

FACTORS INFLUENCING INTEGRATION OF COMPUTER BASED TECHNOLOGIES  
IN TEACHING AND LEARNING: A CASE OF SELECTED SECONDARY SCHOOLS IN  
KISII COUNTY, KENYA

BY

ROSA KEMUNTO KIBAGENDI

A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR AWARD OF THE DEGREE OF MASTERS IN DISTANCE  
EDUCATION OF THE UNIVERSITY OF NAIROBI

## DECLARATION

I declare that this project report is my original work and has not been submitted in any other University for the award of a degree.

Signature..... Date.....

Rosa Kemunto Kibagendi

L45/84355/2012

This research project is submitted for examination with my approval as supervisor

**Signature**

**Date**

Mr. Augustine Mwangi

.....

.....

Lecturer

University of Nairobi

## **DEDICATION**

This study is dedicated to my loving husband Daniel Orondo, my children and parents.

## **ACKNOWLEDGEMENT**

First and foremost my special gratitude goes to the Almighty God whom I owe the strength and sense of purpose that has enabled me to complete this research project.

This project has been accomplished with the encouragement, support and contributions from a number of people whom I am deeply indebted. I wish to express my sincere gratitude to my supervisor Mr. Augustine Mwangi for his guidance and insight throughout the research project. He gave me ideas that became extremely useful within the academic scope of this project writing. Sincere thanks and appreciation also goes to the entire staff of School of Continuing and Distance Education (SCDE) and in particular Professor Macharia, Dr. A. Ndiretu, Dr. Noam, and Dr. Juliana for their encouragement, advice and contributions in the course of my study. I also wish to thank all the schools that participated in the study without which I could have not succeeded.

I owe special thanks to my family members, who gave me full support in editing, formatting and who were patient with me even when my study was “eating” into the time meant to be spent with them, particularly my sons, Cyprian, Vincent, Peter Maingi, my daughters Edinah, Ann, my son in-law Benson and my daughters in-law Joseline and Cynthia.

Finally, I am highly indebted to my dear loving Husband Mr. Daniel Orondo who stood with me at all times. He gave me lots of hope, encouragement, great support and provision of fees and all the finances that were needed for other logistics for the study.

# TABLE OF CONTENTS

DECLARATION .....	i
DEDICATION .....	ii
ACKNOWLEDGEMENT .....	iii
TABLE OF CONTENTS.....	iv
LIST OF TABLES .....	viii
LIST OF FIGURES.....	ix
LIST OF ABBREVIATIONS AND ACRONYMS .....	x
ABSTRACT.....	xi
CHAPTER ONE: INTRODUCTION .....	1
1.1 Background to the study .....	1
1.2 Statement of the problem .....	4
1.3 Purpose of the study.....	4
1.4 Research objectives.....	4
1.5 Research questions.....	5
1.6 Significance of the study .....	5
1.7 The delimitation of the study .....	6
1.8 Limitations of the study .....	6
1.9 Assumptions of the study.....	6
1.10 Definition of significant terms as used in the study .....	6
1.11 Organization of the study .....	7
CHAPTER TWO: LITRATURE REVIEW.....	8
2.1 Introduction.....	8
2.2 Integration of Computer Based Technologies in teaching and learning.....	8
2.3 Teachers' attitudes towards the integration of Computer-Based Technologies in teaching and learning.....	10
2.4 Teachers' Prior knowledge in CBT and integration of Computer Based Technologies in teaching and learning. ....	12

2.5 Teachers ‘Access to CBT tools and integration of Computer Based Technologies in teaching and learning. ....	14
2.6 Subject taught and integration of Computer Based Technologies in teaching and learning .....	14
2.7 Theoretical frame work.....	16
2.8 Conceptual frame work.....	20
2.9 Chapter summary .....	22
<b>CHAPTER THREE: RESEARCH METHODOLOGY.....</b>	<b>23</b>
3.1 Introduction.....	23
3.2 Research design.....	23
3.3 Target population.....	23
3.4 Sample size and sampling procedure .....	23
3.5 Research instruments. ....	24
3.6 Instrument reliability.....	24
3.7 Instrument validity. ....	25
3.8 Data collection procedure.....	25
3.9 Data analysis procedure .....	25
3.10 Operationalization of variables.....	26
<b>CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION.....</b>	<b>29</b>
4.1 Introduction.....	29
4.2 Response rate.....	29
4.3 Demographic information .....	29
4.3.1 Gender of the respondents.....	29
4.3.2 Age of the respondents.....	30
4.3.3 Teaching experience of the respondents .....	30
4.3.4 Education level of the respondents .....	31
4.3.5 Teachers major teaching subjects .....	32
4.3.6 Computer use experience level of the respondents .....	32
4.3.7 Internet use experience level of the respondents.....	33
4.4 Teachers’ attitude towards Computer Based Technologies.....	34
4.4.1 Use of CBTs as an effective and efficient mode of curriculum delivery .....	34

4.4.2 Use of Computer Based Technologies improves instructional delivery .....	35
4.4.3 Use of Computer Based Technologies enhance learning.....	36
4.4.4 Teachers’ opinion on whether it is easy to plan and prepare a Computer Based Lesson.....	36
<b>4.5 Teachers’ prior knowledge on Computer Based Technologies in teaching and learning ..</b>	<b>37</b>
4.5.1 Teachers’ computer training .....	37
4.5.2 Information on teachers’ teachers’ internet training .....	38
4.5.3 Teachers’ knowledge on various CBT tools use.....	38
4.5.4 CBT knowledge score standards.....	39
<b>4.6 Teachers’ access to Computer Based Technology tools.....</b>	<b>39</b>
4.6.1 Access to CBT tools.....	39
4.6.2 CBT tools score standards.....	40
<b>4.7 Subject taught.....</b>	<b>40</b>
4.7.1 Integration of CBTs and teaching subjects .....	41
4.8 Student Response on CBTS in Teaching and Learning .....	42
<b>CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS</b>	<b>43</b>
.....	
<b>5.1 Introduction.....</b>	<b>43</b>
<b>5.2 Summary of findings.....</b>	<b>43</b>
5.2.1 Attitude .....	43
5.2.2 Prior knowledge .....	43
5.2.3. Access to CBT tools.....	44
5.2.4 Subject taught.....	44
<b>5.3 Discussion of findings .....</b>	<b>44</b>
5.3.1 Teachers’ attitude towards Computer Based Technologies .....	45
5.3.2 Teachers’ prior knowledge in Computer Based Technologies .....	46
5.3.3 Teachers’ access to Computer Based Technology tools .....	46
5.3.4 Subject taught.....	48
<b>5.4 Conclusions.....</b>	<b>48</b>
<b>5.5 Recommendations .....</b>	<b>49</b>
<b>5.6 Suggestions for further research .....</b>	<b>49</b>
<b>REFERENCES.....</b>	<b>50</b>

APPENDICES.....	57
<b>Appendix I: Letter of Introduction .....</b>	<b>57</b>
<b>Appendix II: Questionnaire for the Teachers .....</b>	<b>58</b>
<b>Appendix III: Student Group Discussion Questions.....</b>	<b>66</b>
<b>Appendix IV: Public Secondary Schools with Computers in Kisii County.....</b>	<b>70</b>
<b>Appendix V: Krejcie&amp; Morgan Table, (1970).....</b>	<b>71</b>



## LIST OF TABLES

Table 4.1: Gender of the respondents.....	29
Table4.2: Age of the respondents.....	30
Table 4.3: Teaching experience of Respondents.....	30
Table 4.4: Educational level of respondents.....	31
Table 4.5: Major teaching subjects .....	32
Table 4.6: Computer use experience level .....	33
Table 4.7: Internet use experience level.....	33
Table 4.8: CBT as an effective and efficient mode of curriculum delivery.....	34
Table 4.9: Use of CBTs improves instructional delivery.....	35
Table 4.10: CBTs as tool to enhance learning.....	36
Table 4.11: Planning and preparing a Computer Based lesson.....	36
Table 4.12: Information on teacher’s Computer training.....	37
Table 4.13: Information on teacher’s Internet training.....	38
Table 4.14: Teachers’ CBT knowledge score standards.....	38
Table4.15: Teacher CBT knowledge score.....	39
Table 4.16: interpretation of access to CBT tools score standards.....	40
Table 4.17: Access to CBT tools score.....	40
Table 4.18: Comparison of variance between and within groups of subjects taught.....	41

## **LIST OF FIGURES**

Figure 1: Conceptual framework.....	21
Figure 2: Operationalization of variables.....	27

## **LIST OF ABBREVIATIONS AND ACRONYMS**

CBT – Computer Based Technologies

SPSS – Statistical Packages for Social Sciences

SCDE – School of Continuing and Distance Education

UK – United Kingdom

CD- ROM – Compact Disk-Read Only Memory

CCK – Communication Commission of Kenya

USAID – United States Agency of International Development

NEPAD – New Partnership for African Development

HIV – Human Immunodeficiency Virus

AIDS – Acquired Immune Deficiency Syndrome

USA – United States of America

LCD – Liquid Cristal Display

OHP – Over Head Projector

CD – Compact Disk

DVD – Digital Versatile Display

MS – Micro Soft

KIE – Kenya Institute of Education

WWW – World Wide Web

## **ABSTRACT**

This study investigated factors influencing the integration of Computer Based Technologies (CBTs) in teaching and learning by teachers in secondary schools. In the recent past, Research studies indicates that CBTs is an effective means of increasing educational opportunities in Kenyan secondary schools; though most schools do not use these technologies with integration with the curriculum. Although Investments on Computer Based Technologies (CBTs) infrastructure, equipment and professional development to improve education throughout the country have been put in place in most of the learning institutions, still integrating this technology into classroom practices is still a challenge to many schools. It was critical therefore, to study the factors which influenced integration of CBTs in teaching and learning. The effectiveness of the implementation of CBTs was not depended on several factors. The factors that were analyzed included, attitude towards CBT, prior knowledge in CBT, access to CBT tools by both teachers and students and subject taught by individual teachers. Successful initiation and implementation of educational technology in schools' program dependent strongly on teachers' support and attitudes, the availability and accessibility of CBT resources, teachers' prior knowledge on CBT and the subject taught by individual teachers. The study used a descriptive survey design using questionnaires for teachers and group discussion questions for students as major data collection instruments, and this was specifically used on public secondary school teachers whose schools had computers. The schools with computers were purposively sampled. The data was stored in Microsoft excel and was studied using Statistical Packages for Social Sciences. Qualitative data was presented using frequency tables and percentages. The study findings were used to make recommendations on the factors influencing CBTs in teaching and learning. The recommendations were meant to assist the school education stakeholders to improve on integration of CBTs in teaching and learning. Chapter Four previews data analysis, presentation and interpretation. The data was analyzed as per the study objectives and was presented using tables and discussions were made by use of frequencies and percentages. The presentation was made based on the research objectives. Chapter five summarizes findings, discussions, conclusions and recommendations. The findings of the research report were that factors influencing integration of computer based technologies were; teachers' attitude, teachers' prior knowledge and teachers' access to CBT tools. They were closely related according to research findings. Recommendations were also made and these were that intensive workshops and training for teachers on CBTs should be carried out to enable all teachers to have computer knowledge. The CBT tools and facilities should be strategically placed for more accessibility to the teachers. Suggestions were also made on further research on the effect of school administration support and learner support in integration of CBTs in curriculum delivery.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the study

Today's society is becoming more and more dependent on electronic devices in both business and education. Computers in classrooms are one of the best ways of creating motivation to both instructors and learners in the process of teaching and learning. Locally, nationally and internationally, learners are accessing knowledge through computers and web based technologies. The educational institutions which have adopted CBT in curriculum delivery, have realized how much the teachers and learners are enjoying the kind of experiences they are gaining through the interaction among themselves Tomei, (2005). This has made learning more interesting, effective and efficient to the learners and the society. The use of CBTs in the classroom increases students' ability to reach a wide variety of educational resources available in the world. It increases interactivity with various scholars in the world and therefore facilitates self-paced learning where the student is able to learn what is appropriate at their own time.

Integrating technology into curricula with the intent of positively influencing teaching and learning has been a state of evolution over the past 20 years Dias &Atkinson, (2001).

When CBT is used appropriately, it can help to strengthen the importance of education to increasingly networked society, raising quality of education by making teaching and learning an active process connected to real life Zaman et al, (2011).

Technology can support pedagogical, curricular and assessment reforms, which intend to support the process of knowledge creation Kozma,( 2005).

Previous studies have shown that an appropriate use of CBT can raise educational quality and relate learning to real-life situations. According to Flanagan and Jacobsen (2003), technology integration is meant to be cross-curricular rather than a separate course or topic in itself.

Technology should be used as a tool to support the educational objectives such as skills for searching and assessing information, cooperation, communication and problem solving which are important for the preparation of children for the knowledge society Drent & Meelissen, (2007).

Hence every classroom teacher should use learning technologies to enhance their student learning in every subject because it can engage the thinking, decision making, problem solving and reasoning behaviors of students Grabe & Grabe,(2001).

CBT plays a very important role in enhancing the quality of education. However, successful implementation requires strategic planning. As Wagner et al (2005) observes, “Research suggests that simply putting computers into schools is not enough to impact student learning”.

Despite successful efforts to acquire computer hardware and to raise the student computer ratio, there has been less success in identifying, which computer skills should be taught in school and how computers can be used for teaching and learning Dooling,(2000). Thus, current attention has turned to what is actually happening in the classroom with computer technology.

Other studies show that the adoption and use of CBT in schools can promote collaborative, active and lifelong learning, increase student motivation, offer better access to information and shared working resources, deepen understanding, help student think and communicate creatively. Khan et al, (2012).

All over the world, different countries have consistently initiated programs that are directed in making teachers use CBT in their day-today teaching and learning practices in school. According to Jimoyiannis & Komis (2007) countries like UK, Singapore, China, Australia and European Union have established programs that aim at enhancing teachers’ skills in using CBT during teaching and learning processes.

Computer Based Technologies (CBTs) create the formation of virtual learning communities where teachers and students contact each other anywhere anytime to share experiences, observations and information. Students interact to work on group assignments as assigned by their teachers. Many schools in developing countries including Kenya are yet to embrace the use of these technologies in classrooms. Currently the technological tools available to the average learner include print materials, radio, television and video. Even in schools where pioneer projects have been sponsored by donors and the government, integration of CBT is not yet mainstreamed Ayere et al,(2010). Most schools use face to face delivery

methodologies with print media being the major instructional material. It is necessary for such institutions to rapidly invest in integrating computer based technologies in education.

Computers can aid learning in the Computer Assisted Instruction mode, for instance, computers individualize learning while giving immediate reinforcement and response. Computers are a multimedia tool. With integrated graphic, print, audio and video capabilities, computers can effectively link several technologies. Interactive video and CD ROM technologies can be infused into computer based instructional units, lessons and learning environments. Computers are interactive microcomputer systems incorporating different software packages and are highly flexible and optimize learner control. Computer technology is advancing very fast and innovations are steadily emerging while corresponding reduces. The cost conscious educators need to understand the contemporary needs and future technical requirements in order to effectively access the volatile computer hardware and software market. Technology makes it easy access to education locally, regionally, nationally, and internationally as networking can link resources and individuals wherever they are (Tomei, (2005).

Effective integration of Computer Based Technologies in curriculum delivery can only be a effective if all teachers and students have access to global information and World Wide Web (www) in order to get equal opportunities for computer interaction and response. Access to computers at school and at home can increase both teacher and student progress. Most importantly they should have the basic skills on computers and on online communication Khan et al, (2012).

Computer learning projects have been initiated in some secondary schools in Kenya by various donor groups. Some of these include computer donations and networking by Kenya telecommunications regulator, Communications Commission of Kenya (CCK) and partnership programs by the Clinton global initiatives, United States Agency of International Development (USAID) and New Partnership for African Development (NEPAD).

The government in association with New Partnership for African Development (NEPAD) launched a computer learning project in (2005) in six schools in the whole country. These schools were picked from six provinces then. The six schools were chosen to be centers of excellence in the integration of CBT which would act out as role models to the other schools

in the provinces they represented. These schools were provided with computers, internet applications and electronic learning materials.

Computer Based Technologies enhance effectiveness in teaching and learning processes through access to the internet, www and computers. The research aimed at establishing the factors influencing the integration of Computer Based Technologies in teaching and learning in public secondary schools.

### **1.2 Statement of the problem**

As far as the integration of Computer Based Technologies (CBT) in curriculum delivery in secondary schools is concerned, it has been generally noted that it has been received at a very slow rate in Kenya. Ayere et al (2010) discovered significant differences in levels of integration of CBT in curriculum subjects, in the use of e materials in educational research and availability of libraries. Technology keeps on advancing in all sectors and education is one of the sectors where computer technology should be embraced by secondary school stakeholders. The only worry is the rate at which the integration is being embraced by various institutions and individual teachers. The rates vary from one institution to another and one individual teacher to another. It was therefore, very important to investigate and understand how teachers have integrated technologies in education and factors which have influenced the integration of technology within Kisii county, Kenya.

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

The purpose of the study is to investigate the factors that have influenced the integration of Computer Based Technologies in teaching and learning in secondary schools in Kisii County, Kenya.

### **1.4 Research objectives**

The objectives of this research are;

- i. To establish the extent to which attitudes of secondary school teachers influence the integration of Computer Based Technologies in teaching and learning.
- ii. To determine the extent to which secondary school teachers' prior knowledge influence the integration of Computer Based Technologies in teaching and learning.
- iii. To determine the extent to which secondary school teachers' access to CBT tools influences integration of Computer Based Technologies in teaching and learning.



- iv. To establish the extent to which the subject taught by secondary school teachers' influence integration of Computer Based Technologies in teaching and learning.

### **1.5 Research questions**

The research questions are;

- i. To what extent does the attitude of teachers influence the integration of Computer Based Technologies in teaching and learning in secondary schools?
- ii. How much does the teachers' prior knowledge on CBT influence the integration of Computer Based Technologies in teaching and learning?
- iii. To what extent does the teachers' access to CBT tools influence the integration of Computer Based Technologies in teaching and learning?
- iv. To what extent does the subject taught influence the integration of Computer Based Technologies in teaching and learning in secondary schools?

### **1.6 Significance of the study**

The research will enable various stakeholders in education at different levels to be in a position to develop proper plans and strategies in dealing with the factors that influence the integration of computer Based Technologies in teaching and learning in secondary schools. These include, the Ministry of Education whose work is to develop the curriculum. Using the findings of the study, the curriculum developers will be able to develop a curriculum that can be easily implemented by the teachers using CBTs in their lesson delivery..

The results of the study will enable the government to offer sufficient support by providing relevant infrastructure and equipment to all secondary schools. This may include, funding schools to connect electricity, buy computers and connect internet and other necessary equipment for the delivery of content. CBT policy makers will also use this study to formulate policies that will be supportive to the integration of CBTs in secondary schools.

The teachers will use the findings to come up with appropriate plans in implementing Computer Based Technologies in teaching and learning. The study will be a foundation for future research studies to matters related to teachers' integrating Computer Based Technologies in teaching and learning process.

### **1.7 The delimitation of the study**

The study is confined to the influencers to integration of Computer Based Technologies in teaching and learning in secondary schools in Kisii County. The factors which were included in the study were the attitude of 372 teachers using technologies in giving instruction in the various subjects taught. The study explored the extent to which teachers' prior knowledge and access to computers could influence the integration of Computer Based Technologies in teaching and learning in the 24 public secondary schools in Kisii County with computer facilities. The sample population was drawn from the 24 selected secondary schools with computers.

### **1.8 Limitations of the study**

The sample schools were visited at a time when end of term exams were taking place. Most of the teachers were busy administering and marking exams, therefore questionnaires were distributed to the teachers and left behind to be filled and collected at a later time. The students' discussion was held during lunch break and games time. In other schools there was no time at all, the researcher had to make several repeat visits in order to get the students for the discussions. It was expensive financially to move from one school to another considering that repeat visits were made and above all it was not very easy to get permission from the administrators to get out of the work place for the research. However, regardless of all the struggles I succeeded to collect the data.

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

The assumptions made were that, the respondents would be available, cooperative and would give correct information; that the Principals would give consent for members of staff and students to participate in the study; that the respondents would give a true picture of what was going on in their institutions with regard to computer technologies and that the use of computers in the delivery of instructional content was a viable method that they were aware of. These assumptions came true to the expectations of the researcher. The respondents were available, cooperative and were able to provide information concerning CBTs in their schools. The principals were very cooperative.

### **1.10 Definition of significant terms as used in the study**

**Computer based technologies:** Technologies which use a computer as a form of central component for delivery of educational content in a classroom situation.

**CBT Integration:** Teaching while incorporating Computer Based Technologies for efficiency and effectiveness of content delivery. This comprises any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form that can be used by teachers and learners.

**Attitudes:** These are beliefs and feelings about something, for example the feelings which the teachers have towards the use of computers in content delivery.

**Prior Knowledge:** This is an already existing experience on something for example, teachers' prior computer knowledge and skills in the use of computers in the delivery of contents.

**Access:** The right to have and use something, especially to find information and this specifically refers to how much both teachers and pupils are able to use computer to retrieve information without any obstacles.

**Subject Taught:** An area of knowledge with content such as information, ideas, facts or opinions that have to be delivered by teachers by use of Computer Technologies.

**Teaching and Learning:** Giving information, ideas, knowledge and facts to someone who needs it, especially learners through computer technologies in a classroom situation.

### **1.11 Organization of the study**

The study consists of five chapters. Chapter One consists of introduction that gives the background to the study, statement of the research problem, the purpose of the study, delimitations of the study ,scope of the study, assumptions of the study, definitions of terms and presentation of the operationalization table. Chapter Two consists of literature review that has an introduction, teachers' attitude, teachers' prior knowledge, teachers' access to CBT tools and subjects taught. Chapter Three consists of an introduction, research design, location of the study, target population, sample size and sampling procedure, research instruments, reliability, validity and data collection and data analysis procedure. Chapter Four consists of an introduction, response rate, general characteristics of respondents, teachers; attitudes, teachers' prior knowledge, teachers' access to CBT tools and subjects taught. Chapter Five covers introduction, summary of findings, discussions, conclusions and recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter consists of the literature review on integration of Computer Based Technologies in teaching and learning, views of other researchers in different fields concerning CBT integration in teaching and learning, attitude and CBT integration, prior knowledge in CBT, access to CBT tools and its implications in teaching and learning, finally subject taught across the whole syllabus and integration in teaching and learning.

#### **2.2 Integration of Computer Based Technologies in teaching and learning**

Methodology in teaching keeps on changing from time to time depending on the modern way of living. It is critical for teachers to change from the old ways of direct face to face teaching to the use of modern technologies in order to cope up with the present situation. Technology keeps on advancing in all sectors and education is one of the sectors where technology should be embraced by both students and teachers. Computer Based Technologies in teaching is one of the most recent methodologies that has been innovated and is now increasingly being integrated into curriculum delivery.

Computers began to be used in schools in the early 1980s, several researchers suggest that CBT outdo barriers to education for students and teachers (Mooiji et al, 2007), (Cross et al, 2007), (Bhattacharya, 2007). Provides average combination of work and family life education (Bhattacharya, 2007). (Barolli et al, 2009) notes; how much students have today and how much they use CBT, how CBT could improve the process of teaching and learning within the academic sphere are today key problems. Realization of the process of teaching and learning through CBT can be achieved through a series of factors as; the necessary infrastructure related to CBT together with relevant technologies, preparation accompanied with training of human that will work with this technology and supported in this infrastructure. Association with people in the process of the world globalization, contribution in the field of information, overhaul of the classic model of giving information, exchange of ideas, recycling of time, formal learning; learning with measurement, collaboration, activation of attention, commitment, materialization efficiency will engage students to do more work. CBT adds to the growth of knowledge and human capital which provides many benefits for stakeholders in

education. Modern technologies offer a lot of means of improving teaching and learning in the classroom Lefebvre, Daudelin & Loisel, (2006).

According to Punie, (2007) CBT promotes learning; it motivates an individual and the same time gives the capability to do certain activities. Its presence betters the learning environment and enriches the learning experience. Markovac & Rogulja, (2009), Punie,(2007) claims that ,CBT enables the child to process learning content in an entertaining and interesting way, it also provides the foundation for long life learning and personal development, it as well brings about digital competence and technical competences, which are needed for employment, education, self-development and general activeness in the modern society. Punie, (2007) claim that the usage of CBT is essential for the child because it can help him (or her) integrate in the” e- society” meanwhile the child can use its potential, which is still little understood by adults.

Most research has proven the benefits to the quality of education, Al-Ansari,(2006), CBT gives room to the creation of digital resources like digital libraries where the students, teachers and professionals can access research materials and course materials from any place at any time (Bhattacharya & Sharma, 2007). CBT does away with time barriers in education for learners as well as teachers. It eliminates Geographical barriers as learners can log on from any place (Mooiji, 2007; Cross & Adam, 2007). CBT provides fast dissemination of education to target disadvantaged groups (Chandra & Patkar, 2007). (Polmp et al, (2007) state that experience of many teachers, who are early innovators, are that the use of CBT is motivating for the students as well as for the teachers themselves. Dawes, (2001), is of the view that new technologies have the potential to support education across the curriculum and provide opportunities for effective Communication between teachers and students in ways that have not been possible before. CBT in education has the potential to be influential in bringing out changes in ways of teaching. However, this potential may not be easily realized as (Dawes, 2001), underlined that teachers may be a problem in implementing the CBTs.

Due to CBT’s importance in society and possibly in the future of education, there is great need to integrate computer Based Technologies in teaching in secondary schools as this will be an great step in improving the quality of teaching and learning. It is evident from other researchers that there are barriers which are likely to prevent the integration of CBT in teaching. Blanskat, Blaimire & Kefala (2006), argue that although educators appear to

acknowledge the value of CBT in schools, difficulties continue to be encountered during the process of adopting these technologies. Identifying these barriers may assist teachers and educators to overcome them and become successful technology adopters Al-Alwani, (2005). The barriers range from lack of knowledge in CBT, lack of access to CBT tools, lack of motivation, and poor leadership among others. Furthermore, lack of appropriate course content for teachers and learners and confidence among teachers have affected integration of CBTs Hennessey et al, (2010).

According to Hennessey et al, as quoted by Nengo (2012), they have identified physical and cultural factors that affect CBT integration by teachers, these include lack of reliable access to electricity, limited technology, infrastructure such as (internet access, band width, hardware and software provision), language of instruction and available software, geographical factors such as terrain and communication, demographic factors such as population size, industry and dispersion, poverty, HIV and AIDS, and lack of political will. Teacher literacy, skills, attitudes, inadequate autonomy and knowledge to evaluate the use and role of CBT in teaching have hindered teachers' readiness and confidence in using CBTs while Kozma, Machkee, Quellmaz & Zelles (2004), identified insufficient time available in classes, in teacher's schedules and lack of policy in the use of computers as factors affecting integration of CBTS.

Incorporating technology into teaching and learning is a slow, time-consuming process that requires substantial levels of support and encouragement. Research has shown that those schools which receive substantial assistance and attention in technology integration are making the most progress. Support by the administration of the school to the teachers is very vital, for example, giving opportunities for teachers to train in CBT, make presentations in technology conferences, and participate in technology demonstration projects. The study aimed to establish the extent to which attitude, prior knowledge, access to CBT tools and subject taught influenced CBTS in curriculum delivery.

### **2.3 Teachers' attitudes towards the integration of Computer-Based Technologies in teaching and learning**

Attitudes are beliefs and feelings that one has towards something which can be positive or negative. (Oscamp & Schultz (2005), have defined the word attitude as a state of readiness, organized through experience, exerting a directive or dynamic influence upon individual's response to all objects and situations to which it is related. Attitude is a predisposition to

respond favorable or unfavorable to an object, person or event Ajzen, (1988). In order to initiate and implement educational technology in school's program depends strongly on teachers' attitudes. It is believed that if teachers perceived technology programs as neither fulfilling their needs nor their students' needs, it is likely that they will not integrate the technology into their teaching and learning. In this case, attitudes are the beliefs and feelings teachers have towards technology in teaching.

Attitudes are formed and changed depending on situations and experiences. Teachers are change agents in schools. They play very important roles in integrating technology into schools Teo, (2008). Among factors that influence successful integration of CBT into teaching are teachers' attitudes and beliefs towards technology Hew & Brush, (2007); Keengwe & Onchwari, (2008). Tella, (2007) found that computer use was predicted by intentions to use and that perceived usefulness was also strongly linked to these intentions. If teachers' attitudes are positive towards the use of educational technology then they can easily provide useful insight about the adoption and integration of CBT into teaching and learning processes .More so, the success of any initiatives to implement technology in an educational program depends strongly on the support and attitudes of teachers involved Hew & Brush, (2007);Yildirim,( 2007).

According to Ng &Gunstone, (2003), teachers are at the center of the successful implementation of these technologies in the classroom. Teachers attitudes towards computers is an important factor related to teachers' attitude toward the effective use of computers in education. Therefore, the question of teacher attitude towards computer is critical to the effective use of computers in education Yushau, (2006). Teachers' computer –based-teaching in their classrooms will depend on their attitude toward computers. Literature suggests that teachers attitude towards computer is a key factor regarding to their CBT uses for instruction Hung & Hsu, (2007).

Recent studies show that, the successful implementation of the educational technologies depends largely on the attitudes of the educators. Especially in Israel Klieger, et al,( 2010), Australia Pierce & Ball, (2009), USA Glazer et al,(2009);Hixon & Buckenmeyer, (2009) ;Liu & Szabo, (2009), Turkey Goktas et al, (2008), Asia Sang et al, (2010) based studies still consider the attitudes of teachers towards CBT as an important issue.

According to Crawley & Fine, (2004), a teacher's attitude or belief is one of the several important human factors which have a significant impact on the computer adoption and the implementation of the technology in the classroom. Bullock, (2004), found that, the attitude of teachers is a major enabling factor in the adoption of the technology. Similarly, Kersaint, et al, (2003), found that the teachers with positive attitudes towards the technology feels more comfortable while using it and usually incorporate it into their teaching activities. Therefore, the teachers' attitude towards computers is one of the significant factors in enhancing the quality of computer usage for instruction. Bayramoglu, (2007) points out that, teachers' negative attitudes towards computers changed after training about computer use. He claims that the training created positive and significant differences on the attitude towards www, self-efficacy and perceived web usefulness. When the teachers perceive CBT as a beneficial, compatible instrument with their current activities, they will demonstrate positive attitudes towards CBT in education.

According to Macleod, (2009), the most straightforward way of finding out about someone's attitude would be to ask them. One way to measure attitude is to construct Likert scale items to which the subject would respond. The research sort to establish the extent to which attitudes of teachers influence the integration of Computer Based Technologies in teaching and learning in secondary schools.

#### **2.4 Teachers' Prior knowledge in CBT and integration of Computer Based Technologies in teaching and learning.**

For teaching and learning to be effective and efficient, teachers must be competent enough in the methodologies they use in the dissemination of instruction. Teachers tend to use methods in which they feel competent Gachenga, (2007). Teachers need to be computer competent. Computer competence is defined as being able to handle a wide range of varying computer applications for various purposes, Tondeur et al, (2008).

According to Pelgrum, (2001), the success of educational innovations depends largely on the skills and knowledge of teachers. He found that teachers' lack of knowledge and skills was the second most inhibiting obstacle to the use of computers in schools Pelgrum & Law et al (2003). In the United States, Knezek & Christensen, (2000), hypothesized that high levels of attitude, skills and knowledge (proficiency), and tools (level of access) would produce high levels of technology integration that will reflect on student achievements positively. Their



model postulated that educators with high levels of skill, knowledge and tools would exhibit higher levels of technology in the classroom. Therefore, teachers should develop their competence based on the educational goals they want to accomplish with the help of CBT.

According to Bordbar, (2010), most of the teachers who reported negative or neutral attitude towards the integration of CBT into teaching and learning processes lacked knowledge and skills that would enable them to make “informed decision”. Therefore, teachers’ acquisition of appropriate CBT and pedagogical skills that are necessary for CBT is crucial. It is only possible if they have necessary skills in CBT that they will attempt to integrate CBT in their teaching and learning. Teacher and student training both initial and in-service, are a prerequisite for the ability of education to use CBT in teaching and learning processes.

Teachers who regularly use CBT have confidence in using CBT; perceive it to be useful in their personal work and for their teaching and plan to extend their use further in the future. Teachers who are using CBT according to according to, Cox et al, (1999), have found it easier, more fun for them and their students, more diverse, more motivating to the students and more enjoyable. Additional personal factors are; improving presentation of materials, allowing greater access to computers for personal use, giving more power to the teachers in the school, giving the teacher more prestige, making the teachers’ administration more efficient and providing professional support through the internet

Institutions need to set goals and objectives to be achieved. The set goals and objectives will enable the identification of the kind of technology required to achieve them. Once the technology is identified, competence of the teachers to use the technology will be given priority by providing CBT integration guides and know-how. Teachers’ accessibility to necessary CBT integration guides, know-how and experience on concepts that have virtual manipulation resources, employ CBT-process-based teaching and learning activities Wakhaya,(2010)l. Such facilities are necessary for enhancing knowledge on CBT.The study aimed at determining the extent to which secondary school teachers’ prior knowledge influences the integration of Computer Based Technologies in teaching and learning.

## **2.5 Teachers 'Access to CBT tools and integration of Computer Based Technologies in teaching and learning.**

Wakhaya, (2010), investigated the relationship that existed between access and use of CBT tools and rate at which they were used, purpose and type of teaching and learning activities in teaching mathematics. The study 'revealed a averagely strong correlation between mathematics teachers' access and use of CBT tools' and frequency of use in teaching mathematics. Teachers who access CBT tools frequently employed computers, Liquid Cristal Display (LCD) or Over Head Projector (OHP) in mathematics lesson, multimedia, Compact Disk (CD), Digital Versatile Display (DVD) and cyber schools and Encarta, internet resources for lesson preparation, math related computer or internet games or activities, MS Power Point simulations or animations to illustrate math concepts; interactive CBT math resources as well as data base for math related records. It was evident that mathematics teachers with planned access and use of CBT infrastructure took time to plan on what and how to integrate technology in teaching, Wakhaya, (2010).

Ayere et al, (2010), attributed more use of CBT in teaching to availability of internet and other CBT equipment and materials which made integration easier as teachers easily accessed the materials or directed learners to relevant sources. Schools that had more access to the internet and e-libraries recorded more integration of CBT in teaching and learning. The study recommended that a school that has a CBT program should seek to be connected to the internet and to be in possession of the e-content relevant to the curriculum taught. It was also recommended that the government finds a way of exposing more schools to e-learning centers within specified education localities. The implication is that, teachers' access to CBT tools is likely to influence integration of CBTs in teaching and learning. Therefore, the study sort to determine the extent to which secondary school teachers' access to CBT tools influences integration of Computer Based Technologies in teaching and learning.

## **2.6 Subject taught and integration of Computer Based Technologies in teaching and learning**

Wakhaya, (2010), investigated the influence of the use of CBT on teaching and learning Mathematics in secondary schools in Nairobi Province, Kenya. The study sought to explain the status and influence of CBT integration in teaching and learning mathematics. It also sought to establish the influence of computers, scientific calculators and internet connectivity on teaching and learning mathematics besides computers being taught as an examinable

subject. The main objective was to assess the influence of experience in CBT tools use, extent of CBT tools access and use in teaching and learning mathematics.

According to this research, secondary schools that are well equipped with computer technology are at different levels of embracing CBT integration in teaching and learning mathematics. It was realized that the level of CBT integration was low due to the rate of capacity of teachers to use the tools for subject teaching. The findings showed that factors of experience and knowledge in CBT influenced CBT integration in teaching and learning mathematics. The findings also revealed that non-systematic implementation and mainstream of CBT tools in teaching and learning mathematics had led to poor integration of CBT in teaching and learning activities and related management of schools.

Ayere et al, (2010), compared the application of e-learning in New Partnership for African Development (NEPAD) and non-NEPAD schools in Kenya. The study identified significant differences in levels of integration of CBT in curriculum subjects, the differences in use of materials in education research, availability of e-libraries and significant differences in academic performance of NEPAD and non-NEPAD schools attributed to e-learning. The findings indicated that e-learning produces significantly better results in teaching-learning outcomes in secondary schools. According to the analysis made, the use of CBT in teaching other subjects in NEPAD schools was more significantly frequent than in non- NEPAD schools. The following CBT equipment found in the NEPAD schools contribute to the frequent use and integration of CBT in teaching and learning. These include; Smart boards, E-libraries, Liquid Crystal disc (LCD) projects, availability of internet connectivity among others. The teachers and learners accessed the materials easily; the subject teachers were able to give instruction and directed learners to relevant sources as per the subjects. This gives an implication that; the subject taught by individual teachers is likely to influence the integration of computer based technologies in teaching and learning. Thus, the study sort to establish the extent to which subject taught by secondary school teachers influences integration of Computer Based Technologies in teaching and learning.

## **2.7 Theoretical frame work**

Theoretical frame work is a group of related ideas and concepts that provide guidance to a research project. The theory that was used in this study was Diffusion of Innovation Theory. Diffusion of Innovations theory seeks to explain how, why, and at what rate new idea and technology spreads through culture. This theory was developed by Everett Rogers, (1962). It is one of the oldest Social Science theories. It originated in communication to explain how, over time, an idea or product gains momentum and diffuses through a specific population or social system. The result of this diffusion is that people, as part of a social system, adopt a new idea, behavior or product. Adoption means that a person does something differently than what they had previously, (that is, purchase or use a new product, acquire and perform a new behavior). The key to adoption is that the person must perceive the idea, behavior or product as new or innovative. It is through this that diffusion is possible Les, Robinson, (2009).

The independent variable is the one to which different subjects are exposed in different degrees or the variable on which the groups of subjects to be compared are different Kathuri & Pals, (1993). Therefore, the independent variable is expected to bring about change in the dependent variables. The dependent variable in this study is Integration of Computer Based Technologies in teaching and learning. Innovation diffusion models help to understand and explain the ways and stages through which teachers will adapt Computer Based Technologies in teaching and learning. The models will as well enable education administrators to design, develop and implement projects in a way which will facilitate and enhance the adoption of Computer Based Technologies in teaching and learning.

Adoption of a new idea, behavior or product does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt the innovation than others. Researchers have found that people who adopt an innovation early have different characteristics than people who adopt an innovation later. When promoting an innovation to a target population, it is important to understand the characteristics of the target population that will help or hinder adoption of the innovation. There are various strategies used to appeal to the different adopter categories. Diffusion researchers believe that a population can be broken down into five different segments, based on their propensity to adopt a specific innovation; these are; innovators, early adopters, early majority, late majority and laggards. Each group has its own “personality”, at least as far as its attitude to a particular innovation goes. The first adopter categories are Innovators which takes 2.5%; these are people who want to be

venturesome in new ideas. They are very willing to take risks and often the first to develop new ideas. There is very little to be done to appeal to this population.

The second category is; Early adopters which takes 13.5%; these are people who represent opinion leaders. They enjoy leadership roles, and embrace change opportunities. They are already aware of the need to change and so are very comfortable adopting new ideas. Strategies to appeal to this population include how-to manuals and information sheets on implementation. They do not need information to convince them to change. The third category is early majority which takes 34%; these people can rarely be leaders, but can adopt new ideas before the average person. All that said, they typically need to see evidence that innovation works before they become willing to adopt it. Strategies to appeal to this population include success stories and evidence of the innovations' effectiveness. The fourth category is late majority which takes 34%; these people are skeptical of change and will only adopt an innovation after it has been tried by the majority. Strategies to appeal to this population include information on how many other people have tried the innovation and have adopted it successfully. The fifth category is, Laggards which are 16%; these kind of people are dominated by tradition and very conservative. They are very skeptical of change and are the hardest group to bring on board. Strategies to appeal to this population include statistics, fear appeals, and pressure from people in the other adopter groups.

It is presumed that any given teacher is likely to fall under one of these categories of adopters in integrating CBTs in their teaching and learning. In this case, it is important to identify the teachers by their category and therefore, formulate strategies for adoption of Computer Based Technologies. Robinson, (2009), in a summary of diffusion of innovations, presents five qualities that determine the success of an innovation. The qualities make valuable checklist to frame focus group discussion. They can help identify weaknesses to be addressed when improving behavior. The first quality is relative advantage. This is the degree to which an innovation is perceived as better than the previous generation by a particular group of users, measured in terms that matter to them, like economic advantage, personal control, time saving, social prestige, convenience or satisfaction. The greater the perceived relative advantage, the more rapid its rate of adaption is likely to be. The implication is that, for the teachers to adapt Computer Based Technologies in teaching and learning, they have to perceive them positively, that is, the teachers should have positive attitudes towards technology.

The second one is compatibility; if an innovation is compatible with their values, norms and practices, it is likely to be adapted more rapidly as compared to an innovation that is incompatible. The assumption here is that, the teachers are likely to adapt the use of Computer Based Technologies in teaching and learning, if they are perceived as being compatible with their values, past experiences and needs. The third is complexity; if the innovation is too difficult an individual will not likely adopt it. New ideas which are easier to understand are adapted faster than those that require the adapter to have new skill and understanding. Teachers are likely to adapt Computer Based Technologies in teaching and learning, if they perceive technology as easy to learn and understand.

The fourth quality is trial ability; this refers to the extent to which an innovation can be tried within a limited level. If a user has hard time using and trying it, there is a likelihood of less adoption. The implication is that the teachers should have an opportunity to access to CBT tools to gain more experience and as they continue, they are likely to incorporate them in their teaching and learning. The fifth one is observable results; an innovation that is more visible will drive communication among individuals and peers and personal networks. This creates more positive or negative reactions. The implication is that, teachers should allowed to share technological experiences among themselves to enable them to adapt computer based technologies in teaching and learning.

Essentials to diffusion are the notion that the idea, practice or product that is communicated is new. Rodgers, (1995), came up with four basic elements of diffusion. First is innovation which helps one to understand and explain stages through which new ideas can be adapted. Second is communication, this entails exchange of information on new idea by means of communication channel. Thirdly time, this describes several aspects of diffusion which range from firstly the stages through which an individual passes from initial knowledge of an innovation to the stages of persuasion, decision, implementation and confirmation. Secondly the relative period that an individual chooses to adopt an innovation compared with others and thirdly an innovation's rate of adoption in a system. Rodgers, (1995). The final element of diffusion is social system. Social system creates parameters that affect diffusion, through norms of communication and behaviors, through the roles of opinion leaders and change agents and through the types of decision making that exist.

Diffusion researchers have identified factors that can help or hinder the sharing of information about new technologies. The First factor is relative advantage; this refers to the degree to which an innovation is perceived to offer enhanced benefits compared to those of existing technologies. The benefits can be expressed in terms of economic advantage, social prestige, conveniences, time saving, satisfaction, personal control among others. The implication is that for teachers to adapt Compute Based Technologies in teaching, the technology should be perceived as consistent with the values, past experiences and needs of adapters. Secondly, compatibility; it refers to how closely a new technology aligns with the existing one. The more compatible the new technology is the more likely it is to be adapted. This can be expressed in terms of existing values, believes which can be easily incorporated into the curriculum.

Thirdly, is characteristics of change agents, this is the person who has the responsibility of encouraging the adoption of the technology within a particular institution, group or audience. The change agent has an important role where he/she acts as a mediator who understands the teachers' needs in terms of technology. The change agent simplifies the innovation in a way that it can be adopted easily. New ideas that are easier to understand are adapted faster than the difficult ones. The implication is that, the government policy on CBT and the school administration should offer support that will facilitate the adoption of Computer Based Technologies in teaching and learning. The fourth factor is trial ability which refers to the extent to which an innovation can be experimented within a limited basis. The implication here is that teachers should be given an opportunity to experiment the use of CBTs in their teaching and that the more they experiment the more they are likely to adopt CBTs in teaching and learning.

According to Rodgers, (1995), diffusion of innovation occurs in five stages: awareness, interest, evaluation, trial and adoption respectively. Awareness exposes the teachers to the innovation i.e., technology and the exposure leads the teacher to become interested in the technology and therefore craves for more information about it. Evaluation of the information follows where individuals try to apply the innovation using the information available. Finally the individuals adapt the innovation and continue using it. The importance of Diffusion of Innovations Theory in the integration of Computer Based Technologies in teaching and learning is that, integration is likely to succeed if focus is based on satisfying the needs of the teachers and learners.

## **2.8 Conceptual frame work**

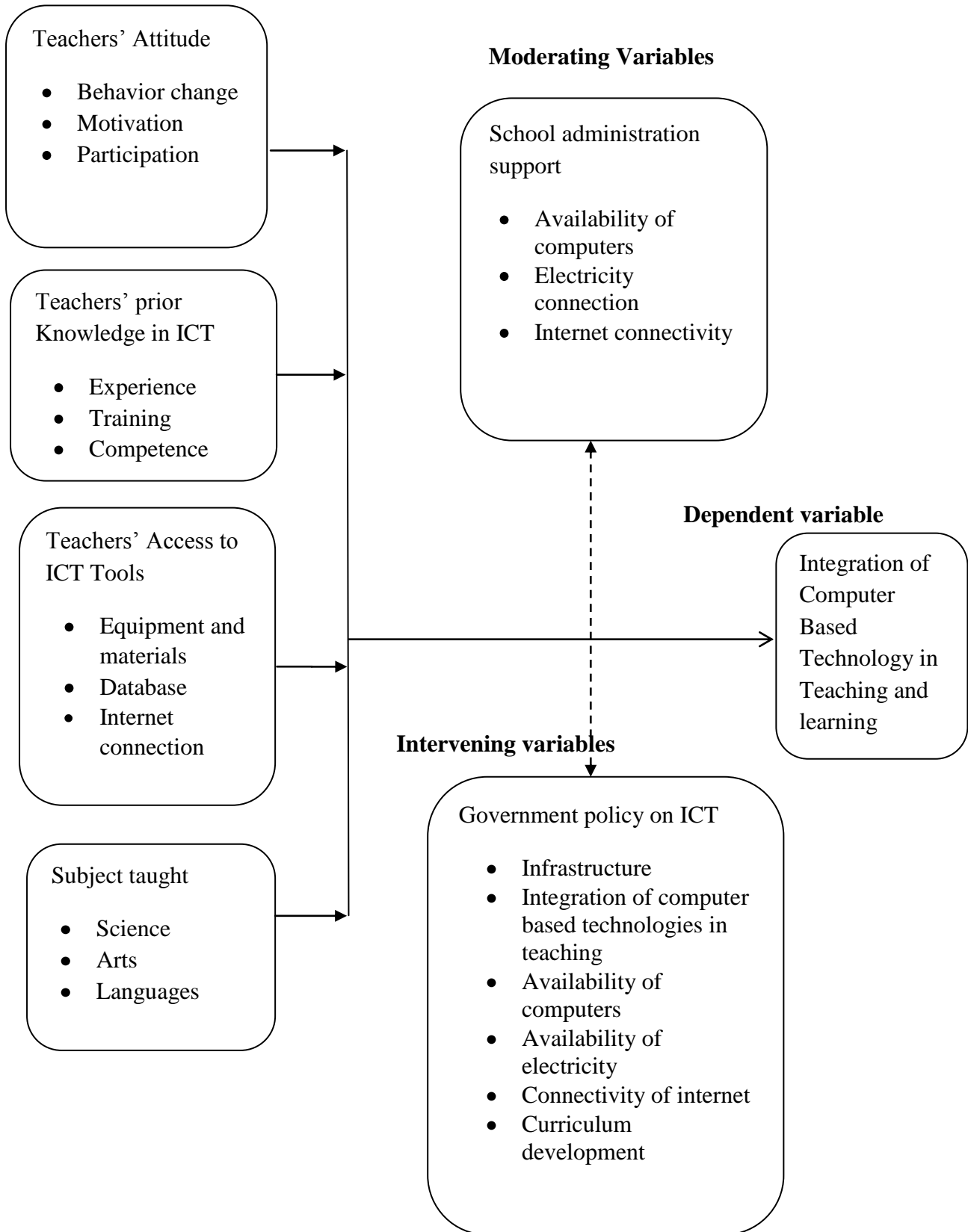
The study is divided into various parts; dependent variables, independent variables, moderating variables and intervening variables. The dependent variable is the integration of Computer Based Technologies in teaching and learning in secondary schools. The independent variables are the attitudes the teachers have towards Computer Based Technologies as a method of instruction, availability and access to CBT facilities, the teachers' knowledge and skills in CBT and subject taught.

School administration support in CBT is a moderating variable in the research. Moderating variables behaves like an independent variable in that; it has a significant contributory effect on the relationship between the dependent and the independent variable. Government policy on CBT is an intervening variable but it is not easy to measure the nature of their influence.



**Figure 1: Conceptual Framework**

**Independent Variables**



The study investigated the level of use of Computer-Based Technologies in teaching and learning content as dependent variable. It also investigated the teachers' attitude towards the use of CBTs in teaching, which was detected from the teachers motivation and participation in the use of CBTs in giving instruction, the teachers prior knowledge and skills, whether they had undergone any training in CBT, the experience they had and how confident and competent they were in the use of CBT in teaching and learning, access to CBT facilities in school, whether there was availability of computers, internet connectivity, equipment and other materials including Data base for giving instruction, subject taught and how often CBT's were used in content delivery.

## **2.9 Chapter summary**

Based on previous studies, attitude, knowledge, access to CBT tools, influences integration of Computer Based Technologies. There existed a gap in knowledge on the influence of the factors in integration of Computer Based Technologies in teaching and learning in secondary schools. There was no significant difference in subject taught across the curriculum. It was critical that the influence be established for future implementation of Computer Based Technologies in teaching and learning.

The conceptual framework presented the relationship between independent variables which were; teachers' attitude to CBTs, teachers' prior knowledge to CBTs teachers' access to CBT tools, subject taught and the dependent variable, integration of CBTs in teaching and learning.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines and describes the research design, sample size and sampling procedures. It also examines the research instruments, validity and reliability, data collection and data analysis procedures that were used in this study.

#### **3.2 Research design**

The research used a descriptive survey design which is easily used to investigate phenomena in their natural environment. A survey design provides a quantitative and numeric description of trends, attitudes or opinions of a population by studying a sample of the population (Croswell 2003). Descriptive survey design makes it easy to use a variety of data collection instruments. The data collected was used to examine the already existing integration of computer based technologies in curriculum instruction by the target population. The sample population was drawn from 107 teachers, and 500 students in five selected public secondary schools with computers in Kisii County.

#### **3.3 Target population**

A population is the complete set of relevant units of analysis, or data. It can as well be referred to as the sum of all cases that conform to some designated set of specifications Isidor Chain, (1992). The target population in the study was 372 teachers and 1308 Form three students whose schools have computers spread in public secondary schools in Kisii County. A list of secondary schools in Kisii County with computer facilities was obtained from Kisii County Education office as shown in appendix (IV).

#### **3.4 Sample size and sampling procedure**

All the twenty four schools with computers in Kisii County were purposively sampled to participate in this study. Probability and non-probability sampling procedures were used to come up with the sample size and sampling procedures. Non probability sampling is used at a time a researcher needs to get information from given sources. Purposive sampling, one type of non-probability procedures, was used in selecting five schools from the 24 public secondary schools. According to Best & Kahn, (2006), purposive sampling assists the researcher build a sample that is average to their specific needs.

Probability sampling was used in choosing secondary schools. According to Gay et al, (2009), probability sampling uses techniques that allow the researcher to specify the probability, or chance, that each member of a particular population is selected for the sample. Simple random sampling was used, as it gave equal chances of participation to each member of the population. It is useful because the researcher is able to make generalizations thus seeking representativeness of the larger population Cohen et al., (2007). It also allows the researcher to apply inferential statistics to the data and provide equal chance of selection for each element of the target population Kombo& Tromp, (2006).

A sample of five schools was purposively selected based on the following categories; One from each category within Kisii county; National school; County Girls' school, County Boy's school; sub-county boarding school; sub-county mixed day school. Random sampling was applied to select the teachers from the five schools. Form three students were preferred in the study because they had stayed in school longer and were more knowledgeable on CBTs in their schools. The total number of teachers and form three students in the five selected schools was 107 and 500 respectively. The students were given group discussion questions in groups of 30 to 40 students. A sample size of 86 teachers selected from all the five categories was determined using Krejcie & Morgan table for calculating sample size as stated in their 1970 article "Determining Sample size for research activities" Education and Psychological Measurement,( 1970).

### **3.5 Research instruments.**

Data was collected using questionnaires for the teachers and students' group discussion questions. The aim of the research instruments was to enable the researcher to collect data on the teachers' background, attitude, knowledge, access to CBT and subject taught.

### **3.6 Instrument reliability.**

Mugenda & Mugenda,(2009),defines reliability as a measure of the degree to which a research yields constant results after being repeated severally. Research is influenced by a random error, when random error increases, reliability decreases. Pilot study was carried out where two members of staff and two form three students from three schools were chosen randomly and the research instruments were administered. The reliability coefficient of the instruments was calculated using Pearson correlation coefficient that was computed to evaluate the extent to which the content of the questionnaire was consistent in producing the

same response every time the instrument was administered. The feedback was used to validate the instruments in readiness for the actual study. A reliability coefficient of at least 0.7 is accepted as recommended by Wiersma & Jurs, (2005). The research instrument was reliable because it had a reliability coefficient of 0.8. This method is more practical in that it does not require two administration of the same or an alternative form test.

### **3.7 Instrument validity.**

Validity refers to the appropriateness, meaningfulness and usefulness of an inference that a researcher draws based on data obtained through the use of any instrument. It is also the degree to which results obtained from the analysis of the data represent the phenomena under study, Mugenda & Mugenda, (2003). The basic validity is content-validity which is the degree to which a measuring instrument gives adequate coverage of the topic under study, and its determination is basically judgmental and intuitive, Kothari, (2003). To a certain the validity of the instrument, expert opinion was sought from colleagues who had formulated similar questionnaires and had already been validated.

### **3.8 Data collection procedure**

The researcher prepared questionnaires for the teachers and students' group discussion questions. They covered the key areas of the research objectives. This included attitudes, prior knowledge, and access to CBTs, subject taught, and demographic information. The researcher visited a few sample schools for piloting the instruments their validity and reliability. Before the study begun, the questionnaires were distributed to each teacher and groups of 30 to 40 students in each selected school.

### **3.9 Data analysis procedure**

The data was collected from sample population from sample schools identified. Data was compiled according to the research objectives. The results of the questionnaires were scrutinized for completeness for the preparation of its analysis. It was correctly coded for ease of use with Statistical Package for Social Sciences. The easiest way to represent data according to Brinker, (1988) is in descriptive statistics, that is; tables, and distributions which gave a summary of data about single variable. Descriptive statistics enabled the researcher to meaningfully describe a distribution of scores or measurements using a few indices or statistics. Every statistic used in descriptive statistics had a purpose. These depended on variables in the study and the scale of measurement used. Using SPSS program gave such

descriptive statistics and therefore the program was much appropriate for the analysis. The results were presented in tables, frequencies and percentages.

### **3.10 Operationalization of variables**

The operationalization of variables in the study is shown in Figure 3.2. The variables include; teachers' attitudes, teachers' prior knowledge, teachers' access to CBT tools and subject thought. The operations used include; indicators, measurement, data collection tools and data analysis.

**Figure 3.2: Operationalization of variables**

<b>Objective</b>	<b>Type Of Variable</b>	<b>Indicators</b>	<b>Measurement</b>	<b>Data Collection Tools</b>	<b>Data Analysis Design</b>
To establish the magnitude of influence of secondary school teachers' attitude towards the integration of computer based technologies in teaching and learning in secondary schools in Kisii county.	Independent variable; attitude on CBTs	Teachers' Attitude; <ul style="list-style-type: none"> <li>• Behavior change</li> <li>• Motivation</li> <li>• Participation</li> </ul>	Number of times CBT tools are used in a week in the delivery of instruction.	Questionnaires	Descriptive statistics
To determine the extent of influence of secondary school teachers' prior knowledge on CBT has on the integration of CBTs in teaching and learning.	Independent variable; prior knowledge in CBT	Teachers' prior knowledge in CBT; <ul style="list-style-type: none"> <li>• Experience</li> <li>• Training</li> <li>• Competence</li> </ul>	Number of trained or experienced teachers in the use of CBT tools.	Questionnaires	Descriptive statistics

<p>To determine the extent to which secondary school teacher's access to CBT tools influences the integration of CBTs in teaching and learning.</p>	<p>Independent variable; access to CBT tools</p>	<p>Teachers' access to CBT tools;</p> <ul style="list-style-type: none"> <li>• Equipment and materials</li> <li>• Database</li> <li>• Internet connection</li> </ul>	<p>Number of CBT tools available in the school against the number of the users.</p> <p>Physical location of the CBT tools</p>	<p>Questionnaires</p>	<p>Descriptive statistics</p>
<p>To establish the extent to which subject taught by secondary school teachers influences integration of CBTs in teaching and learning.</p>	<p>Independent variable; subject taught</p>	<p>Subject taught;</p> <ul style="list-style-type: none"> <li>• Science</li> <li>• Mathematics</li> <li>• Languages</li> <li>• Humanities</li> <li>• Technical and Applied subjects</li> </ul>	<p>Number of subjects taught using CBTs.</p>	<p>Questionnaires</p>	<p>One way ANOVA</p>



## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1 Introduction

In this chapter findings from the data collected were presented, interpreted and discussed using tables' frequencies and percentages. The information includes teachers' gender, age, teaching experience, academic level, subject taught, knowledge in the use of computer based technologies, attitude and access to computer based technologies. The findings were analyzed, presented and interpreted in sections based on the research objectives in the study.

#### 4.2 Response rate

The sample size of the study was eighty six. All the 86 teachers responded to the research questions and this interpreted to 100% response rate. This response rate was perfect since every sample member participated in the study.

#### 4.3 Demographic information

Demographic information of the Respondents in the study was obtained using a questionnaire which focused on the teachers' gender, age, academic level, major subject taught and the knowledge in the use of CBTs. Information obtained was analyzed to provide descriptive information and frequencies.

##### 4.3.1 Gender of the respondents

Information on the gender of the respondents was analyzed and presented in Table 4.1 which indicates the distribution of respondents according to gender.

**Table 4.1: Gender of the respondents**

Gender	Frequency	Percent
Male	62	72
Female	24	28
Total	86	100

Table 4.1 shows that the most of the respondents were male (72%) and female (28%). The data collected therefore was sufficient to provide information representative of both male and

female teachers taking into account that all the female teachers in the selected schools participated.

### 4.3.2 Age of the respondents

Table 4.2 shows the age brackets of the respondents at the time of the study.

**Table 4.2: Age of the respondents**

<b>Age</b>	<b>Frequency</b>	<b>Percent</b>
<b>25 years and below</b>	<b>11</b>	<b>12.8</b>
<b>26-30 years</b>	<b>26</b>	<b>30.2</b>
<b>31-40 years</b>	<b>27</b>	<b>31.4</b>
<b>41-50 years</b>	<b>22</b>	<b>25.6</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.2 shows that the respondents aged 25 years and below (12.8%), (30.2%) were aged between 26-30 years, (31.4%) were aged between 31-40 years and (25.6%) were aged between 41-50 years. From the table we can deduce that a majority of the respondents are aged below 40 years. The interpretation here is that, most of the teachers are young and are most likely to embrace the new technology easily.

### 4.3.3 Teaching experience of the respondents

Table 4.3 shows the teaching experience of the respondents in terms of years.

**Table 4.3: Teaching experience of the Respondents**

<b>Experience in years</b>	<b>Frequency</b>	<b>Percent</b>
<b>Below 5 years</b>	<b>37</b>	<b>43</b>
<b>5-9 years</b>	<b>4</b>	<b>4.7</b>
<b>10-14 years</b>	<b>22</b>	<b>25.6</b>
<b>15-24 years</b>	<b>23</b>	<b>26.7</b>
<b>More than 24 years</b>	<b>0</b>	<b>0</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.3 shows that the respondents in the study with a teaching experience of below 5 years was (43%), (4.7%) had a teaching experience of 5-9 years, (25.6%) had a teaching experience of 10-14 years, (26.7%) had a teaching experience of 15-24 years and there was none with teaching experience of more than 24 years. From this information it can be deduced that a good most teachers had a rich experience in teaching and therefore, most likely conversant with Computer Based Technologies and gave reliable information on integration of CBTs in teaching and learning.

#### **4.3.4 Education level of the respondents**

The respondents' level of education at the time of the study is shown in Table 4.4

**Table 4.4: Education level of the respondents**

<b>Educational level</b>	<b>Frequency</b>	<b>Percent</b>
<b>Master's degree</b>	<b>4</b>	<b>4.7</b>
<b>Bachelor's degree</b>	<b>79</b>	<b>91.9</b>
<b>Diploma</b>	<b>3</b>	<b>3.4</b>
<b>Other</b>	<b>0</b>	<b>0</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.4 indicates that (4.7%) of the teachers had Master's Degree, (91.9%) Bachelor's Degree and (3.4%) Diploma as the highest level of education. From this information it can be deduced that the most of the teachers had Bachelor's degree and above and therefore, had adequate training in teaching and would provide adequate information on CBT integration. This as well interpreted that the teachers were highly qualified and would most likely integrate Computer Based Technologies in teaching.

### 4.3.5 Teachers major teaching subjects

Table 4.5 shows the major teaching subjects of the respondents

**Table 4.5: Major teaching subjects**

<b>Subject group</b>	<b>Frequency</b>	<b>Percent</b>
<b>Languages</b>	<b>17</b>	<b>19.8</b>
<b>Mathematics</b>	<b>12</b>	<b>14</b>
<b>Humanities</b>	<b>20</b>	<b>23.2</b>
<b>Sciences</b>	<b>21</b>	<b>24.4</b>
<b>Technical and Applied subjects</b>	<b>16</b>	<b>18.6</b>
<b>Total</b>	<b>86</b>	<b>100</b>

In Table 4.5 the subjects were grouped into five categories according to the subject groups; Languages, Mathematics, Humanities, Science and Technical and Applied subjects. The table shows that all the subject groups taught in secondary schools were adequately represented in the study. It also indicates that (19.8%) of the respondents taught languages, (14%) of the respondents taught Mathematics, (23.2%) of the respondents taught Humanities, (24.4%) of the respondents taught Sciences and (18.6%) of the respondents taught Technical and Applied subjects. This interprets that there was no major difference across the subjects in the curriculum and therefore, most likely that they were all taught using technology.

### 4.3.6 Computer use experience level of the respondents

The level of experience of teachers in the use of computers in teaching or any other purpose is shown in Table 4.6.

**Table 4.6: Computer use experience level of the respondents**

<b>Experience level</b>	<b>Frequency</b>	<b>Percent</b>
Never	5	5.8
0-1 year	5	5.8
1-2 years	13	15.1
3-4 years	13	15.1
More than 5 years	50	58.2
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.6 shows that (5.8%) of the respondents had never had any experience in the use of computers in teaching or any other purpose, (5.8%) had an experience of less than 1 year, (15.1%) had an experience of 1-2 years, (15.1%) had an experience of 3-4 years and (58.2%) had an experience of more than 5 years. This is a clear indication that more than half of the teachers use computers either in teaching or any other use. Using this information therefore, the respondents are likely to have given adequate information on CBT use and integration in teaching and learning in the schools.

#### **4.3.7 Internet use experience level of the respondents**

Table 4.7 shows the level of experience of internet use by respondents.

**Table 4.7: Internet use experience level of respondents**

<b>Experience level</b>	<b>Frequency</b>	<b>Percent</b>
0- 1 year	7	8.1
1 -2 years	13	15.1
3-4 years	14	16.3
More than 5 years	52	60.5
None	0	0
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.7 shows that (8.1%) of the respondents had an experience of internet use for less than 1 year, (15.1%) had an experience of internet use for 1-2 years, (16.3%) had an experience of internet use for 3-4 years and (60.5%) of the teachers had an experience of internet use for more than 5 years. From the table we can deduce that most of the teachers had an experience of internet use for more than 3 years. This therefore, indicates that the information given by the respondents was viable and is likely to integrate Computer Based Technologies in teaching and learning.

#### **4.4 Teachers' attitude towards Computer Based Technologies**

The first objective in the study sought to establish the extent to which attitudes of secondary school teachers influence integration of Computer Based Technologies in teaching and learning. Information about teachers' attitude towards Computer Based Technologies was obtained using questionnaires and the attitude was measured using five items that required teachers to rate four major aspects of CBT. The four aspects include; the effectiveness and efficiency of CBTs, improvement of instruction delivery, enhancement in learning and planning and preparing computer based lessons. The four aspects were analyzed separately using tables' frequencies and percentages.

##### **4.4.1 Use of CBTs as an effective and efficient mode of curriculum delivery**

Table 4.8 shows the teachers' use of Computer Based Technologies as an effective and efficient mode of curriculum delivery.

**Table 4.8: CBT as an effective and efficient mode of curriculum delivery**

<b>Item</b>	<b>Frequency</b>	<b>Percent</b>
<b>Strongly Agree</b>	<b>63</b>	<b>73.3</b>
<b>Agree</b>	<b>11</b>	<b>12.8</b>
<b>Disagree</b>	<b>9</b>	<b>10.4</b>
<b>Strongly Disagree</b>	<b>0</b>	<b>0</b>
<b>Not decided</b>	<b>3</b>	<b>3.5</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.8 indicates that the response from the respondents was positive because most of them (73.3%) strongly agreed that Computer Based Technologies is an effective and efficient mode of curriculum delivery. The remaining (12.8%) agreed, (10.4%) disagreed, (3.5%) were yet to establish. From this analysis it can be concluded that most respondents had apposite attitude that use of Computer Based Technologies is an effective and efficient mode of curriculum delivery. This gives an interpretation that with this positive attitude a good number of teachers are likely to impress the integration of Computer Based Technologies in teaching and learning.

#### **4.4.2 Use of Computer Based Technologies improves instructional delivery**

The researcher wanted to know the opinion of the respondents on the use of CBTs in instructional delivery when compared to other methodologies. Table 4.9 shows the analysis of use of Computer Based Technologies as a method that improves instructional delivery

**Table 4.9: Use of CBTs improves instructional delivery**

<b>Item</b>	<b>Frequency</b>	<b>Percent</b>
<b>Strongly Agree</b>	<b>61</b>	<b>70.9</b>
<b>Agree</b>	<b>15</b>	<b>17.4</b>
<b>Disagree</b>	<b>7</b>	<b>8.2</b>
<b>Strongly Disagree</b>	<b>1</b>	<b>1.2</b>
<b>Not decided</b>	<b>2</b>	<b>2.3</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.9 shows that (70.9%) of the respondents strongly agree that the use of CBTs in teaching and learning improves instructional delivery, (17.4%) of the respondents agree, (8.2%) of the respondents disagree, (1.2%) of the respondents strongly disagree and (2.3%) of the respondents were undecided. The analysis gives an interpretation of high positive attitude in most of the teachers, hence, most likely to integrate CBTs in teaching and learning.

#### 4.4.3 Use of Computer Based Technologies enhance learning

Data on the use of CBTs as a tool that enhances learning was collected, analyzed and the results were presented in Table 4.10

**Table 4.10: CBTs enhance learning**

<b>Item</b>	<b>Frequency</b>	<b>Percent</b>
<b>Strongly Agree</b>	<b>59</b>	<b>68.6</b>
<b>Agree</b>	<b>19</b>	<b>22.1</b>
<b>Disagree</b>	<b>6</b>	<b>7</b>
<b>Strongly Disagree</b>	<b>0</b>	<b>0</b>
<b>Not decided</b>	<b>2</b>	<b>2.3</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.10 shows that (68.6%) of the teachers strongly agreed that CBT enhance teaching and learning, (22.1%) of the teachers agreed, (7%) of the teachers disagreed, (2.3%) of the respondents were undecided. This analysis indicates that majority of the respondents had a positive attitude and thus would easily integrate computer based technologies in teaching and learning. .

#### 4.4.4 Teachers' opinion on whether it is easy to plan and prepare a Computer Based Lesson

The data collected from the respondents was analyzed and presented in Table 4.11.

**Table 4.11: Planning and preparing a Computer Based lesson**

<b>Item</b>	<b>Frequency</b>	<b>Percent</b>
<b>Strongly Agree</b>	<b>57</b>	<b>66.3</b>
<b>Agree</b>	<b>16</b>	<b>18.6</b>
<b>Disagree</b>	<b>9</b>	<b>10.4</b>
<b>Strongly Disagree</b>	<b>1</b>	<b>1.2</b>
<b>Not decided</b>	<b>3</b>	<b>3.5</b>
<b>Total</b>	<b>86</b>	<b>100</b>



From Table 4.11 we can deduce that (66.3%) of the teachers strongly agreed that it is easier to plan and prepare a lesson using computers, (18.6%) of the teachers agreed, (10.4%) of the teachers disagreed, (1.2%) of the teachers strongly disagreed and (3.5%) of the teachers were undecided. Using this analysis we can deduce that majority of the respondents had a positive attitude and this would mean that integration of CBTs would be effected with easy.

#### **4.5 Teachers' prior knowledge on Computer Based Technologies in teaching and learning**

The second objective sought to determine the extent to which secondary school teachers' prior knowledge influence integration of CBTs in teaching and learning. This objective focused on; the teachers' computer training, teachers' internet training and finally the level in which the teachers are able to use various computer tools in teaching and learning.

##### **4.5.1 Teachers' computer training**

The information on teachers' computer training was obtained using questionnaires and the information is shown in Table 4.12.

**Table 4.12: Information on teachers' Computer training**

	<b>Frequency</b>	<b>Percent</b>
<b>No</b>	<b>16</b>	<b>18.6</b>
<b>Yes</b>	<b>70</b>	<b>81.4</b>
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.12 shows that (18.6%) of the teachers had not undergone computer training while majority of the teachers (81.4%) had undergone computer training. This implied that it was easy for the teachers to integrate computer based technologies in teaching and learning since they were knowledgeable on the use of computers.

#### 4.5.2 Information on teachers' internet training

Information on teachers' internet training is shown in Table 4.13

**Table 4.13: Information on teachers' internet training**

	Frequency	Percent
No	21	24.4
Yes	65	75.6
<b>Total</b>	<b>86</b>	<b>100</b>

Table 4.13 shows that (24.4%) of the respondents had no knowledge on the use of the internet while majority of the respondents (75.6%) had knowledge on the use of the internet. Since the majority had knowledge it is evident that they are likely to integrate computer based technologies without any problem.

#### 4.5.3 Teachers' knowledge on various CBT tools use

Information on teachers' knowledge on various CBT tools use was obtained using questionnaires. This was measured using 12 items on the questionnaire (refer appendix 1) that required teachers to rate their level of knowledge on a scale of; excellent (3), good (2), fair (1) and no capability (0). The scores from each teacher were summed to obtain a composite score that was expressed as a percentage of teachers' CBT tools use knowledge score. A high score indicated higher level of teacher knowledge score and lower score indicated low level teacher knowledge score. The information is shown in Table 4.14.

**Table 4.14: Teacher CBT knowledge score**

	N	Mean	Std Deviation
	Statistic	Statistic	Std Error
Percentage teacher CBT Knowledge score	86	76.23	2.4797
Valid N ( list wise)	86		22.9964

Table 4.14 show that teacher knowledge in CBT tools use was high (76.23%) based on the standards of interpretation set in the study. High knowledge in CBT tools use could mean that they are likely to integrate CBTs effectively in their teaching and learning.

#### 4.5.4 CBT knowledge score standards

**Table 4.15: Teachers’ CBT knowledge score standards**

<b>Teacher CBT knowledge score</b>	<b>Interpretation of CBT knowledge score</b>
<b>75% and above</b>	<b>High level of CBT knowledge</b>
<b>Below 75%</b>	<b>Low level of CBT knowledge</b>

Table 4.15 shows the standards set for the interpretation of teachers’ computer based technologies knowledge score. Most of the teachers scored more than (75%) and above and a few were below (75%). The data obtained was used to compute mean teacher CBT tools use knowledge score and comparisons were made across groups.

#### 4.6 Teachers’ access to Computer Based Technology tools

The third objective in the study sought to determine the extent to which secondary school teachers’ access to CBT tools influence integration of Computer Based Technologies in teaching and learning. The information on access to CBT tools was obtained using the teachers’ questionnaires and 8 items (12-19 appendix II) were used to measure the level of teachers’ access to CBT tools. The integration of CBT score and access to CBT tools were computed and comparisons were made across groups.

##### 4.6.1 Access to CBT tools

The 8 items in the study focused on the physical location of CBT tools and frequency of teacher access to these tools. The physical location of CBT tools was considered an important factor in teacher access to these tools. The location of CBT tools in order of preference were rated as follows; school (computer laboratory, library, classroom, staffroom, administration office) (4), home (3) commercial places (cyber café) (1) other (2) and none at all (0). The frequency of computer use in school within a week was also graduated on a four point scale as follows; very often (3), often (2), seldom (1) and none (0). It was important to know the frequency of internet use in the school in hours per week. The frequency in internet use was

also graduated on a five point scale as follows; more than five hours and above (4), three to four hours (3), one to two hours (2) and none (0). The scores of individual teacher on access to CBT tools was summed up and used to compute percentage score. A high score indicated high access to CBT tools and a low score indicated a low access to CBT tools. Table 4.16 shows access to CBT tools score.

**Table 4.16: Access to CBT tools score**

	<b>N</b>	<b>Mean</b>		<b>Std Deviation</b>
	<b>Statistic</b>	<b>Statistic</b>	<b>Std Error</b>	<b>Statistic</b>
<b>Percentage access to</b>				
<b>CBT tools score</b>	<b>86</b>	<b>64.18</b>	<b>2.9351</b>	<b>27.2194</b>
<b>Valid N ( list wise)</b>	<b>86</b>			

The results in Table 4.16 show that teachers' access to CBT tools was low (64.18%) based on standards of interpretation set for the study. This therefore indicates that access to CBT tools is an important factor in integration of CBTs in teaching and learning.

#### **4.6.2 CBT tools score standards**

Table 4.17 shows Interpretation of access to CBT tools score standards.

**Table 4.17: Interpretation of access to CBT tools score standards**

<b>Access to CBT tools score</b>	<b>Interpretation of access to CBT tools score</b>
<b>75% and above</b>	<b>High level of access to CBT tools</b>
<b>Below 75%</b>	<b>Low level of access to CBT tools</b>

Table 4.17 shows the standards set for the interpretation of access to CBT tools score. The data obtained was used to compute mean percentage score of access to CBT tools.

#### **4.7 Subject taught**

The fourth objective in the study sort to establish the extent to which the subject taught by secondary school teachers influence integration of computer based technologies in teaching

and learning. Sixteen subjects in the curriculum were taken into account in the study. These subjects were clustered into five clusters according to how they are classified by Kenya Institute of Education (KIE). The five clusters include; Sciences, Mathematics, Languages, Humanities and Technical and Applied subjects.

#### 4.7.1 Integration of CBTs and teaching subjects

The data was collected using questionnaires and used to analyze the frequency at which the teachers were using CBTs in carrying out various activities in lesson delivery in the subjects they taught and the frequency at which students were allowed to use CBTs in carrying out learning activities. Twelve (12) activities for lesson delivery were considered and they included; accessing teaching and learning resources, preparing lessons, downloading lessons from the internet, enhancing existing teaching methods, subject enriching exercises, implementing lessons, processing test scores, preparation of subject scores, accessing email on subject related emails, computation activities for students, problem solving activities and solving real life problems using digital tools and resources. To establish the extent of CBT integration, one way ANOVA was conducted to test whether there is any significant mean difference in integration in teaching and learning between subjects. The results found are presented in Table 4.18.

**Table 4.18: Comparison of variance between and within groups of subjects taught**

<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>		<b>F</b>	<b>Significance</b>
<b>Between groups</b>	<b>1690.002</b>	<b>4</b>	<b>422.500</b>	<b>0.913</b>	<b>0.458</b>
<b>Within groups</b>	<b>62918.184</b>	<b>82</b>	<b>462.634</b>		
<b>Total</b>	<b>64508.195</b>	<b>86</b>			

Table 4.18: shows that there was no statistically significant difference in mean CBT integration score between the categories of subjects at [F= 0.913, df (4, 82), p> 0.05]. According to the analysis the subject taught at secondary schools is not significant in CBT integration in teaching and learning.

#### **4.8 Student Response on CBTS in Teaching and Learning**

The student responses were collected using student group discussion questions. The questions were based on the student knowledge on CBT, access to CBT tools and subjects in the curriculum. Data was collected from students in groups of 30 to 40 students in the sample school. The response from the groups that represented the sample schools testified that they use computers in their schools and they are accessed in the computer laboratories. Most students had undergone computer training during computer lessons with the help of their teachers. The training had enabled them to operate a computer and at the same time they have been enabled to look up for supplementary information in the internet to add on what they learn in class. Student experience of computer use was between 1 to 2 years and internet access in the school was thrice in a week within a period of two to three hours in a week.

The students also testified that teachers used CBTs in teaching in all the subjects in the curriculum. From the response the students indicated that use of CBTs in teaching and learning was livelier, motivating, interesting and that they would wish to access and use computers throughout their learning.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter represents summary of findings, discussions, conclusions and recommendations based on the study. The research sought to investigate factors influencing integration of Computer Based Technologies in teaching and learning by secondary school teachers. This information is important for the successful implementation of the CBTs in secondary school population. This study focused on secondary schools that are equipped with Computer Technologies in Kisii County.

#### **5.2 Summary of findings**

The purpose of the study was to investigate the factors influencing integration of Computer-Based-Technologies in teaching and learning by secondary school teachers in Kisii County. Four objectives were constructed to guide the analysis and interpretation of data. These were; teachers' attitude, teachers' prior knowledge, teachers' access to CBT tools and subject taught by teachers and their influence on the integration of Computer Based Technologies in teaching and learning.

##### **5.2.1 Attitude**

The analyzed data showed evidence that the level of CBT integration by teachers was above average. Most of the teachers were aged below 40 years making a percentage of (87.2%) of the teachers teaching in secondary schools. This means that most of the teachers were young stars and most likely to embrace the new technology in teaching and learning. The teachers showed positive attitude towards computer based technologies based on the items used in the study to rate their responses towards various aspects concerning CBTs in teaching and learning. It was therefore concluded that teachers' attitude towards CBTs was a significant determinant of CBT integration in teaching and learning in secondary schools.

##### **5.2.2 Prior knowledge**

From the analysis, most teachers had teaching experience between 9 and 24 years (57%) and the remaining percentage of (43%) are young teachers who have just entered the field of teaching. The young teachers are most likely to enjoy using the CBTs in teaching even without much experience in the field, this is because the youth just embrace the new

technology without any pressure from the authorities. The most experienced teachers are also likely to embrace CBTs as their experience helps them to adopt new methodologies in teaching and learning. Generally, it was evident that teachers' prior knowledge in CBT use was (76.23%) based on the standards that were set for the study. This indicated that CBT had not been integrated fully by all the teachers due to lack of knowledge in technology based on this analysis, teachers' prior knowledge on CBT use was a significant predictor of CBT integration in teaching and learning. This analysis justifies the second objective of this study that teachers' prior knowledge influences integration of CBTs in teaching and learning.

### **5.2.3. Access to CBT tools**

The analyzed data for teachers' access to CBT tools focused on the physical location of the CBT tools and the frequency at which the tools were accessed by the teachers, this was considered to be important as it would be an easy means to access the tools (appendix II Item) The findings showed that teachers' access to CBT tools was low (64.18%) based on the standards that were set for the study. The indication was that (35.82%) of the teachers do not access to the CBT tools. In most of the schools that were visited, CBT tools were confined in computer laboratories which were under lock and key and could only be accessed during class lessons. This could not allow for any kind of practice for teachers who wanted to gain knowledge and experience on computer use. Therefore, something has to be done by the administrators of the schools to cap up the situation to enable teachers to integrate CBTs in teaching and learning. Due to these factors, access to CBT tools was found to be a contributing factor to the integration of CBTs in teaching and learning.

### **5.2.4 Subject taught**

The analyzed data showed the frequency of CBT use in lesson delivery across the curriculum and the frequency of CBT use for student activities across the curriculum. The result was that, no major difference observed in the use of CBTs across the subjects. This meant that subject taught by the teachers was not an important factor in the integration of CBTs in teaching and learning.

## **5.3 Discussion of findings**

Discussion of findings in this study has been done based on four objectives. The objectives include; teachers' attitude towards CBTs, teachers' prior knowledge to CBTs, teachers'



access to CBT tools and subject taught and their integration in teaching and learning in secondary schools.

### **5.3.1 Teachers' attitude towards Computer Based Technologies**

This study focused on the attitude of secondary school teachers on the use of CBTs in teaching and learning. Bingimlas, (2008), recorded a number of studies indicating that attitude and inherent resistance to change were significant barriers to integration of Information Communication Technology into education by teachers. Becta, (2004); Gomes, (2005); Schoepp, (2005); Cavas, etal (2009), found that attitudes of teachers towards information communication technology supports integration of technology in education. This agrees with writers in the sense that it indicated most teachers (66%) and above were positive towards computer based technology. More than (73.3%) were in agreement that CBTs is an effective and efficient mode of curriculum delivery, more than (79.9%) acknowledged that the use of CBTs improves instructional delivery, more than (68.6%) gave an impression that the use of CBTs enhances learning and finally more than (66.3%) agreed that it was easier to plan and prepare a computer based lesson.

According to the Innovation Diffusion models in the literature review, the teachers achieved the first of the five diffusion of innovation stages; awareness, interest, evaluation, trial and adoption Rodgers (1995). At the same time the qualities that determine the success of an innovation namely; relative advantage, compatibility, simplicity of use, trial ability and observability, Robinson, (2009), holds true for the teachers in integration of CBTs in teaching and learning. This agrees with the findings where the teachers evidently show that the technologies are compatible with their work and are simple to use as they make their work easier and self-motivating. The prior knowledge enabled teachers to use the technologies. According to the findings, those who had no prior knowledge were not able to use technology in their teaching and they had no interest in the use of any technology. Since (2005) the Ministry of Education initiated projects to sensitize teachers on CBT integration in teaching. Such projects include; Communication Commission of Kenya (CCK), (2006) and Strengthening Mathematics and Science in Secondary Education (2007). Seminars Workshops and other activities on Information Communication Technology and e learning were also held by other organizations including Kenya Institute of Education (KIE), Intel, Microsoft, Computer for schools and Cyber School on integration of information communication technology in teaching which could lead to integration of Computer Based

Technologies in teaching and learning. It is possible that these activities assisted the teachers to develop positive attitude to the integration of computer based technologies in teaching and learning. In the study, the results indicated that most teachers were of the opinion that use of computer based technologies was an effective and efficient mode of curriculum delivery as it improved instructional delivery enhancing teaching and learning with ease and planning of computer lessons as compared to other methodologies of instructional delivery.

### **5.3.2 Teachers' prior knowledge in Computer Based Technologies**

The second objective sought to determine the extent to which teachers' influence integration of Computer Based Technologies in curriculum delivery. According to Gachenga, (2007), teachers tend to use methods in which they feel competent. There is need for teachers to be computer competent which will enable them handle a wide range of varying computer applications for various purposes Tondeur, et al, (2008). Results of data analyzed indicated that teachers' prior knowledge in CBT use was (76.23%). The analysis showed that majority of the teachers had prior knowledge on computer and internet use after undergoing training. It was also evident that most of the teachers were able to use various computer tools which included; e-mailing, internet browser, word processor multimedia flash disk, DVD, CD, spread sheets, Digital camera, computer programming, animation use, computer games, computer management statistical tools and interactive white boards among other CBT tools. The implication is that computer training for teachers is very necessary for integration to succeed. The data analysis showed that (24.5%) of the teachers had not been trained. This means that the Ministry of Education has the obligation to organize for seminars and workshops to train the remaining lot of teachers for uniformity in integrating CBTs in teaching and learning. According to Gnjakuu, (2006), knowledge in the use of information and communication technology is the most critical variable in integration of computer based technologies in teaching. This statement is true and it agrees with the findings in that the teachers who had undergone computer training and who had a wide experience on computer technology were able to use the technology in teaching.

### **5.3.3 Teachers' access to Computer Based Technology tools**

The third objective in this study sought to determine the extent to which secondary school teachers 'access to CBT tools influence integration of CBTs in teaching and learning. The physical location of the CBT tools was seen to be an important factor in teachers' access to

technology tools. It was considered that tools within the school were more accessible to the teachers than those found outside the school such as cybercafé and other places.

The analysis showed that access to CBT tools was below average (64.18%) within the school based on the standards that were set for this objective. Most teachers were able to access CBT tools in the computer laboratories within the school more than any other places such as library, staff room, and class room and administration office, but within limited time. This implies that access to CBT tools was a significant factor that contributes to CBT integration. Robinson, (2009), argues that there are which qualities determine the success of an innovation these are; relative advantage, compatibility, simplicity of use, trial ability and observability. It is therefore likely that the more accessible the CBT tools are, the higher their observability and trial ability thus enhancing integration of CBTs in teaching and learning.

According to Rodgers, (1995), late majority and laggards easily pick on the technology as they witness, early adopter and early majority peers integrate CBTs in teaching and learning. From the analysis it was evident that, it was a common trend in all the sample schools that computer facilities were located in computer laboratories with a few found in the classroom or library or administration office. The study findings imply that CBT tools located within easy physical reach of the teachers would attract and enhance observability and trial ability enabling the late adapters and laggards an opportunity to watch and interact with early majority and early adapters as they integrate CBTs in teaching and learning. Confining computer facilities to laboratories that were under key and lock only to be operated during lesson delivery was likely to impact negatively in integration of computer based technologies in teaching and learning.

### **5.3.4 Subject taught**

The fourth objective in the study sought to establish the extent to which the subject taught by secondary school teachers influence integration of computer based technologies in teaching and learning. This study focused on all the subjects in the curriculum. They were clustered into five clusters as classified by Kenya Institute of Education (2002). The five clusters include; Mathematics, Science (Biology, Physics, Chemistry), Languages (French, English, Kiswahili), Humanities (Geography, History and Government, Christian Religious Education) and Technical and applied Subjects (Art and Design, Computer Studies, Business Studies, Agriculture and Music).

The data collected was analyzed and presented using tables' frequencies and percentages. The result showed that the subject taught is not a significant factor in influencing integration of CBTs in teaching and learning. Integration of CBTs by teachers across all the five subject clusters was almost the same. Various CBT activities were carried out in all the subjects. The activities include; preparing computer lessons, downloading lessons from the internet, subject enriching exercises, processing test scores, preparing subject reports, problem solving activities, student digital activities, question and answer activities, observing educational illustrative simulations, observing and discussing educational animations among others.

### **5.4 Conclusions**

The study investigated independent variables (attitude, prior knowledge, access to CBT tools and subject taught), intervening variables, moderating variables and dependent variable. Data collected was subjected to tables' frequencies and percentages. Using the findings it was concluded that three of the independent variables that were investigated contributed to integration of CBTs in teaching and learning. High percent teachers' attitude was positive in the use of technology in teaching. Few had a negative attitude. It therefore follows that teachers need to be more exposed to technology to arouse their interest. Therefore, teachers' attitude is a significant factor in integration of computer based technologies.

Following the data that was collected, it was realized that more than half of the teachers (76.23%) were computer literate after training and were very competent using CBTs in teaching and learning. Computer knowledge motivated teachers to the use computer technology. The remaining percent (23.77%) of the teachers lacked computer knowledge and therefore lacked interest in the use of CBTs in teaching. Prior knowledge in CBT is a significant factor in integrating CBT in teaching and learning. Using the analysis, almost all schools confined CBT equipment and materials in computer laboratories and were used

mostly accessed during lessons. Administration support was needed to avail computer equipment and materials at strategic places where they can be accessed easily by all the teachers at their convenient time. It was concluded that teachers access to CBT was low (64.18%) based on the standards set for the study. (35.82%) of the teachers were not able to access the computer equipment. The more exposed the teachers are to the computer materials the more they will use them in teaching and learning, thus access to CBTs is a significant factor in integration of computer based technologies in teaching and learning. All subject clusters were considered in the study and from the analysis there was seen no important difference in CBT use across subjects, therefore subject taught is not a significant factor in integration of Computer Based Technologies in teaching and learning.

### **5.5 Recommendations**

The study identified factors that determine the integration of CBTs in teaching and learning by secondary school teachers. These factors include; attitude, prior knowledge, and access to CBT tools. For this reason therefore it is recommended that:

1. Policies should be formulated by the Ministry of Education and school administrators to enhance teacher access to CBT facilities in the institutions in order to enhance integration of CBTs in teaching and learning.
2. Physical location of the CBT facilities should be strategically placed for more accessibility to the teachers. More time for manipulation of CBTs is necessary for teachers' practice.
3. School administrators with the help of the Ministry of Education should carry out intensive workshops and training for teachers to gain more knowledge on CBT integration in teaching and learning.

### **5.6 Suggestions for further research**

The researcher recommends that further research be conducted in the following areas:

1. The effect of school administration support in integration of CBTs in teaching and learning.
2. The effect of learner support in integration of CBTs in teaching and learning.

## REFERENCES

- Al-Alwani, A. (2005). Barriers to Integrating Information Technology in Saudi Arabia Science Education. *Doctoral dissertation, the University of Kansas, Kansas.*
- Al-Ansari, H. (2006). Internet use by the faculty members of Kuwait University. *The electronic library* vol.24, no. (6), pp.; 791-803
- Albarrasin, D, Johnson, B.T; and ZanaM.P (2005); *The Handbook of Attitudes; Lawrence Erlbaum Associates Mahwah. New Jersey.*
- Ayere, M.A, Odera, F.Y and AgakJ.O (2010). ELearning in secondary schools. A case study of the NEPAD E-schools. *Educational research and reviews* vol. 5 (5), pp. 218-223, retrieved from <http://academicresearchjournals.org.19/07/2010>
- Balanskat, A., Blamire, R. & Kefala, S. (2006). *The CBT Impact Report: A review of studies of CBT impact on schools in Europe.* [Viewed 11 Aug 2014] <http://ec.europa.eu/education/doc/reports/doc/CBTimpact.pdf>.
- Barolli, E., and Savrani, K; reflections of E. Learning Readiness in Albania Education Contemporary Economics, periodicals (2009) *Warsaw, Poland*, pp. 17-18
- Bayramoglu, Y. (2007), a training to promote teachers positive attitude towards web use: *self-efficacy, web enjoyment, web usefulness and behavioral intention to use the web.* (M.A Thesis) Boazici University, Istanbul
- Bhattacharya, I and Sharma.(2007). India in the knowledge economy- an electronic paradigm. *International journal of education management*, 21(6); pp. 543-568
- Bullock. (2004) Moving from theory to practice; an examination of the factors that preserves teachers encounter as they attempt to gain experience teaching with technology during field placement experiences. *Journal of technology and teacher education*, 12(2); pp 211-237
- Bingimlas,(2009). Barriers to successful integration of ICT in teaching and learning Environments. A review of the literature. RMT University. Bandoora. VIC, Australia.
- Cates, W Price, Band Bodzin, A. (Dec 2002) .The importance of formative evaluation for the next Trier of teaching and learning, *journals of computers and schools.*

- Chandra, S and Paktar, V. 2007, CBTS: A catalyst for enriching the learning process and library services in India. *The international information and library review* vol.39, no. (11) pp. 1-11
- Chein, I. (1951)"Notes on a framework for the measurement of discrimination and prejudice," in Marie Jahoda, M. Deutsch, and S.W. Cook, *Research Methods in Social Relations* (New York: Dryden Press), Vol. 1, pp. 382-422.
- Crawley, F., &Koballa, T. (2004). Attitude research in science education: Contemporary models and methods. *Journal of Research in Science Teaching*, 78 (1), 35-55.
- Cresswell, J.W. (2003); Research Design, Qualitative, Quantitative and mixed methods.*Approaches- Second Edition.Sage publication*. Thousand Oaks. London.
- Cross and Adam (2007), CBT policies and strategies in higher education in South Africa; *National and institutional pathways.Higher education policy*. 20(1), pp. 73-95
- Dawes L. (2007) what stops teachers using new technology? In Issues in Teaching Using CBT (ed. M. Leask), pp.61–79.Routledge, London
- Dias, L.B., & Atkinson, S. (2001). Technology Integration: Best Practices Where Do Teachers Stand? *International Electronic Journal for leadership in learning*, 5(10). Retrieved July 24, 2005, from:<http://www.ucalgary.ca/~iejll/volume5/dias.html>
- Dooling, J.O. (2000). What students want to learn about computers, *Educational Leadership*, 53, 20-24.
- Drent,M.,&Meelissen, M., (2008). Which factors obstruct or stimulate teachers to use CBT innovatively? *Computers & Education*, vol.51, no.1, pp. 187-199.
- Flanagan, L. and Jacobsen, M., (2003).Technology Leadership for the Twenty first Century Principal.*Journal of Educational Administration*, 41(2), 124-142.
- Gachenga, S. K. (2007). The influence of teaching methods on students' achievement in Mathematics in Kieni Division, Nyeri County.University of Nairobi.
- Gakuu, C.M. (2006). Analysis of factors and attitudes that influence lecturers' readiness to adopt distance education and use of ICT in teaching.The case of University of Nairobi.

- Gay, L. R and Airsian (2009).*Educational Research Competencies for Analysis and Applications 9<sup>th</sup> Ed.* London: Pearson Education Limited2
- Goktas, Y., Yildirim, S. &Yildirim, Z. (009).Main barriers and possible enablers of CBT integration into preservice teacher education programs.*Educational Technology & Society*, 12 (1), 193-204.
- Grabe, M., &Grabe, C., (2001), *Integrating Technology for Meaningful Learning.* Houghton Muffin Company.USA.
- Hennessy, S. Harrison, D. and Wamakote, L. (2010). Teacher factors Influencing Classroom use of CBT in Sub-Saharan Africa. *Itupale online Journal of African studies*, 2(2010).39-5441.ISSN 204.36165. Accessed 4/5/2012 from <http://www.cambridgetoafrica.org> (resource/hennessyetal-Final.pdf
- Hew, K. & Brush, T. (2007). Integrating Technology into K-12 teaching and learning current knowledge gaps and recommendations for future research.*Educational Technology Research and Development* 55(3); 223-252.do1;10.1007/5//4 23-006-9022-5.
- Hixon, E. &Buckenmeyer, J. (2009). Revisiting technology integration in schools: *Implications for professional development - computers in the schools*, 26(2), 130-146.dol:10.1080/07380560902906070
- Hung, Y-W, & HSU, Y-S (2007).Examining teachers' CBT use in the classroom a study in secondary schools in Taiwan.*Educational technology & society*, 10(3), 233-246.
- International Journal of Humanities and social Science vol.2No.3; February 2012.
- Journal of Turkish Science Education volume 8, issue 2, June 2011.
- Kathuri, J.N., & Pals, D.A. (1993).Introduction to Educational Research.Njoro: Egerton
- Keengwe, J., &Onhwari, G. (2008). Computer Technology Integration and student learning: *Barriers and Promise, Journal of Science Education and Technology*, vol.17.
- Kersaint, A, Ben-Hur, Y, & Bar Yossef, N. (2010) Integrating laptop Computers into classroom; attitudes, needs and professional development of Science teachers – *A case study.Journal of Science Education and Technology*, 19(2), 187-198.dol:10./007/5/0956-009-9191-1.



- Kersaint, G, Horton, B., Stohi, H., &Garofalo, J.(2003).Technology, beliefs and practices of mathematics education faculty. *Journal of Technology and Teachers Education*, 11(4), 549-577.
- Klieger, A., Ben-Hur, Y. & Bar-Yossef, N. (2010).Integrating laptop computers into classroom: Attitudes, needs, and professional development of science teachers-A case study. *Journal of Science Education Technology* 19,187-198.doi:10.1007/s10956-009-9191-1
- Kombo, D. L. & Tromp L. A. (2006).Proposal and Theses writing: An Introduction. Pauline Publications Africa (2<sup>nd</sup>ed) *Don Bosco Printing Press, Makuyu: (Kenya)*.
- Kothari, C. R. (2003). *Research Methodology*.Vikas Publishing House pvt.Ltd. New Delhi.
- Kozma, R., (2005). National Policies that connect CBT –based education reform to economic and social development. *Human Technology*, 1 (2)
- Kozma, R., McGhee, R., Quellmalz, E., and Zalles, D. 2004. Closing the digital divide: *Evaluation of the World Links program. International Journal of Educational Development*, Vol. 24, No. 4, pp. 361–381.
- Lefebvre, S., Deaudelin, D., &Loiselle, J. (2006, November).CBT implementation stages of primary school teachers: *The practices and conceptions of teaching and learning. Paper presented at the Australian Association for Research in Education National Conference, Adelaide, Australia*
- Les, Robinson, (2009). Chan geology, the book. “An enjoyable, inspiring crash course in social change thinking”.
- Liu, Y, &Szabo, Z. (2009).Teachers’ attitude towards Technology Integration in schools a four-year-study.*Teachers and Teaching*, 15(1), 5-23, dol: 10.1080/13540600802661295.
- Markorac, V. and Rogulja, N. (2009). Key CBT Competences of kindergarten teachers. In 8<sup>th</sup> special focus symposium on ICESKS: *Information Communication and Economic Sciences in the knowledge society* P. (72-77) Zadar. Faculty of Education University of Zagreb in ENCSI database.

- Mooij, (2007). Design of Education and CBT Conditions to Integrate differences in learning Contextual learning theory and a first transformation step in early education. *Computers in Human Behavior*, 23(3), 1499 -1530.
- Mugenda O.M. & Mugenda A.G. (2003). Research Methods Quantitative and qualitative approaches. Nairobi: Acts Press
- Mugenda, A. G. (2009). Social science research: Theory and principles. Nairobi: Applied science.
- Mukasa S.A. (2001). The systems Approach to Teaching. A Handbook for Teachers. *Western Educational Publishers. Eldoret.*
- National CBT Policy, 2006. Ministry of Information and Communications. <http://www.information.go.ke/docs/CBT%20policy.pdf>.
- Nepad e-schools Demonstration Project. 2005-2006: E.Africa commission. [www.eafricancommission.org/nepad-eschool-initiative.html](http://www.eafricancommission.org/nepad-eschool-initiative.html)
- Ng, W., & Gunstone, R. (2006). Science and computer-based technologies in VCB Torian government schools: *Attitudes of secondary science teachers. Journal of Research in Science and Technology Education*, 21(2), 243–264.
- OECD World Forum. The 3<sup>rd</sup> OECD World Forum on "statistics, Knowledge and policy" Charting progress, Building Visions, Improve life. Busan Korea – 27 – 30 October 2009. Thierry Karsenti et al... (2009)
- Patton. M.Q (1990). Qualitative evaluation and research methods (2nd edition). Sage publications, CA.
- Pierce, R, & Ball, L. (2009). Perceptions that may affect teachers' attention to use technology in secondary mathematics classes. *Educational studies in mathematics* 71(3), 299-317: doi:10.1007/s/0649-008-9177-6
- Plomp, T.; Pelgrum, W.J. & Law, N. (2007), 'SITES2006—International comparative survey of pedagogical practices and CBT in education', *Education and Information Technologies* Vol. 12, No. (2), Pp.; 83-92.

- Professor Thierry Karsenti et al (2012). Pedagogical Integration of CBT; Successes and Challenges from 100 + African schools.
- Punie, Y. (23-5-2007). Learning spaces; on CBT – enabled model of future learning in the Knowledge- based society. *European Journal of Education*, 42.Retrieved 30.10.2010 from <http://onlinelibrary.wilay.com/doi/10.1111/5.1465-3435.2007.00302.x/full>.
- Robert, V. K., &Daryle, W. M. (September 01, 1970). Determining Sample Size for Research Activities.*Educational and Psychological Measurement*, 30, 3, 607-610.
- Robinson, L. (2009). A summaryof Diffusion of innovations.Enabling change.Downloaded 14<sup>th</sup> June 2011. From: <http://enablingchange.com.ou/Summary-Diffusion-Theory.pdf>
- Rogers, E. (1995). Diffusion of Innovations.Downloaded 18<sup>th</sup> February 2011. From: <http://www.Stanford.edu/class/symbys205/Diffusion%20Innovation.html>.
- Sang, B.K., (March 2010). CBT Integration Program in the ministry of Education. *A paper presented during the International Conference on e-learning 31<sup>st</sup> March, 2010 R KIE. Nairobi Kenya.*
- Teo, T. (2008). Pre-Service teachers’ attitude towards computer use: *A Singapore Survey Australasian Journal of Educational Technology*, 24(4), 413 – 424.
- The World Face book 2007.<https://cia.gov/cia/publications/facebook/geos/ke.html>.
- TOJET: The Turkish Journal of Education Technology – July 2012, volume 11 issue 3.
- Tomei, L. A. (2005). *Taxonomy for the technology domain*. USA: Information Science Publishing.
- Wakhaya, M. N. (2010). Influence of the use of Information and Communication Technology on Teaching and Learning Mathematics in Secondary Schools: *A case of Nairobi Province, Kenya University of Nairobi.*
- Wiersma, W., &Jurs, S. (2005). *Research Methods in Education An Introduction (8th Ed.)*. Boston: Allyn and Bacon.

- Yildirim, S. (2007).Current utilization of CBT in Turkish basic Education schools.A *review of teachers' CBT use and barriers to Integration. Internal Journal of Instructional Media*, 34(2), 171-186.
- Yushau, B. (2006). Computer attitude, use Experience, software familiarity and Perceived Pedagogical usefulness: The case of mathematics professors. *Eurasia Journal of mathematics, Science and Technology Education*, 2(3), 1-7.
- Zaman, M. Shahim R., & Clement K. (2011).Trends and issues to integrate CBT in teaching and learning for the future world of education.*International journal of Engineering & Technology* 11(3) 114-119.

## **APPENDICES**

### **Appendix I: Letter of Introduction**

ROSA KEMUNTO KIBAGENDI,

UNIVERSITY OF NAIROBI,

PO BOX 30197,

NAIROBI.

Dear Respondent,

You have been selected to take part in the research on factors influencing integration of Computer Based Technologies in teaching and learning in secondary schools, a case of selected secondary schools in Kisii County.

The information you will provide will be used for pedagogical integration of Computer Based Technologies in teaching and learning.

To ensure confidentiality, do not write your name or anything that will lead to your identification.

Thank you for your assistance and co-operation.

Rosa Kemunto.

## **Appendix II: Questionnaire for the Teachers**

This questionnaire is designed to collect information on factors influencing integration of Computer Based Technologies in teaching and learning in secondary schools in Kisii County, Kenya. You are humbly requested to tick the appropriate response. Do not write your name or use any other mark for identification. The responses you will provide will be confidential and will only be used for the purpose of the study only. The questionnaire is divided into five parts, A to E, please respond to all the questions in all the parts.

### **Part A: Demographic Information**

1. Indicate your gender

- a) Male
- b) Female

2. What is your age?

- a) 25 years and below
- b) 26-30 years
- c) 31-40years
- d) 41-50years

3. For how long have you been teaching?

- a) Below 5 years
- b) 5-9 years
- c) 10-14years
- d) 15-24years
- e) More than 24 years

4. What is your highest academic level?

- a) Master's degree
- b) Bachelor's degree
- c) Diploma
- d) Other

5. Write your major teaching subject\_\_\_\_\_

6. For how long have you been using computers for teaching or any other purpose?

- a) Never [ ]
- b) Less than a year [ ]
- c) 1-2 years [ ]
- d) 3-4 years [ ]
- e) More than 5 years [ ]

7. What is your experience in using the internet?

- a) None [ ]
- b) Less than a year [ ]
- c) 1-2 years [ ]
- d) 3-4 years [ ]
- e) More than 5 years [ ]

**Part B: Attitude**

8. In the table shown, tick your opinion as regards to each stated factor

	<b>Factor</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Not decided</b>
(a)	The practice of using computer based technologies is an effective and efficient mode of curriculum delivery					

(b)	The use of computer based technologies improves instruction delivery					
(c)	The use of computer based technologies enhances learning					
(d)	It is easier for the teacher to plan and prepare a computer based lesson.					

**Part C: Prior Knowledge**

9. Have you ever received training on the use of computers in teaching?

a) Yes

b) No

10. Have you ever trained on the use of internet in teaching?

a) Yes

b) No

11. The table gives CBT tools that are used in teaching and learning and other purposes in everyday life. Indicate the level in which you are able to use the tools by ticking the appropriate column.



	<b>CBT Tool</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Not Able</b>
(I)	E-mailing				
(ii)	Internet browser or web page process				
(ii)	Word processor				
(iv)	Multimedia flash disk, DVD, CD.				
(V)	Spread sheets (MS excel)				
(VI)	Digital camera				
(VII)	Computer programming				
(VIII)	Animation use				
(IX)	Computer games				
(X)	Computer management (MS Access)				
(XI)	Statistical tools				
(XII)	Interactive white boards.				

**Part D: Access to CBT Tools**

12. Please tick where you use computers at school. You can tick more than one as applicable.

- a) Library [ ]
- b) Staff room [ ]
- c) Classroom [ ]
- d) Computer laboratory [ ]
- e) Administration office [ ]
- f) Other

13. How often do you access computers in your school per week?

- a) Very often [ ]
- b) Often [ ]
- c) Seldom [ ]
- d) None [ ]

14. Do you access the internet in your school? If so, how many hours in A WEEK?

- a) 5 And above [ ]
- b) 3-4 [ ]
- c) 1-2 [ ]
- d) None [ ]

15. Do you access computers outside the school compound?

- a) YES [ ]
- b) NO [ ]

16. Where else do you access computers apart from those within the school?

- a) At home [ ]
- b) Cyber café [ ]
- c) Other places [ ]
- d) None [ ]

17. Do you use computers in teaching?

a) Yes [ ]

b) No [ ]

18. A web page can be used as a teaching tool; do you use any in your teaching?

a) Yes [ ]

b) No [ ]

19. If you do, what are your feelings on the use of CBT tools in teaching and learning?

a) Very effective [ ]

b) Time consuming [ ]

### Part E: Subject Taught

Computers can be used for various purposes in instruction delivery to students. The table shows a list of the various purposes.

20. Please indicate by ticking the frequency at which you are using each of them in your teaching.

	<b>Purpose</b>	<b>Daily</b>	<b>More than twice a week</b>	<b>More than twice a month</b>	<b>Never</b>
(I)	accessing teaching and learning resources				
(ii)	Preparing lessons				
(iii)	Downloading lessons from the internet				
(iv)	Enhancing existing teaching methods				
(v)	Subject enriching exercises				
(vi)	Implementing lessons				
(vii)	Processing test scores				
(viii)	Preparation of subject reports				
(ix)	Accessing email on subject related emails				
(x)	Computation activities for students				

(xi)	Problem solving activities				
(xii)	Solving real life problems using digital; tools and resources				
(xiii)	Communicating with other teaching staff and administration				
(xiv)	Others				

21. Computers can be used to carry out various activities in teaching and learning. How often do you carry out these activities? Tick the columns appropriately.

	<b>Activity</b>	<b>Daily</b>	<b>Often</b>	<b>Seldom</b>	<b>Never</b>
(i)	Individual student and group activities on digital resources				
(ii)	Question and answer activities				
(iii)	Observing educational illustrative simulations				
(iv)	watching to power point or OHP presentations in class				
(vi)	Observing and discussing educational animations in power point activities				

**Thank you for your time and cooperation.**

## Appendix III: Student Group Discussion Questions

### Instructions.

The questions for group discussion are divided into three sections; A to C. The researcher will use them in the discussion with the students in groups of 30 to 40 students.

NAME OF SCHOOL \_\_\_\_\_

FORM \_\_\_\_\_

### Part A: Prior Knowledge

1. Have you ever used a computer? Explain when and where you used a computer.

2. For how long have you been using a computer?

- a) More than 5years [ ]
- b) 3-4 years [ ]
- c) 1-2 years [ ]
- d) Less than one year [ ]

3. Have you ever undergone any computer training? Explain how the training has helped you in learning.

.....  
.....

### Part B: Access

4. Do you access computers in your school? Explain where you access them and discuss how convenient they are for you in learning.

.....  
.....

5. How often do you access your school computers?

.....

6. Do you ever access internet in your school? How does it help you in your learn

.....  
.....

7. How often do you access internet in your school?

.....

8. How often do you wish to use the internet in your learning?

.....

### Part C: Subjects

#### In which subjects do your teachers use computers in content delivery?

9. The following are CBT tools used in learning. How often do you use them in learning in your school per week?

	<b>CBT tools</b>	<b>Very often</b>	<b>Twice or more</b>	<b>Seldom</b>	<b>Never</b>
(I)	email for communicating completed assignments to teachers				
(ii)	Multimedia CD, DVD subject content, e.g. K I E cyber school or student Encarta.				
	<b>CBT TOOLS</b>				
(iii)	Computer LCD or OH projector during lessons				
(iv)	Solving real life subject problems using computer or internet.				
(v)	MS excel processed worksheets for class activities, tests and exams				
(vi)	MS PowerPoint simulations or animations to illustrate subject concepts				



(vii)	Subject resource from internet or web page during lessons. For example, subject enrichment exercises information gathering, assignments for both individual and group work.				
-------	---	--	--	--	--

**Appendix IV: Public Secondary Schools with Computers in Kisii County.**

	School	Student Enrolment			Staff Establishment		
		Boys	Girls	Total	Male	Female	Total
1	Sengera Parish	-	45	45	04	06	10
2	Nyaura Secondary	19	15	34	05	03	08
3	Bobaracho Secondary	35	31	66	09	05	14
4	Nyosia Sec	15	12	27	04	02	06
5	Riondonga Secondary	31	30	61	15	03	18
6	Boruma Secondary	25	20	45	08	04	12
7	Kereri Girls	-	220	200	45	02	47
8	Itibo Boys	50	-	50	09	03	12
9	Getembe Secondary	25	15	40	09	05	14
10	Kioge Girls	-	84	84	14	08	22
11	Tendere Secondary	40	21	61	12	07	19
12	Nyaguku	13	14	27	06	04	10
13	Nduru Boys	46	-	46	12	05	17
14	Suneka Secondary	69	31	100	19	13	32
15	Hema Sec	18	17	35	09	05	14
16	Gakero ELCK	40	31	71	06	03	09
17	Nyamache Boys	56	-	56	12	04	16
18	Magen Boys	80	-	80	15	04	19
19	Rianyabaro Boys	20	-	20	02	01	03
20	Tambacha cog	10	19	29	10	04	14
21	Amariba Secondary	13	5	18	05	06	11
22	Masimba Secondary	13	19	32	12	01	13
23	Monianku Secondary	12	18	30	07	12	19
24	ST. CatherineIranda	20	11	31	10	03	13
	<b>TOTAL</b>	<b>650</b>	<b>658</b>	<b>1308</b>	<b>259</b>	<b>113</b>	<b>372</b>

**Appendix V: Krejcie & Morgan Table, (1970)**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size  
"S" is sample size.

Source: Krejcie & Morgan, 1970