning issues that could start to appear as E-learning takes place. Therefore, it is imperative to design evaluation tools for future improvements to keep E-learning on the right track and increase positive results. The main indicator for successful E-learning implementation is student achievements in E-learning courses. Barron (2006) mentioned several evaluation tools, one of which is to get learner feedback on E-learning courses by conducting a general survey, which can be reviewed by instructors and school administrators for improvement and suggestions later on. As technology and science advance, the E-learning course materials must be updated with the latest information to demonstrate to students that learning content is compatible with the outside world. The success of E-learning is largely dependent on building relationships with learners, with faculty members, and with school administrators during the E-learning process to provide meaningful learning experiences.

2.4 Theoretical Review

2.4.1 Diffusion of Innovation Theory

Rogers (2003) defined diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. The process of diffusion relies mainly of the communication channels available for the change agents within a social system. As Surry & Farquhar (1997) defined it, diffusion is the process by which an innovation is adopted and accepted by member of the community. The rapid growth of individual knowledge and industrial fields has obliged the world to come up with quite few diffusion of innovation models that best fit communities' needs.

Rogers (2003) discussed the five characteristics that determine an innovation's adoption rate in a specific social system. The five characteristics of adoption rate are relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. The higher the degree to which an individual recognizes the advantages of an innovation, the faster the adoption rate will take place. Compatibility is the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters. If an idea is inconsistent with the values and norms of a social system, it will have an extremely slow adoption rate compared with the adoption rate of a compatible idea. Complexity is the degree of the innovation's difficulty to be understood and used. Innovations that is easy to understand and use claim higher adoption rates than do complicated innovations. Trial ability is the degree to which an innovation may be experimented with on limited bases. New innovations that can be tried before adoption will be adopted quickly, giving individuals a sense of assurance for adaptation. Observability is the degree to which the results of an innovation are visible to others. The easier to see positive results of an innovation, the more likely users will be adopting it (Rogers, 1995). This theory can be related to the dependent variable in the study which is on the adoption of E-learning in public secondary schools

2.4.2 Institutional theory

The institutional theory points out that the beliefs, attitudes and behaviors of individuals and organizations are strongly influenced by various networks and interactions (Scott, 2001). It also addresses the role of institutions in understanding the behavior of social actors, and provides a perspective which can help assess the institutions' formal and informal rules that can strongly shape the beliefs, attitudes and behaviors of social actors (Burkhardt, 1994).

The institutional theory holds that the institutions' influences on the beliefs, attitudes and behaviors of social actors are secret but pervasive. Scott noted that institutionalization should be better viewed as the 'social process by which individuals came to accept a shared definition of social reality' (Scott, 1987) and defined institutions as 'social structures that have attained a high degree of resilience' (Scott, 2001).

Once internalized, or encoded into actors through a socialization process, institutions transform into a particular pattern of attitudes and behaviors, which will shape actors' future attitudes and behaviors and provide stability, order, continuity and meaning to social life. When institutions are established, they become authoritative guidelines for social behaviors (Scott, 2004). Thus organizational structures and processes become ingrained in the organization, and become 'taken for granted' as 'the way these things are done' (Scott, 1987). Therefore, the actors may not even realize that their behaviors are in fact partly shaped by institutions. This theory is related to the variable on e learning curriculum in the research study

2.4.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably: Perceived usefulness (PU) - This was defined by Fred Davis as 'the degree to which a person believes that using a particular system would enhance his or her job performance'. Perceived ease-of-use (PEOU) - this is 'the degree

to which a person believes that using a particular system would be free from effort' (Davis, 1989)

TAM posits that perceived usefulness and perceived ease of use determine an individual's intention to use a system with intention to use serving as a mediator of actual system use. Perceived usefulness is also seen as being directly impacted by perceived ease of use. Researchers have simplified TAM by removing the attitude construct found in TRA from the current specification (Venkatesh, 2003). Attempts to extend TAM have generally taken one of three approaches: by introducing factors from related models, by introducing additional or alternative belief factors, and by examining antecedents and moderators of perceived usefulness and perceived ease of use (Wixom and Todd, 2005).

Attitude and intention are two widely examined variables in the literature of technology acceptance. Attitude indicates a person's general feeling of favorableness or unfavorableness toward some particular technology system (Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Behavioral intention refers to a user's intention to use a technology system. According to the original definition, behavioral intention encompasses the user's motivational factors that influence technology system usage behavior. These factors indicate how much effort a user will put forth in using a technology system (Ajzen, 1991). TAM postulates the attitudinal explanations of intention to use a specific technology or service (Davis, 1989). It also posits that adoption intention is jointly determined by the attitude toward subjective norm and perceived behavioral control (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; Ajzen, 1991).

The theory of the Technology Acceptance Model (TAM) is in line with the theory of planned behaviour (Ajzen, 1985, 1988). Ajzen posits that people's actions are governed by their attitudes and beliefs, their sense of self-efficacy, and their compliance with the perceived expectations of the people around them. In this study we propose that teachers' acceptance and readiness to use technology and E-learning is influenced by their attitudes, beliefs and their expectations that technology and e- learning will be able to enhance their efficiency and improve their skill levels. These theories relates to the variable on Teachers readiness in the research study

Generally, the study will use diffusion theory, institutional theory and theory of acceptance model as its theoretical basis as education institutions across the world have been adopting ICT teaching and E-learning technologies in an effort to create an environment for both students and their instructors to engage in collaborative learning and gain access to information to support them in trying new strategies, thinking and creativity that are reflective in practice aimed at engaging them to new innovations

2.5 Empirical Review

In his study Ya-Ching Lee (2006) sought to investigate the factors affecting the adoption of the E-learning system (ELS) in mandatory and voluntary settings, through an extension of the technology acceptance model (TAM). Regression analysis was used to observe the associations of proposed constructs. This research implied that, first of all, mandatory usage is necessary for overall adoption of the ELS. The ELS should be developed to target changes in perceived usefulness, perceived ease of use, and perceived network externality. Practical alternatives included enhancing content quality, developing a simple and easy-to-use system, and enhancing students' computer self-efficacy. Secondly, perceived network externality was important in ELS adoption. That is, promotion of the system should emphasize the popularity of the system and future ELS products and services in order to create bandwagon effects.

Robert Hinson, (2006) in his study purposed to contribute to the literature on internet use, with particular respect to academics. The literature on academic uses of the internet is littered with empirical studies, which analyze aspects of the broad spectrum of uses to which the internet can be put, by academics anywhere in the world. His study based largely on literature survey and an assessment of the existing models of internet use by academics. The research findings suggest that The Internet Adoption Model for Academics (IAMA) provides a framework for internet use, and has the potential for being instructive for academics who have currently not integrated the internet fully into their professional activities.

In 'Measuring the Acceptance and Adoption of E-Learning by Academic Staff' by Alalakh and Alnawas (2011), they had the objective of exploring the student acceptance of E-learning in order to understand the various factors influencing acceptance. The theoretical basis of the research was derived from behavioral intention and technology acceptance models. The model was adapted to reflect determinants relevant to lecturers' attitudes to the adoption of E-learning system. Structural equation modeling was used to test the validity of the research model and the relationship among its constructs. The findings of the research showed that perceived ease of use and perceived usefulness were significant, but not the strongest constructs to predict behavioral intention. Experience and computer knowledge were the strongest indicators among other constructs to predict behavioral intentions.

Jan et al (2012) in their study on The adoption of E-learning: an institutional theory perspective whose aim was to improve understanding of what social forces influence employee's attitude and intention of E-learning adoption within an organizational context. Drawing upon the institutional theory, this study proposed a model to examine three social environmental factors of coercive, normative and mimetic pressures within the E-learning context. An empirical study involving 172 subjects and the partial least square method was conducted to test this model. The results indicated that normative and mimetic pressures significantly influence the attitude and intention of adopting E-learning, while coercive pressures appear not to. Attitude plays a mediating role between both normative and mimetic institutional pressures and E-learning adoption. For organizations, the results suggest that training managers may need to build an E-learning community to create normative expectations and provide success stories of high profiles employee's E-learning experience to promote the adoption of their E-learning.

Chigona et al. (2010) carried out an empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. Their study aimed at investigating the factors that affect the integration of ICTs in teaching and learning. Their survey focused on the domestication of ICTs in schools serving the disadvantaged communities in a developing country context. The researchers employed a qualitative research approach to

investigate domestication of ICT in the schools and data for the study was gathered using in-depth interviews. Participants were drawn from randomly sampled schools in disadvantaged communities in the Western Cape. Results showed that even though schools and educators appreciate the benefits of ICTs in their teaching and even though they are willing to adopt the technology, there are a number of factors that impede the integration of ICTs in teaching and learning.

Kiilu and Muema (2012), in their research on E-Readiness Implications in Kenya which examines the E-readiness implication on the adoption of E-learning in secondary schools in Kenya. The paper provides an opportunity for reflection on E-learning adoption and the potential role ICT can play in education. The review established that up to date, less than 10% of secondary schools in Kenya offer computer studies as a subject in the curriculum despite its perceived potential. The few schools that have an ICT programme limit the number of candidates who take up the subject considering it a specialty irrespective of its being an essential subject as other compulsory subjects like Mathematics and Languages. Whereas the processing of information to build knowledge is one of the essential literacy skills vital for the workforce in the 21st century, it is often overlooked in current educational practices. The study implies that the question of e-readiness of Kenyan schools cannot be overlooked if Kenya plans to use education as a platform for becoming an e-society of the 21st century as envisaged in Vision 2030.

Mulwa, (2012) researched on the influence of ICT infrastructure on readiness to adopt E-Learning in secondary schools in Kitui district, Kenya. She explored the relationship between ICT infrastructure and readiness to adopt E-learning in secondary schools. The research was based on literature review and field research by employing cross-sectional survey research design to determine the extent to which ICT infrastructure influences readiness to adopt E-learning in secondary schools in Kitui district. A single questionnaire coupled with observation schedule were used to collect data from 15 provincial and 36 District schools selected through stratified random sampling. The results established that institutional factors such as infrastructure (connectivity, sources of energy and e-equipment) have a significant influence on readiness to adopt E-learning.

However, most schools in Kitui district did not have adequate infrastructure to support the adoption of E-learning.

2.7 Conceptual Framework

In this section, the conceptual framework is presented in a schematic interpretation as shown in the figure 2.1 below. It identifies the variables that when put together explain the issue of concern.

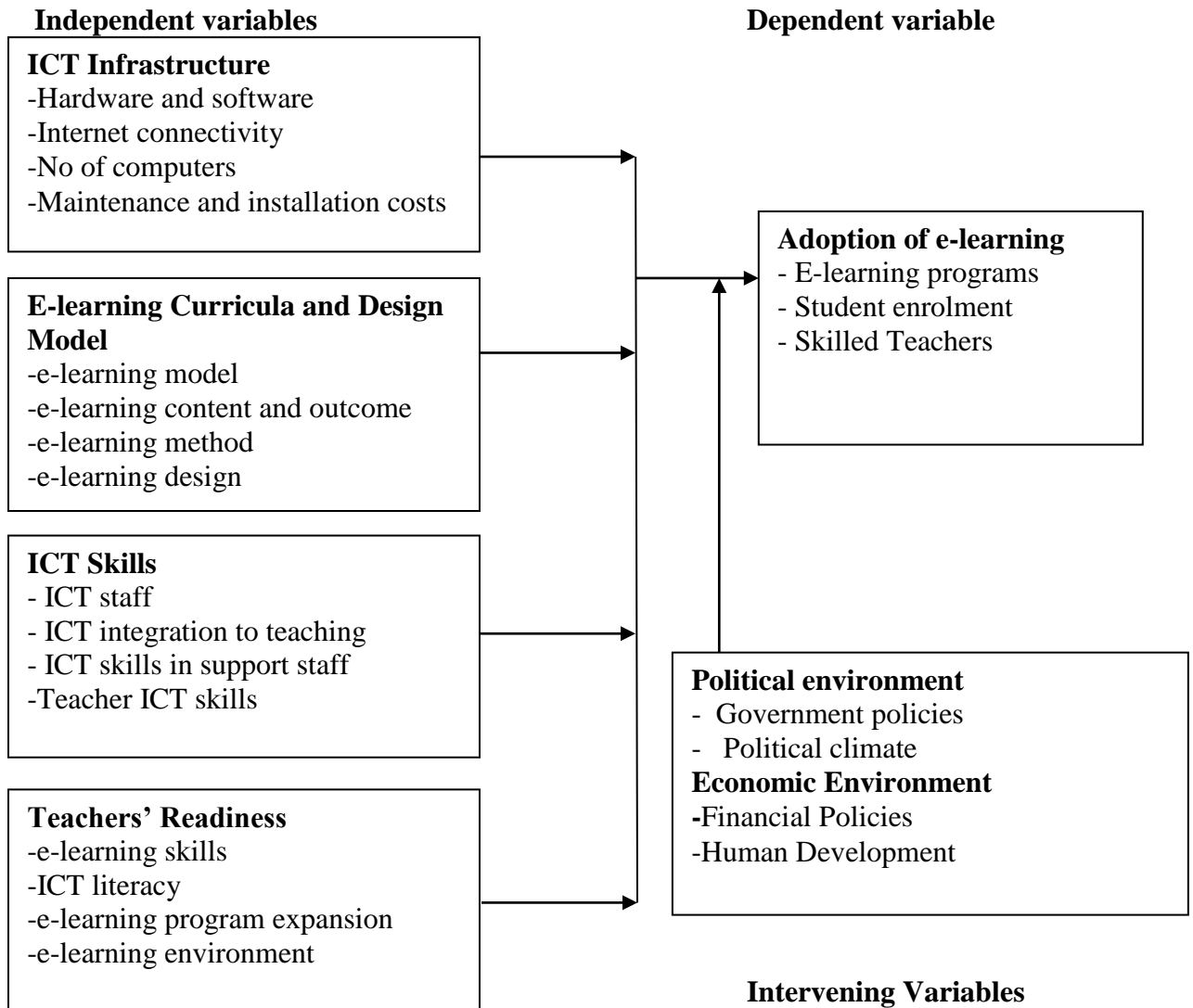


Figure 1: Conceptual framework

Source: Author, (2013)

The researcher sought to establish the relationship between ICT infrastructure, E-learning curricula, teacher readiness and teacher ICT skills and the adoption of e-learning in public secondary schools. ICT infrastructure, E-learning curricula, teacher readiness and

teacher ICT skill were the independent variables and adoption of E-learning was the dependent variable. From the conceptual framework, it is assumed that there is a direct relationship between the independent variables (ICT infrastructure, E-learning curricula, teacher readiness and teacher ICT skill) and the dependent variable (adoption of E-learning). However, this is not necessarily the case since there are other variables which the researcher may not be able to control (the intervening variables) and in this case some of the suggested ones were government policies, political climate, financial policies and human development.

CHAPTER THREE:

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter outlined the methodology that was used in conducting the study. The issues discussed included the research design, locality of the study, the target population, the sampling design and sample size, the data collection methods as well as the data analysis and presentation methods.

3.2 Research Design

A research design can be regarded as an arrangement of conditions of collection and analysis of data in a manner that aims to combine relevance with research purpose (Kombo and Tromp, 2006). A survey research design was adopted in this study. This is because it is an attempt to collect data from members of the population in order to determine the current status of that population with respect to one or more variables in a particular study (Mugenda and Mugenda, 2003). This type of design was also useful in this study because apart from just describing, survey can be used for explaining and exploring the existing status of two or more variables at a given point in time (Mugenda and Mugenda, 2003). Survey method was the most appropriate because it focused on a specific population and hence gets quick and immediate information.

3.3 Locality of the study

The study was conducted in Makadara sub-county, Nairobi County. All the secondary schools in this area formed the population of the study and a sample population of 98 respondents was drawn

3.4 Target Population of study

The target population was drawn from all the head teachers, deputy head teachers and teachers of all the ten (10) public secondary schools in Makadara Sub-county, Nairobi County as shown in the population frame on table 3.1 below. Mugenda and Mugenda (2003) define a population frame as a list, directory or index of cases from which a

sample can be selected. According to Cooper and Schindler (2008) a population frame must thus contain an up-to-date list of all those that comprise the target population.

Table 3.1: Target Population

Units	Frequency	Percentage
Head Teachers	10	5.1
Deputy Head teachers	10	5.1
Teachers	175	89.7
Totals	195	100

Source: Author, (2013)

3.5 Sample and Sampling Procedures

Stratified random sampling which involves dividing the population into distinct non overlapping subgroups (strata) according to characteristics of roles (The strata was made up of Head teachers, deputy head teachers and teachers) and then a random sample was selected within each subgroup. This was used to obtain study sample, as this ensured that a representative sample is picked from each stratum thus ensuring that the research findings were able to be generalised. According to Mugenda and Mugenda (2003) at least 10% of the target population is important for the study. The study therefore used a sample of 50% of the target population which gave a sample size of ninety eight (98) respondents consisting of head teachers, deputy head teachers and teachers as shown on table 3.2 below

Table 3.2: Sample Population

Units	Population	Sample Size
Head teachers	10	5
Deputy head teachers	10	5
Teachers	175	88
Totals	195	98

Source: Author, (2013)

3.6 Data Sources and Instruments

The researcher used primary data sources; Primary data was collected through questionnaires. The questionnaires had five sections. The first section contained questions on the demographic information of the respondent, the second part; on the other hand answered questions on ICT infrastructure, while the third answered questions on E-learning curricula, the fourth part questions on teacher ICT skills and the fifth section addressed questions on teacher readiness.

3.7 Data Validity and Reliability

The objective of validity is to ensure that the scale (each item or question of the questionnaire) measures what it is supposed to measure. In this study content validity of the construct (composing, wording) measurements (of questionnaire items) was of concern from early stage of questionnaire development. Three stages were followed to ensure the validity of the research instrument (questionnaire): Firstly, a review of the relevant literature, as well as a set of exploratory interviews with the respondents was conducted. This resulted in the development of an initial list of items representing each of the study's constructs. Secondly, these lists of items were modified based on recommendations from the supervisor and the expert advice. Thirdly, the amended list of items were piloted with ten (10) respondents from the schools who were not included in the final study sample to ascertain the thinking behind the answers so that the researcher could accurately assess whether the questionnaire would be filled out properly, whether the questions would be actually understood by respondents, and whether the questions asked what the researchers intended, based on the response. These respondents were not included in the final survey as a result of the pilot test, changes in word selection and instructions were made to the research instrument.

Reliability of the questionnaire was evaluated through the test re-test. The questionnaire was piloted in two schools that are included in the study. After two weeks the same questionnaire was re-administered to the same group of respondents. A Pearson's' Correlation for the two sets of filled up questionnaires and a correlation coefficient of 0.82 was realized which was reliable.

3.8 Data Analysis and Presentation

The data collected by use of the questionnaire was first thoroughly edited and checked for completeness and comprehensibility. Quantitative data was chronologically arranged with respect to the questionnaire outline to ensure that the correct code is entered for the correct variable. Data was then cleaned, tabulated and analyzed with the aid of Statistical Package for Social Sciences (SPSS 22.0). The study used descriptive statistics, regression analysis and correlation analysis to analyze data. The demographic characteristics of the respondents, the study variables of ICT infrastructure, E-learning curricula, and teacher readiness, adoption of E-learning and teacher ICT skills were analyzed.

The regression model was therefore presented in the equation below:

$$Y = \alpha + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \varepsilon$$

Y = Adoption of E-learning in public secondary schools

α = constant

b_{1-4} = Regression Coefficients

X_1 = ICT infrastructure

X_2 = E-learning Curricula

X_3 = Teacher readiness

X_4 = Teacher ICT Skills

ε = error term

The use of both descriptive and inferential (regression) statistics was appropriate as they assisted in establishing patterns, trends and relationships and made it easier to understand and interpret the implications of the study.

The analysis of qualitative data drawn from open ended questions involved coding and organizing collected data into themes that addressed the research questions and then analyzed using content analysis.

Presentation of data was in form of tables, pie-charts and bar graphs only where it provided successful interpretation of the findings. Descriptive data was provided in form of explanatory notes. The purpose of presentation of data is to highlight the results and to

make data or results more illustrative by presenting in the form of figures and tables so that it is easy to observe general trends (Coolican, 2003).

CHAPTER FOUR:

DATA ANALYSIS

4.1 Introduction

This chapter presents the analysis of study findings based on the factors affecting adoption of E-learning in selected public secondary schools based on the specific objectives of the study which included: To establish the influence of technological infrastructure on the adoption of E-learning, to investigate the influence of E-learning curricula on the adoption of E-learning, to examine the effect of teacher readiness on the adoption of E-learning in public secondary schools and to examine the effect of teacher ICT skills on the adoption of E-learning in public secondary schools. This chapter analyses the variables involved in the study and estimates of the model presented in the previous chapter.

4.2 Response Rate

Table 4.3: Response rate

Response Category	Frequency	Percentage
Responded	79	80.61
Did not respond	19	19.39
Total	98	100

Source: Research Data (2013)

The study above shows the total number of the respondents who responded and those who did not respond. The total questionnaires that were distributed to the field were 98, and out of these questionnaires, 79 questionnaires were returned duly answered which represent 80.61% of the total questionnaires that were administered to the field, while 19 questionnaires which represent 19.39% were not returned. From Table 3 above it can be concluded that the response rate was good.

4.3 Demographic factors

This section gives a description of the demographic characteristics of the respondents involved in this study. Such a description is considered to be very important in providing a better understanding of the respondents included in the study and therefore provide a good foundation for a detailed discussion of the results based on the stipulated objectives of study. The demographic characteristics included designation, gender, age, level of education, the position held in the school and years of service.

4.3.1 Response on the basis of Gender

Table 4: Gender of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid MALE	30	38.0	38.0	38.0
FEMALE	49	62.0	62.0	100.0
Total	79	100.0	100.0	

Source: Research Data (2013)

According to the above study the total number of males who responded was 30 representing 38% of total respondents while females were 62%. From Table 4 of the study it can be concluded that the majority of respondents were females.

4.3.2 Response on the basis of Age of Respondents

Table 5: Age Category

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20-30	6	7.6	7.6	7.6
31-40	30	38.0	38.0	45.6
42-50	35	44.3	44.3	89.9
51 and above	8	10.1	10.1	100.0
Total	79	100.0	100.0	

Source: Research Data (2013)

According to the study above, 7.59% were 20-30 years; 31-40 years and 41-50 years represented 39.97% and 44.30% of the respondents respectively whereas 10.13%

represented respondents above the age of 51. Based on Table 5 above it can be inferred that majority of the respondents were 41-50 years.

4.3.3: Highest Level of Education of Respondents

Table 6: Level of education

	Frequency	Percent	Valid Percent	Cumulative Percent
Primary level	1	1.3	1.3	1.3
Secondary level	17	21.5	21.5	22.8
Diploma level	25	31.6	31.6	54.4
Degree level	30	38.0	38.0	92.4
certificate	4	5.1	5.1	97.5
masters	2	2.5	2.5	100.0
Total	79	100.0	100.0	

Source: Research Data (2013)

The study above shows the level of education of various respondents. According to the table, the respondents who were diploma holders representing 31.6%, secondary level 21.5%; bachelor's degree had a total number of 30 respondents which translates to 38.0% of the total respondents while masters level, certificate level and primary level had a percentage of 2.5%, 5.1% and 1.3% respectively. From Table 6 above it can be deduced that the majority of the respondents were diploma holders.

4.3.4: Respondent Categories

Table 7: Respondent Categories

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Head teacher	4	5.1	5.1	5.1
Deputy Head teacher	4	5.1	5.1	10.1
Teacher	71	89.9	89.9	100.0
Total	79	100.0	100.0	

Source: Research Data (2013)

The above study shows the category of people who responded among sample category. 89.87% of teachers responded, while 5.06% responded for both head teachers and deputy head teachers. From table 7, it can be concluded that that there was a good response rate across the sample categories, hence a fairly representative response.

4.3.5 Response based on the Period worked in the school

Table 8: Years of service/working period

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0-4	17	21.5	21.5	21.5
5-9	27	34.2	34.2	55.7
10-19	22	27.8	27.8	83.5
above 20	13	16.5	16.5	100.0
Total	79	100.0	100.0	

Source: Research Data (2013)

The study above shows the number of years that various respondents have been in the schools. From the study 21.5% of the total respondents indicated that they have been in the school for a period of than 0-4 years, 34.2% said that they been in the school for a period of 5-9 years, 27.8% indicated that they have been in the school for a period of 10-19 years; 16.5% stated that they have been in the school for a period of more than 20 years. From Table 8 above, it can be deduced that a majority of the respondents have been in the schools for a period of 5-9 years.

4.4 Adoption of E-learning by the schools

Table 9: Response on whether their school has adopted e- learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	36	45.6	45.6	45.6
No	43	54.4	54.4	100.0
Total	79	100.0	100.0	

Source: Research Data (2013)

The study above (table 9) shows the views of the respondents on whether their school has adopted e- learning. Based on the study 45.6% indicated that their school has adopted e- learning, while 54.4% indicated that their school has not adopted e- learning. From the study it can be deduced that majority of the schools have not adopted E-learning.

4.5 How the program is supported

Table 10: How the Program is supported

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid school	7	8.9	18.4	18.4
parents	17	21.5	44.7	63.2
private partnerships	6	7.6	15.8	78.9
donors	8	10.1	21.1	100.0
Total	38	48.1	100.0	
Missing System	41	51.9		
Total	79	100.0		

Source: Research Data (2013)

The study above shows how E-learning is supported in the respondent's schools. According to the table, majority of the supporters were parents, representing 44.74% while the school, donors, and private partnerships had a percentage of 18.42%, 21.05% and 15.79% respectively. From Table 10 above it can be deduced that the majority of the supporters were parents.

4.6 Challenges faced in the implementation of E-learning

Table 11: If the schools face any challenges in the implementation of e- learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	70	88.6	90.9	90.9
no	7	8.9	9.1	100.0
Total	77	97.5	100.0	
Missing System	2	2.5		
Total	79	100.0		

Source: Research Data (2013)

The study above shows the views of the respondents on whether their schools are facing any challenges in the implementation of E-learning. Based on the study 90.91% indicated that their schools face challenges, while 9.09% indicated that their schools do not face any challenges. From the study it can be deduced that majority of the schools face challenges in the implementation of E-learning programs this is shown in the table 11 above.

4.7 Factors that affect the E-learning program

Table 12: Factors that affect the E-learning program in the schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ICT infrastructure	12	15.2	15.8	15.8
	E-learning curricula and design model	11	13.9	14.5	30.3
	teacher ICT skills	10	12.7	13.2	43.4
	Teacher readiness	9	11.4	11.8	55.3
	all of them	34	43.0	44.7	100.0
	Total	76	96.2	100.0	
Missing	System	3	3.8		
Total		79	100.0		

Source: Research Data (2013)

The table 12 above shows the views of the respondents on the factors that affect the E-learning program in their schools. 11.8% of the respondents stated that teacher readiness affect E-learning program in their schools, 13.2% and 15.8% of the respondents stated teacher ICT skills and ICT infrastructure respectively whereas 44.7% of the respondents indicated that all of the above factors affect the E-learning program in their schools. From the study it can be deduced that all the above factors affect the E-learning program in the respondents' schools

4.7.1 Factors that affect the E-learning program/Has your school adopted E-learning?

Which factors affect E-learning program in your school and has your school adopted E-learning cross tabulation

Table 13: Factors that affect the E-learning program in the schools/adoption of E-learning

	Has your school adopted E-learning?		Total	
	Yes	No		
Which factors affect E-learning program in your school	ICT infrastructure	6	6	12
	E-learning curricula and design model	4	7	11
	teacher ICT skills	1	9	10
	Teacher readiness	8	1	9
	all of them	16	18	34
Total		35	41	76

Source: Research Data (2013)

The above study shows a cross tabulation on the adoption of E-learning against the factors that affect the E-learning program in the schools. The table 13 above shows that those schools that have adopted E-learning biggest challenges teacher readiness and ICT infrastructure, while the schools that have not adopted E-learning are affected greatly by all the above challenges i.e. ICT infrastructure, E-learning curricula design and model, teacher ICT skills and teacher readiness.

4.8 Adoption of E- learning in Public Schools

Table 14: Response on the adoption of e- learning in public schools

	SA	A	N	D	SD
government develops digital curriculum support materials for secondary schools	38.00%	27.80%	8.90%	15.20%	10.10%
Schools have been rolling out E-learning programs with the support of both the private sector and government.	8.90%	48.10%	21.50%	12.70%	8.90%
E-learning makes it possible to enroll large number of learners without restrictions	3.80%	32.90%	34.20%	16.50%	12.70%
adoption of E-learning has made education more affordable and accessible increasing enrollments and improving course quality	8.90%	29.10%	24.10%	21.50%	16.50%

Source: Research Data (2013)

Table 14 above shows the views of respondents on the adoption of e- learning in public schools. according to the study majority (38.00%), (48.10%) and (29.10%) of the respondents strongly agreed and agreed respectively that: the government develops digital curriculum support materials for primary and secondary schools, schools have been rolling out e learning programs with the support of both the private sector and government and adoption of e learning has made education more affordable and accessible, increasing enrollments and improving course quality. 34.20% of the respondents were neutral on the issue

4.9 ICT infrastructure

Table 15: Response on infrastructure in the adoption of e- learning in public schools

	SA	A	N	D	SD
poor ICT infrastructure coupled with high cost of connectivity and bandwidth are barriers to e learning adoption by schools	55.7%	32.9%	6.3%	1.3%	3.8%
the low teledensity and high cost of installing and maintaining lines are major barriers	19.5%	54.5%	16.9%	3.9%	5.2%
the number of computers is a major barrier in that learners have to share the few that are there when they have classes	22.8%	30.4%	36.7%	3.8%	6.3%
in schools cost of installation, maintenance and expansion of ICT and e learning remain a major challenge	21.5%	36.7%	24.1%	10.1%	7.6%

Source: Research Data (2013)

Table 15 above shows the views of respondents on infrastructure in the adoption of e-learning in public schools. According to the study majority (55.7%), (54.5%), (36.7%) and (36.7%) of the respondents category agreed and strongly agreed and where neutral respectively that: poor ICT infrastructure coupled with high cost of connectivity and bandwidth are barriers to e learning adoption by schools; the low teledensity and high cost of installing and maintaining lines are major barriers; the number of computers is a major barrier in that learners have to share the few that are there when they have classes; in schools cost of installation, maintenance and expansion of ICT and E-learning remain a major challenge

Table 16: Response on the influence of ICT infrastructure on the adoption of e-learning

	Frequency	Percent	Valid Percent	Cumulative Percent
yes	72	91.1	94.7	94.7
no	4	5.1	5.3	100.0
Total	76	96.2	100.0	
Missing System	3	3.8		
Total	79	100.0		

Source: Research Data (2013)

The study above shows responses of respondents on whether ICT infrastructure influences the adoption of E-learning in public schools in Kenya. From the study 94.7% of the total respondents agree that ICT infrastructure influences the adoption of E-learning in public schools in Kenya, while 5.3% disagree that the adoption of E-learning in public schools in Kenya is influenced by ICT infrastructure. From Table 18 it can be concluded that ICT infrastructure influences the adoption of E-learning in public schools in Kenya

Qualitatively, a majority of respondents acknowledged that secondary schools face tough financial situations which constrain their ability to pay for costly infrastructure, sustaining computer networks as the costs of installation, maintenance and expansion remain high. These have to be included in their already constrained budgets.

4.10 E-learning Curricula

Table 17: Response on the influence of E-learning curricula on adoption of E-learning

	SA	A	N	D	SD
e-learning has not been fully integrated into the curricula	57.0%	26.6%	5.1%	3.8%	7.6%
teachers are not fully aware of or familiar with e-learning content and outcomes	26.6%	40.5%	15.2%	12.7%	5.1%
e-learning imposes a new learning method that teachers are required to embrace in order to ensure the success of e-learning implementation	12.7%	41.8%	27.8%	8.9%	8.9%
e-learning curricula are not designed in such a way that is relevant to needs of the learners' quality of delivery and learning approaches	7.6%	39.2%	24.1%	21.5%	7.6%

Source: Research Data (2013)

Table 17 above shows the views of respondents on the adoption of e-learning curricula and design. According to the study majority (57.0%), (40.5%), (41.8%) and (39.2%) of the respondents agreed and strongly agreed respectively that: E-learning has not been fully integrated into their curricula; teachers are not fully aware of or familiar with E-learning content and outcomes; E-learning imposes a new learning method that teachers are required to embrace in order to ensure the success of e learning implementation and E-learning curricula are not designed in such a way that is relevant to needs of the learners' quality of delivery and learning approaches.

Table 18: Influence of E-learning curricula on adoption of E-learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	46	58.2	59.7	59.7
no	31	39.2	40.3	100.0
Total	77	97.5	100.0	
Missing System	2	2.5		
Total	79	100.0		

Source: Research Data (2013)

The study above shows responses of respondents on whether E-learning curricula affect the adoption of E-learning in public schools. From the study 59.7% of the total respondents agree that E-learning curricula affects the adoption of E-learning in public schools, while 40.3% disagree that the adoption of E-learning in public schools in Kenya is affected by E-learning curricula. From Table 18 it can be concluded that E-learning curricula affects the adoption of E-learning in public schools.

Qualitatively, majority of the respondents indicated that there is lack of effort among school officials to guide educational institutions for a smooth transition to E-learning and to design E-learning curriculum to guide instructors on how to deliver information to students with respect to the amount of information and the time that will be required.

4.11 ICT Skills

Table 19: Response on the influence of skills on adoption of E-learning

	SA	A	N	D	SD
limited or non availability of ICT trained teaching staff militate against capacity building in public secondary schools	49.4%	31.6%	7.6%	6.3%	5.1%
most public secondary schools are still at the low level of ICT integration into teaching and learning due to inadequate human resources	39.2%	35.4%	15.2%	6.3%	3.8%
inadequate computers skills among teachers and other support staff is an indicator of lack of in-class technology integration	13.9%	46.8%	26.6%	8.9%	3.8%
teachers need to acquire knowledge and skills in handling ICT techniques that aid teaching and e-learning situations	16.5%	25.3%	43.0%	7.6%	7.6%

Source: Research Data (2013)

Table 19 above shows the views of respondents on the Teacher ICT skills. According to the study majority (49.4%), (39.2%), (46.8%) of the respondents agreed and strongly agreed respectively that: limited or non availability of ICT trained teaching staff militate against capacity building in public secondary schools; most public secondary schools are still at the low level of ICT integration into teaching and learning due to inadequate human resources; inadequate computers skills among teachers and other support staff is an indicator of lack of in-class technology integration; while 43.0% of the respondents were neutral on the factor that teachers need to acquire knowledge and skills in handling ICT techniques that aid teaching and E-learning situations.

Table 20: Influence of skills on adoption of E-learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	51	64.6	65.4	65.4
no	27	34.2	34.6	100.0
Total	78	98.7	100.0	
Missing System	1	1.3		
Total	79	100.0		

Source: Research Data (2013)

The study above shows responses of respondents on whether skills affect the adoption of E-learning in public schools in Kenya. From the study 64.6% of the total respondents agree that E-learning curricula affects the adoption of E-learning in public schools, while 34.2% disagree that the adoption of E-learning in public schools in Kenya is affected by E-learning curricula. From Table 20, it can be concluded that skills affect the adoption of E-learning in public schools.

4.12 Teacher's Readiness

Table 21: Response on the influence of teacher's readiness on adoption of E-learning

	SA	A	N	D	SD
teachers need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an e-learning teaching style	57.0%	27.8%	8.9%	2.5%	3.8%
teachers who may not be technologically literate resist the innovation of technology because of fear of losing their jobs if e-learning is implemented	16.5%	53.2%	15.2%	10.1%	5.1%
teacher readiness of teaching with e-learning is important because it can support the expansion of e-learning program	45.6%	27.8%	17.7%	3.8%	5.1%
providing supportive e-learning environments for teachers early on can gradually build up e-learning as an effective teaching method	21.5%	41.8%	24.1%	2.5%	10.1%

Source: Research Data (2013)

The study shows the views of respondents on teacher's readiness in the adoption of E-learning curricula and design. Majority (57.0%), (53.2%), (45.6%) and (41.8%) of the respondents strongly agreed and agreed respectively that: teachers need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an E-learning teaching style; teachers who may not be technological literate resist the innovation of technology because of fear of losing their jobs if E-learning is implemented; teacher readiness of teaching with E-learning is important, because it can support the expansion e learning program; providing supportive E-learning environments for teachers early on, can gradually build up E-learning as an effective teaching method, as shown on table 21 above

Table 22: Influence of teacher’s readiness on adoption of E-learning

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	49	62.0	70.0	70.0
no	21	26.6	30.0	100.0
Total	70	88.6	100.0	
Missing System	9	11.4		
Total	79	100.0		

Source: Research Data (2013)

The study above shows responses of respondents on whether teachers’ readiness influences the adoption of E-learning in public schools. From the study 70.0% of the total respondents agree that teacher’s readiness influences the adoption of E-learning in public schools, while 30.0% disagree that the adoption of E-learning in public schools is influenced by teacher’s readiness. From Table 22 it can be concluded that teacher’s readiness influences the adoption of E-learning in public schools.

Qualitatively, majority of the respondents pointed out that most teachers have been teaching in traditional manner hence are not technologically literate and sometimes may even resist because of the worry about losing their jobs if E-learning is implemented. Hence for successful adoption of E-learning teachers require new kinds of skills, capabilities attitudes, and empowerment

4.13 Effects of factors affecting adoption of E-learning on the adoption of E-learning

Table 23: Effects of factors affecting adoption of E-learning on the adoption of E-learning

N=79

	Mean	Std. Deviation	Skewness	Kurtosis
ICT infrastructure	8.6753	3.29050	.898	1.430
E-learning curricula	8.1429	3.04231	1.282	1.242
Teacher ICT skills	8.9241	3.19363	1.161	1.144
Teacher readiness	8.5190	3.59794	1.415	1.514
Valid N (listwise)				

Source: Research Data (2013)

The above table 23 shows a summary of the descriptive statistics; Mean, Standard Deviation, Skewness and Kurtosis. The measures of distribution show how much a distribution is different from a normal distribution.

Generally, skewness values greater than 0, depict a right skewed distribution - most values are concentrated on left of the mean, with extreme values to the right. Skewness values less than 0 show a left skewed distribution - most values are concentrated on the right of the mean, with extreme values to the left and skewness values equal to 0 show that the distribution is symmetrical around the mean. All the above variable i.e ICT infrastructure, E-learning Curricula, Teacher ICT skills and Teacher readiness have a Skewness value greater than zero showing a right skewed distribution.

Kurtosis refers to the degree to which your histogram is flat or peaked. It also can be thought of as referring to the degree to which your numbers are squashed together or spread out. Kurtosis value greater than 3 imply a leptokurtic distribution, a distribution sharper than a normal distribution, with values concentrated around the mean and thicker tails. This means high probability for extreme values. Kurtosis value less than 3 on the other hand show a platykurtic distribution, which is flatter than a normal distribution with a wider peak. The probability for extreme values is less than those of a normal

distribution, and the values are wider spread around the mean. A kurtosis value equal to 3 represents a normal distribution also known as a mesokurtic distribution. The variables of the study above have kurtosis values less than 3 and a platykurtic distribution.

Standard deviation measures the spread of a set of observations. The larger the standard deviation is, the more spread out the observations are. The variables all have a standard deviation greater than 3. This shows that their values are deviated from the mean (positive deviation as they have positive skewness). The mean is the average across the observations. It is the most widely used measure of central tendency. ICT infrastructure has a mean of 3.29050, E-learning curricula has a mean value of 3.04231, Teacher ICT skills has a mean value of 3.19363 and Teacher readiness has a mean of 3.19363

4.15 Hypotheses testing

The researcher sought to test the hypotheses by testing the relationship between the dependent and the independent variables. The research sought to find the relationship between the adoption of E-learning and the variables of adoption of E-learning i.e. Adoption of E-learning, ICT infrastructure, E-learning curricula, Teacher ICT skills and teacher readiness.

The results shown on table 24 below, show the correlation analysis on the relationship between adoption of E-learning, ICT infrastructure, E-learning curricula, ICT skills and Teacher readiness at 0.01 significance level; ICT infrastructure ($r=0.409$, $p=0.000$, $N=74$), E-learning curricula ($r=0.445$, $p=0.000$, $N=77$), ICT skills ($r=0.293$, $p=0.009$, $N=78$) revealed a positive and significant relationship to the dependent variable whereas, Teacher readiness ($r=0.189$, $p=0.118$, $N=70$).

Table 24: Correlation between adoption of E-learning and the variables of adoption of E-learning

		Adoption of e-learning	ICT Infrastructure	E-learning curricula	ICT skills	Teacher readiness
Adoption of e-learning	Pearson Correlation	1				
ICT Infrastructure	Pearson Correlation	.409**	1			
E-learning curricula	Pearson Correlation	.445**	.418**	1		
ICT skills	Pearson Correlation	.293**	.428**	.573**	1	
Teacher readiness	Pearson Correlation	.189	.384**	.402**	.634**	1

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

Source: Research Data (2013)

The first hypothesis, Ho1: Technological infrastructure has no influence on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County; was rejected as there was a significance relationship between ICT infrastructure and the

adoption of E-learning in public secondary schools. The technological infrastructure had a Pearson's correlation 0.409 hence a positive relationship. There was also a positive relationship between the adoption of E-learning in public secondary schools and E-learning curricula as the Pearson Correlation coefficient was 0.445. This thus resulted to rejection of the second hypothesis, Ho2: E-learning curricula and design has no influence on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.

Teacher readiness realized a Pearson Correlation of 0.189; this reflects a positive relationship with the adoption of E-learning in public secondary school. The third hypothesis Ho3: Teacher readiness has no effect on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County was also rejected. The fourth hypothesis, Ho4: Teacher ICT skills has no effect on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County was also rejected as there was a positive significant relationship between the two variables. Teacher ICT skills had a Pearson Correlation of 0.293 which depicts a significance relationship. These results imply that ICT infrastructure, E-learning curricula, ICT skills, and Teacher readiness influence the adoption of E-learning in public secondary schools. All the four hypotheses were rejected.

Regression between variables

Table 25: Regression of the dependent variable and the independent variables

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.539 ^a	.291	.244	3.46445

		Un standardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.151	1.774		1.776	.081
	ICT Infrastructure	.259	.156	.212	1.655	.103
	E-learning curricula	.497	.151	.421	3.293	.002
	ICT skills	.032	.188	.025	.169	.866
	Teacher readiness	-.040	.192	-.030	-.208	.836

a. Dependent Variable: Adoption of E-learning

Source: Research Data (2013)

The above table, table 25 shows the relationship between the dependent variable (adoption of E-learning) and the independent variables (ICT infrastructure, E-learning curricula, ICT skills and teacher readiness). In using the regression model $Y = \alpha + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \epsilon$. The following regression equation can be formulated from the above study; $Y = 3.151 + 0.259 X_1 + 0.497 X_2 + 0.032 X_3 - 0.040 X_4 + 1.774$

On the basis of the significance values shown on the table above, the independent variables; ICT Infrastructure (P=0.103), ICT skills (P=0.866) and Teacher readiness (P=0.836) were not found to significantly influence adoption of E-learning in public secondary schools since (P > 0.05). However, E-learning curricula (P=0.002) was found to significantly influence adoption of E-learning since (P < 0.05).

From the study above, the coefficient for ICT infrastructure is 0.259 hence for every unit increase in ICT infrastructure, a 0.259 unit increase on adoption of E-learning is predicted, the coefficients for E-learning curricula and ICT skills have 0.497 and 0.032 coefficients respectively. This shows that there is 0.497 and 0.032 predicted unit increase in adoption of E-learning holding for every unit increase in E-learning curricula and ICT skills respectively holding all other variables constant.

The study used a significance level (alpha) of 0.05 (95%), Degrees of freedom (df) of 4, and two-tailed test. The degree to which independent variables (technological infrastructure, E-learning curricula, ICT skills and teacher readiness) is related to the dependent (adoption of E-learning) is expressed in the positive correlation coefficient (r) = 0.539, coefficient of determination (r^2) = 0.291 indicating 29.1% probability of adoption of E-learning is related to technological infrastructure, E-learning curricula, ICT skills and teacher readiness. This then indicates that there is a significant relationship between technological infrastructure, E-learning curricula and adoption of E-learning in secondary schools.

CHAPTER FIVE:

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The purpose of this chapter was to summarize the findings, discuss and draw conclusions and recommendations on the findings of the main objective of the study which was to assess the factors affecting adoption of E-learning in selected public secondary schools based on the specific objectives of the study which included: To establish the influence of technological infrastructure, E-learning curricula, teacher readiness and teacher ICT skills on the adoption of E-learning in public secondary schools

5.2 Summary of the findings

From the study 94.7% of the total respondents agree that ICT infrastructure influences the adoption of E-learning in public schools in Kenya as most schools have low investment in ICT infrastructure due to high costs of computer hardware, software and related accessories, coupled with high cost of connectivity and bandwidth, absence of electricity, lack of funding, low content development, insufficient building space, lack of available and trained staff, and poor security

From the study 59.7% of the total respondents agree that E-learning curricula affect the adoption of E-learning in public schools since teachers are not fully familiar with E-learning content and outcomes, besides there is lack of effort among school official to guide educational institutions for a smooth transition to E-learning and to design e learning curriculum to guide teachers on how to deliver information to students with respect to the amount of information and the time required. However there are schools which have designed school e- learning curriculum that has created new learning and teaching possibilities that generate greater outcomes

From the study 65.4% of the total respondents agree that teacher's ICT skills influences the adoption of E-learning in public schools as the adoption of E-learning requires ICT trained staff as well as the support staff. For E-learning to be successfully adopted, there is need to capacity build the teachers in order for them to deliver the digital content. There is therefore need for teachers to acquire skills and knowledge in handling information communication techniques that aid in E-learning and teaching situations.

From the study 70.0% of the total respondents agree that teacher's readiness influences the adoption of E-learning in public schools as the program requires new knowledge and skills that allows teachers to shift from traditional teaching experiences to an E-learning and teaching style. The adoption of E-learning implementations has resulted in the need for development of new skills and competencies among teachers as most teachers who have been teaching in traditional manners are not technologically literate and sometimes may even resist because of the worry about losing their jobs if E-learning is implemented, because of their inadequate skills. Hence for successful adoption of e learning teachers require new kinds of skills, capabilities attitudes, and empowerment

5.3 Discussion of the findings

5.3.1 ICT Infrastructure

The first objective of this study sought to investigate the influence of ICT Infrastructure on the adoption of E-learning in public secondary schools. The first hypothesis for the study was Ho1: Technological infrastructure has no influence on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County.

Most respondents of the study agreed that poor ICT infrastructure coupled with high cost of connectivity and bandwidth are barriers to e learning adoption by schools. On the basis of means scores the various factors of this objective had the stated means; Hardware and software (M=1.65), Internet connectivity (M=2.21), Number of computers (M=2.41), Maintenance and installation costs (M=2.46)

The study findings suggest that 94.7% of the respondents agree that ICT infrastructure affects the adoption of E-learning in public secondary schools. These findings are in line with the BECTA Report (2003) which identifies the key barriers to using computers as: Lack of access to appropriate ICT equipment, Lack of time for training, exploration and preparation, Lack of models of good practice in ICT, Negative attitudes towards ICTs in education, Computer anxiety and a lack of confidence, Fear of change and a lack of personal change management skills, Unreliable equipment and lack of technical, administrative and institutional support

Majority of respondents acknowledged that secondary schools face tough financial situations which constrain their ability to pay for costly infrastructure, sustaining computer networks as the costs of installation, maintenance and expansion remain high. These have to be included in their already constrained budgets. From the study, the coefficient for ICT infrastructure is 0.259 hence for every unit increase in ICT infrastructure, a 0.259 unit increase on adoption of E-learning is predicted. The technological infrastructure had a Pearson's correlation 0.409 hence a positive relationship. The first hypothesis was therefore rejected.

5.3.2 E-learning Curricula

The second objective of this study investigated the influence of E-learning curricula on the adoption of E-learning in public secondary schools and the hypothesis was Ho2: E-learning curricula and designs have no influence on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County. Majority of the respondents indicated that there is lack of effort among school officials to guide educational institutions for a smooth transition to E-learning and to design E-learning curriculum to guide instructors on how to deliver information to students with respect to the amount of information and the time that will be required.

From the study 59.7% of the total respondents agreed that E-learning curricula affects the adoption of E-learning in public schools, while 40.3% disagree that the adoption of E-learning in public schools in Kenya is affected by E-learning curricula. 57.0% of the

respondents further strongly agreed that E-learning has not been fully integrated into the curricula. This echoes the findings of Angehrn et al, (2001) which shows that many of the existing E-learning systems do not seem to take full advantage of the possibilities offered by current technologies essentially because they are designed to reflect the classic, lecture style teaching approach. There was also a positive relationship between the adoption of E-learning in public secondary schools and E-learning curricula as the Pearson Correlation coefficient was 0.445. This thus resulted to rejection of the second hypothesis.

5.3.3 ICT Skills

The third objective examined the effect of teacher ICT skills on the adoption of E-learning and used the third hypothesis Ho3: ICT skills have no effect on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County. A total of 51 respondents which translates to 65.4% of the respondents agreed that ICT skills influence the adoption of E-learning. On the basis of the descriptive statistics (Mean (M), standard deviation (SD) and variance (V)) the various ICT skills independent variable factors displayed their means, standard deviations and variances; Availability of ICT staff (M= 1.86, SD=1.129), ICT integration in teaching (M=2.00, SD=1.074), ICT skills in support staff (M=2.42, SD=0.969) and Teacher ICT skills (M=2.65, SD=1.086). The factors if ranked by means, teacher ICT skills factor leads with a mean of 2.65.

From the study the coefficient for ICT skills is 0.032 meaning that for every unit increase in ICT skills, a 0.032 unit increase on the adoption of E-learning is predicted holding all the other variables constant hence rejection of the third hypothesis. There is therefore need for teachers and other support staff in the schools to acquire skills and knowledge in handling information communication techniques that aid in E-learning and teaching situations. This is in line with the concerns raised by Levinsen, (2007) which state that successful design and management of E-learning courses require new skills to overcome major problems such as user needs analysis, instructional design, development of materials, delivery of information, and evaluation of the course

5.3.4 Teacher readiness

The effect of teacher readiness on the adoption of E-learning was the fourth objective that this study sought to examine. 57% of the respondents strongly agreed that teachers need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an E-learning teaching style. These findings are in line with those of Levinsen, (2007) which state that successful design and management of E-learning courses require new skills to overcome major problems such as user needs analysis, instructional design, development of materials, delivery of information, and evaluation of the course. The hypothesis Ho4: Teacher readiness has no effect on the adoption of E-learning in public secondary schools in Makadara Sub-county, Nairobi County, was rejected as the variable depicted a positive relationship of value 0.189 as in the correlation analysis.

70% of the respondents agreed that teacher readiness influences the adoption of E-learning in public secondary schools. However, in the correlation analysis, the study reveals that Teacher readiness ($r=0.189$, $p=0.118$, $N=70$) has a negative relationship to adoption of E-learning in public secondary schools.

5.4 Conclusion

From the study, we can conclude that technological infrastructure, E-learning curricula, teacher readiness and teacher ICT skills influence the adoption of E-learning in public secondary schools. From the regression analysis, it has been established that, the coefficient for ICT infrastructure is 0.259 hence for every unit increase in ICT infrastructure, a 0.259 unit increase on adoption of E-learning is predicted. The coefficients for E-learning curricula and ICT skills have 0.497 and 0.032 coefficients respectively. This shows that there is 0.497 and 0.032 predicted unit increase in adoption of E-learning holding for every unit increase in E-learning curricula and ICT skills respectively holding all other variables constant. 57% of the respondents strongly agreed that teachers need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an E-learning teaching style. The coefficient of determination of the regression analysis (r^2) = 0.291 indicating 29.1% probability of

adoption of E-learning is related to technological infrastructure, E-learning curricula, ICT skills and teacher readiness. This then indicates that there is a significant relationship between technological infrastructure, E-learning curricula and adoption of E-learning in secondary schools. These results conclude that ICT infrastructure, E-learning curricula, ICT skills, and Teacher readiness influence the adoption of E-learning in public secondary schools. The entire four hypotheses were rejected.

5.5 Recommendations

There is need for schools to have E-learning infrastructure included in the financial plans (budget lines) to cater for maintenance and expansion of the ICT infrastructure and the acquisition and maintenance and training of teachers and technical staff. A cost sharing model can also be explored in which teachers are assisted to purchase computers through a recovery mechanism as this will facilitate computer acquisition in schools

E-learning curricula may need to be designed in such a way that is relevant in the quality of information with the outside world because students will use different resources besides their instructor. E-learning course curricula may need to be based on learning approaches other than face-to-face course curriculum, which offers students opportunities to discuss their knowledge related to a certain topic rather than only to listen to the instructor as a provider of information.

To assure a smooth transition to E-learning, teachers may need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an E-learning teaching style hence school official need to avail adequate technical support at the beginning of the adoption of e- learning program, and then gradually lessen that instructional structure and the support as teachers become more confident with the E-learning characteristics and skills required for teaching

5.6 Suggestions for Further Research

The study did not survey all the secondary schools in Kenya but surveyed secondary schools in Makadara Sub-county to represent training institutions spread throughout the country posing a comparison challenge. Consequently, it is difficult to generalize the findings of this study to the appraisal process in other secondary schools in the country because of the number of secondary schools studied. Clearly, secondary schools in different parts of the country are subject to the unique environments, local practices and procedures, they are located in hence these and intra-locations differences need to be addressed in the study, however this was not done in this study. However, in depth analysis of the factors was done thus ensuring that generalization of the study findings was possible. However it is important to undertake further comprehensive study on the factors affecting adoption of E-learning, while widening the sample size of the study population

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APPENDICES
APPENDIX I :
INTRODUCTORY LETTER

Dear Respondent

RE: Factors Affecting Adoption of E-Learning in Public secondary schools

I am a student at Egerton University pursuing a Masters Degree in business management as a partial fulfillment of the requirements for the award of Masters Degree in business management. I am undertaking a study entitled “Factors Affecting Adoption of E-Learning Public secondary schools in Makadara Sub-county in Nairobi County”. This information is valuable for coming up with the findings of the study.

Your response is very important to this study because it represents hundreds of others which are not in this sample. Everything you indicate herein will be treated with strict confidentiality. Your name will be in no way connected to the findings of this vital study, the results of which will appear largely in form of statistical reports.

I appreciate you taking your time to fill this questionnaire

Thank you in Advance.

Yours sincerely

Linnet Makori

- b) Parents []
 - c) Private partnerships []
 - d) Donors []
8. Does the school face any challenges in the implementation of e- learning program
Yes [] No []
9. Which of the following factors affect e- learning program in your school?
- a) ICT infrastructure []
 - b) E-learning Curricula and Design Model []
 - c) Teacher ICT Skills []
 - d) Teacher’s Readiness []
 - e) All of them []

PART 2: Adoption of E- learning in Public Secondary schools

Please tick the statement corresponding to your personal opinion for each statement

	Strongly agree	Agree	Neutral	disagree	Strongly disagree
10. Government develops digital curriculum support materials for Secondary Schools.					
11. Schools have been rolling out e-learning programs with the support of both the private sector and government					
12. E-learning makes it possible to enroll a large number of learners without restrictions.					
13. Adoption of e learning has made education more affordable and accessible, increasing enrollments and improving course quality					

PART 3: ICT Infrastructure

Please tick the statement corresponding to your personal opinion for each statement

	Strongly agree	Agree	Neutral	disagree	Strongly disagree
14. Poor ICT infrastructure coupled with high cost of connectivity and bandwidth are barrier to e learning adoption by schools					
15. The low teledensity and high costs of installing and maintaining lines are major barriers. .					
16. The number of computers is a major barrier in that learners have to share the few that are there when they have classes.					
17. In schools the costs of installation, maintenance and expansion of ICT and e-learning remain a challenge					

18. In your opinion does ICT infrastructure influence the adoption of e-learning in public secondary schools in Kenya?

Yes [] No []

PART 4: E-learning Curricula

Please tick the statement corresponding to your personal opinion for each statement

	Strongly agree	Agree	Neutral	disagree	Strongly disagree
19. E- learning has not been fully integrated into their curricula					

20. Teachers are not fully aware of or familiar with e-learning content and outcomes,					
21. E-learning imposes a new learning method that teachers are required to embrace in order to ensure the success of e learning implementation.					
22. E-learning curricula are not designed in such a way that is relevant to needs of the learners' quality of delivery and learning approaches.					

23. In your opinion does e-learning curricula and design affect the adoption of e-learning in public secondary schools?

Yes [] No []

PART 5: Skills

Please tick the statement corresponding to your personal opinion for each statement

	Strongly agree	Agree	Neutral	disagree	Strongly disagree
24. Limited or non-availability of ICT trained teaching staffs militate against capacity building in public secondary schools					
25. Most public secondary schools are still at the low level of ICT integration into teaching, learning, due to inadequate human resources.					
26. Inadequate computer skills among teachers and other support staff is an indicator of the lack of in-class technology integration.					

27. Teachers need to acquire knowledge and skills in handling information and communication techniques that aid teaching and e-learning situations					
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28. In your opinion do skills influence the adoption of e-learning in public secondary schools in Kenya?

Yes [] No []

PART 6: Teacher’s Readiness

Please tick the statement corresponding to your personal opinion for each statement

	Strongly agree	Agree	Neutral	disagree	Strongly disagree
29. Teachers need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an e-learning teaching style.					
30. Teachers who may not be technological literate resist the innovation of technology because of fear of losing their jobs if e-learning is implemented,					
31. Teacher readiness of teaching with e-learning is important, because it can support the expansion e learning program					
32. Providing supportive e-learning environments for teachers early on, can gradually build up e-learning as an effective teaching method.					

33. In your opinion does teacher’s readiness affect the adoption of e-learning in public secondary schools?

Yes [] No []

Thank You for Your Co-Operation

APPENDIX III :
LETTER OF AUTHORITY TO COLLECT DATA

APPENDIX IV :
LIST OF PUBLIC SECONDARY SCHOOLS IN MAKADARA SUB-COUNTY

1. AQUINAS HIGH SCHOOL
2. HIGHWAY SECONDARY SCHOOL
3. OUR LADY OF MERCY SECONDARY SCHOOL SOUTH B
4. NILEROAD SECONDARY
5. BURUBURU GIRLS SECONDARY
6. MAKONGENI HIGH SCHOOL
7. ST ANNE'S GIRLS' SEC SCHOOL
8. ST PATRICK NAIROBI MIXED SECONDARY SCHOOL
9. HURUMA GIRLS' HIGH SCHOOL
10. OFAFA JERICHO HIGH SCHOOL

(MoE 2013)

**APPENDIX V:
CORRELATION RAW OUTPUT**

Correlations

		ADOPTION	INFRASTRUCTURE	CURRICULA	SKILLS	READINESS
ADOPTION	Pearson Correlation	1	.406**	.387**	.262*	.317**
	Sig. (2-tailed)		.000	.001	.020	.004
	N	79	77	77	79	79
INFRASTRUCTURE	Pearson Correlation	.406**	1	.389**	.402**	.427**
	Sig. (2-tailed)	.000		.001	.000	.000
	N	77	77	75	77	77
CURRICULA	Pearson Correlation	.387**	.389**	1	.481**	.546**
	Sig. (2-tailed)	.001	.001		.000	.000
	N	77	75	77	77	77
SKILLS	Pearson Correlation	.262*	.402**	.481**	1	.624**
	Sig. (2-tailed)	.020	.000	.000		.000
	N	79	77	77	79	79
READINESS	Pearson Correlation	.317**	.427**	.546**	.624**	1
	Sig. (2-tailed)	.004	.000	.000	.000	
	N	79	77	77	79	79