USE OF COMPUTER ASSISTED INSTRUCTION FOR TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KIRINYAGA COUNTY, KENYA

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

To my beloved husband and friend Mr. Kirogo, and our children Cynthia, Lisley and Stasha. Thank you for your support throughout the study.
ACKNOWLEDGEMENT

I wish to thank the Almighty God for sustaining and keeping me up to this moment and granting me peace, knowledge, wisdom and a chance to get this far.

I also take this opportunity to express my profound gratitude and deep regards to my supervisors, Professor Nicholas Twoli, Dr. David Khatete and the late Dr. Ndichu Gitau (May his soul rest in eternal peace) for their guidance and friendly advice during this work. I would also wish to express my warm thanks to all my lecturers who taught and guided me in coursework and to my colleague students for their moral support.

The completion of this thesis could not have been possible without the unwavering support of my loving husband. I also thank my three children for their understanding when I had to be away from the family to do this work. Deep appreciation also goes to all those who assisted me in typesetting and editing this thesis.

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TABLE OF CONTENTS

Declaration ........................................................................................................ ii
Dedication ........................................................................................................ iii
Acknowledgements ........................................................................................ iv
Table of Contents .......................................................................................... v
List of Tables ................................................................................................. viii
List of Figures ............................................................................................... ix
Abbreviations and Acronyms ......................................................................... x
Abstract .......................................................................................................... xi

CHAPTER ONE: INTRODUCTION
1.0 Background of the study ......................................................................... 1
1.1 Statement of the Problem ...................................................................... 7
1.2 Purpose of the Study ............................................................................ 8
1.3 Objectives of the Study ........................................................................ 8
1.4 Research Question ................................................................................ 9
1.5 Significance of the Study ..................................................................... 9
1.6 Limitations of the Study ..................................................................... 10
1.7 Basic Assumptions ........................................................................... 10
1.8 Theoretical framework ....................................................................... 10
1.9 Conceptual framework ....................................................................... 16
1.10 Operational Definitions of terms ....................................................... 18

CHAPTER TWO: LITERATURE REVIEW
2.0 Introduction ........................................................................................... 20
2.1 Review of related Literature outside Kenya ....................................... 21
2.2 Review of related literature in Kenya ................................................ 24
2.2.1 Availability of computers in schools in Kenya ............................. 24
2.2.2 Accessibility of computers for use by teachers and students .......... 26
2.2.3 Teacher and student’s knowledge and skills on computer use .......... 27
2.2.4 Teachers and students’ perception towards the use of computers in teaching and learning ................................................................. 28
2.2.5 Computer Assisted Instruction support from stakeholders ................. 29
2.3 Chapter summary ................................................................................. 30

CHAPTER THREE: METHODOLOGY

3.0 Introduction ......................................................................................... 33
3.1 Research design .................................................................................... 33
3.1.1 Study variables .................................................................................. 35
3.2 Locale of the study ................................................................................ 35
3.3 Target population .................................................................................. 36
3.4 Sampling techniques and sample size ...................................................... 36
3.4.1 Sample techniques .............................................................................. 36
3.4.2 Sample size ......................................................................................... 36
3.5 Construction of the research instruments ................................................. 37
3.5.1 Interview schedules for principals ......................................................... 38
3.5.2 Questionnaires for teachers and students ............................................ 38
3.5.3 Observation checklist .......................................................................... 39
3.6 Pilot study ............................................................................................. 39
3.6.1 Validity ............................................................................................... 39
3.6.2 Reliability ........................................................................................... 40
3.7 Data collection procedures ..................................................................... 40
3.8 Data analysis .......................................................................................... 41
3.9 Logistical and ethical considerations ....................................................... 41
3.10 Chapter summary ................................................................................ 42

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction .......................................................................................... 43
4.2 Demographic information of the study respondents ................................. 44
4.3 Availability of CAI resources in schools .................................................. 46
4.4 Accessibility of computers for use by teachers and students .................. 50
4.5 Knowledge and skills on the use of technologies by teachers and students ..... 55
4.6 Perceptions towards use of CAI in teaching and learning .......................... 60
4.7 CAI support from stakeholders ................................................................ 63
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction .......................................................................................................................... 67
5.2 Summary of the findings ....................................................................................................... 67
5.3 Conclusions .......................................................................................................................... 70
5.4 Recommendations of the study ........................................................................................... 71
5.5 Areas for further research ................................................................................................... 72
REFERENCES ............................................................................................................................. 73

APPENDICES .................................................................................................................................. 77

Appendix I: Consent form ........................................................................................................... 77
Appendix II: Questionnaire for teachers ....................................................................................... 78
Appendix III: Questionnaire for students ..................................................................................... 84
Appendix IV: Interview schedule for principals ............................................................................. 88
Appendix V: Observation checklist ............................................................................................... 94
Appendix VI: Research authorization from the university ............................................................. 95
Appendix VII: Research authorization from NACOSTI ................................................................. 96
Appendix VIII: Research permit ................................................................................................ 97
Appendix IX: Study locale map ................................................................................................... 98
LIST OF TABLES

Table 1.1: The Actions model ................................................................. 15
Table 3.1: Sample grid for schools ......................................................... 37
Table 3.2: Sample grid for students, teachers and principals .................... 37
Table 4.1: Demographic characteristics of the teachers .............................. 44
Table 4.2: Teachers responses on availability of CAI resources in schools .... 47
Table 4.3: Computer-learner ratio ......................................................... 48
Table 4.4: Availability of CAI resources .................................................. 49
Table 4.5: Students’ accessibility to computers for learning ....................... 50
Table 4.6: Students responses on CAI resources accessibility .................... 51
Table 4.7: Teachers response on the accessibility of CAI resources for use .... 54
Table 4.8: Students and teachers rating on their ability to use computers ....... 56
Table 4.9: Teachers and students responses on alternatives taken when a computer problem is experienced ................................................................. 59
Table 4.10: Teachers and students rating on their experience with computers .... 60
Table 4.11: Teachers perceptions towards use of CAI ............................... 62
LIST OF FIGURES

Figure 1.1: Conceptual Framework ......................................................... 17
Figure 3.1: Research design and process of the study ................................ 34
Figure 4.1: Students demographic information ........................................ 46
Figure 4.2: Students’ accessibility to DVDs, VCDs, CDs, Flash discs and online resources .......................................................... 53
Figure 4.3: Teachers training on computer use .......................................... 57
Figure 4.4: Teachers level of computer training ......................................... 58
Figure 4.5: Computer adequacies to support CAI use in schools ................. 64
LIST OF ABBREVIATIONS AND ACRONYMS

CAI-Computer Assisted Instruction
CD-Compact Disc
CDE-County Director of Education
CFSK-Computer for Schools Kenya
CIT-Conventional Instructional Techniques
DVD-Digital Versatile Disc
EFA-Education for All
GOK-Government of Kenya
ICT-Information Communication Technology
IT-Information Technology
KCSE-Kenya Certificate of Secondary Education
KESSP-Kenya Education Sector Support Programme
MOE-Ministry of Education
MoEST-Ministry of Education Science and Technology
NACOSTI-National Council for Science and Technology
NGO-Non Governmental Organization
NI3C-National ICT Innovation and Integration Centre
PA-Parents Association
SPSS-Statistical Package for Social Sciences
VCD-Video Compact Disk
ABSTRACT

The purpose of this study was to determine the use of Computer Assisted Instruction in public secondary schools in Kirinyaga County. The study was guided by the following objectives: to establish the availability of computers in schools; to examine accessibility of computers for use by the teachers and students; to ascertain the extent of knowledge and skills on the use of computers by both the teachers and the students; to determine teachers and students’ perception towards the use of CAI in teaching and learning; to establish whether the use of CAI has support from the Ministry of Education, parents and the private organizations and to assess the demand versus supply of computers in the schools. The study was guided by Bates’ ACTIONS model. The study employed descriptive study design targeting principals, teachers and students in all the 105 public secondary schools in Kirinyaga County. Stratified sampling was used to classify the schools in strata of: ‘public day’ and ‘public boarding’. Purposive sampling was used to select Five (5) schools from the public day category and six (6) from the public boarding category making a total of eleven (11) schools. Questionnaires were used to collect data from teachers and students while an interview schedule was used to conduct face-to-face interview with the principals. The researcher also recorded various aspects of CAI in an observation checklist. Quantitative data collected was coded and entered into an SPSS programme for statistical analysis and the findings were presented using frequency distribution tables, bar graphs and pie charts. The study established that computers were available in all the sampled public secondary schools in Kirinyaga County although they were inadequate to support CAI use. Other resources available in these schools were: LCD projectors, DVDs/VCDs, Flash discs, CD ROMs and internet access. The study further revealed that teachers and students had average skills on computer use and that at least 72.8% of the teachers had training in computer packages. The study also showed that teachers appreciated the importance of CAI in their teaching and learning. It emerged from the study that the schools administration and the ministry of education supported the training of teachers on CAI. There was however no such support offered by the private sector. The study recommends that; the Board of Management in schools should develop programmes through the parents associations to equip schools with more computers and other CAI resources in order to make CAI teaching and learning easier; the government through the ministry of education should organize in-service training for teachers in order to equip them with expertise skills and knowledge and build their confidence with ICT tools; the private sector should support CAI in schools as part of their corporate social responsibility. The Parents’ Associations (PA) should organize a PA fund to equip their schools with more computers; the study also suggested that the Teachers Service Commission recruits more teachers professionally trained in computer use to facilitate in CAI teaching and learning.
CHAPTER ONE
INTRODUCTION

1.0 Background of the study

Education is a key pillar in the economic, political as well as social growth of any nation. On the whole, the success of the government’s overall development strategy will depend on the provision of education and training to all Kenyans. (Republic of Kenya, (2004)). This is why the Kenyan government embraced the EFA movement and took up the cause of providing basic education for all learners. It’s paramount to note that the world in which we live has greatly changed. Our learners have moved into the digital age. Meanwhile our learning institutions continue to function on the ideas and theories from the past. This leads to a disconnect between students and the institutions they attend. Instruction is primarily based on teacher talking in classrooms, textbooks, memorization, and content-based tests; schools are becoming increasingly out of touch with the world around them (Kelly, McCain and Jukes, (2009)). Learning needs to reflect the latest digital reality as well as instructional methods. It ought to incorporate the most recent technological tools to maximize the learning experience for the learners. Online technology together with computers that can perform tasks will change the learning setting with powerful tools for discovery learning in the very near future.

In Africa, the digital divide is really quite severe, going together with the other divides based on gender, racial, locality and poverty lines. Teachers are capable of playing a significant role in crossing this digital divide. Getting a computer is actually the first vital step as it provides access to technology. Then learning to use it bridges the divide further, as new skills are acquired. When the teachers cross this
divide, they then will be able to lead students over the bridge (Kobus, 2009)). Efforts to integrate ICT in education in many countries have called for massive injection of funds into the education sector. This is upon realization that the world has become a global village due to the overwhelming changes in technology. This has led to changes in the labour market. In order to fit in this global village and meet this labour demands, the Kenyan education system is compelled to make certain changes in the curriculum content and most importantly in the delivery methods. Stakeholders in the education system ought to understand and embrace the 21st Century skills within the framework of its academic standards. Learning institutions must also become accustomed to these changes and fully bridge the gap between how the students live and the way they learn (MOEST, 2013)). The challenge is to rise above traditional methods of teaching and change instructional practices in ways which mirror the changing social, political as well as economic setting in which 21st Century learner will be taught. Kenyans are now aware of the valuable role of technology in teaching as well as learning effectively. All the same the country has not managed to make noteworthy progress in improving education by use of Computer Assisted Instruction.

ICT has a crucial part to play in education, so if properly utilized, it can bring numerous benefits to the classroom as well as in the process of education and training in general. ICT use will bring innovative opportunities for both teaching and learning. Some of these will be; prospect for more student centered teaching, a chance to reach more students, better opportunity for students to communicate and collaborate, bigger opportunities for variety of technologies, creating great passion for learning among the students and enabling them to reach a wider variety of
information. Access to computers in schools expose the young and growing population to ICT that they can use to expand their knowledge to meet their training requirements as well as global competitiveness (MOEST and NACST, 2010). Important to note is that developing capacity to ICT use contributes to lifelong learning skills which support the country’s knowledge information and skills. The worrying trend is that most learners to date are still being taught in a similar way as their parents were, using, text book based learning and teaching that is teacher centered. The computer definitely holds greater promise in the instructional process in comparison to other media for instance books and chalkboard that have been used for instructional practices for a long time. Audio visual materials usually increase the children’s interest (Ayot and Patel, 1992). The computer not only activates the sense of sight, touch and hearing of the users but also provides elevated interactive possibility for the users to develop individual academic and creative abilities. Reforms in the way we teach at all levels and all disciplines is needed.

In the case of Kenya, creating a Computer Assisted Instruction environment has remained a challenge, hence a definite need for a better understanding of the many challenges as well as issues affecting teaching and learning with the integration of the computer. This understanding will aid in bringing about changes at these three levels namely; teacher, learning activities and school environment. Teachers for example, if supported by parents through funding, together with administrative and policy makers can be in a position to optimize the many benefits of CAI and thereby make teaching and learning through integration of computer technology a reality.
Most schools are restructuring to accommodate computer as an instructional resource. Schools also acknowledge that computers enhance administrative functions. Computerizing schools requires investment in equipment, professional development and teacher training, technical support, internet connectivity and digital learning process or content. Highly relevant content for Kenyan schools is important if we are to effectively tap into the potential of CAI. Previously the computer was thought of as an expensive device suitable only for mathematicians and scientists. It is believed that in the near future, computers will be part and parcel of every lesson. Teachers need to embrace this technology and exploit its potential. Parents on the other hand should encourage their children to use computers for a variety of activities which promote learning. When used properly, the computer is actually a very powerful tool for supporting teaching and learning in both the home and the school. (Griffin and Bash, (1995)).

The potential of CAI is definitely great. It serves to create efficiency and effectiveness in learning at the same time encouraging students to be more actively involved in their own education. Research plus experience has acknowledged that CAI if properly used in the classroom can be of great worth in various ways:

a. Improving students’ retention. It’s interesting and sustains attention.

b. Increasing their motivation to learn. It has been revealed that students get more motivated when the learning activities used are authentic, challenging, at the same time multi-disciplinary and multi-sensorial. It stimulates sensory and cognitive curiosity.

c. Deepening their understanding of the materials learned as it makes learning meaningful, less abstract and more relevant.
d. Enable learners to access both local and worldwide information from the internet and World Wide Web.

e. Offer an opportunity to communicate, share research, at the same time join projects across geographical boarders.

f. The fact that computer is an interactive media allows learners and teachers to progress at different speeds depending on the existing circumstances.

It is therefore important to ensure that the education offered to learners is the best and meets their needs. This can only be achieved through using the most modern technology in delivering the curriculum. New applications of technology do have great potential in supporting learning across the school curriculum. This allows effective communication to take place between teachers and students in various ways not previously possible. (Leask M.,(2001)). Computer programmes when carefully structured are able to present an alternative approach which enhances the successful features of conventional teaching methods. To begin with, they can present text in a rather highly structured manner and introduction of new concepts and skills can be paced. This will depend on the progress the students are able make through the programme. Moreover, they can give feedback to the student and as long as the student is prepared to keep trying, they will continue to work. CAI has a very crucial part to play in this. The worst thing anyone involved in education can do is to ignore the benefits and challenges of computerized technology, (Griffin and Bash, (1995)). Teachers ought to use the most up to date digital tools for purposes of engaging students in the vital task of learning. Needless to state, technology must be very integral to both teaching and learning in high school just as it is to the world outside schools (Kelly, Mac Cain and Jukes, (2009)).
One vital step to bridge the digital gap is introducing computers and related infrastructure as medium of instruction in schools. From as far back as the 1980s, developed nations have made integration of ICTs in education obligatory. This is not the case in developing countries such as Kenya. In Kenya ICT integration in education is by far more recent, in small scale and rather preliminary. Not in doubt however, is the fact that ICT has potential to play a very powerful role in upgrading resources at the same time improving the learning environment. ICTs can also play a part in preparing students for acquisition of skills, competencies as well as socio skills that are essential for competing in the up-and-coming global “knowledge economies” (MOE, (2006)).

The MOEST in Kenya’s vision is to facilitate ICT as a worldwide tool for use in education and training. To be able to achieve this vision, every educational institution, teacher, learner as well as the respective community need to be properly equipped with suitable ICT infrastructure, competencies together with policies to enhance usage and progress. It therefore requires that teaching and learning is transformed to incorporate new pedagogies which are fitting for the 21st Century (MOE, (2006)). This will equip the future labour force with skills to participate and compete in the 21st Century education and at the same time attain Kenya’s educational goals. Worth mentioning is the National ICT Innovation and Integration Center (NI3C). Established under the M.O.E, this center serves as a capacity development hub for the effective use of ICT in education and training. It’s mandated to test and evaluate new technological ICT innovations and give advice on their usability and effectiveness. During its launch on 10th Aug 2011, the then minister of education Prof. Sam Ongeri cited examples of rather successful
utilization of ICT in the classroom in countries such as Rwanda, Singapore and Malaysia. He also recognized the significance of ICT use in education. He described it as a language that can be utilized to teach a range of subjects in the classroom. (www.vvob.be/kenya/content/nationalICT). There is no doubt therefore that technology especially computer has a critical role to play in helping education deliver its mandate. This hence makes CAI an indispensable tool in the education sector.

1.1 Statement of the Problem

In Kenya, the ministry of education through the Kenya Education Sector Support Programme (KESSP) feature ICT as one of the priority areas with the intention of mainstreaming computers into the teaching and learning process. The country is also rapidly and heavily investing in computer technology for use in digital content and curriculum delivery in schools. Despite these numerous investments, preferred learning outcomes are yet to be realized.

The computer is considered to be an influential learning resource and when used alongside the traditional instructional method it has positive effects on the teaching and learning process such as focusing on subject specific content, better critical thinking skills coupled with scientific enquiry.

The reality on the ground is that the country still faces major challenges such as teachers' perception to change as well as anxiety about using computers which has in turn led to a resistance to use them. Many people who work in schools are also victims of TTWWADT-That’s The Way We’ve Always Done Things. (Kelly, Mc
Cain and Jukes, (2009)). Majority of teachers also don’t make real use of computers in instruction despite its numerous benefits.

It is upon the realization that use of CAI in Kenya has not yet yielded adequate results that the study sought to look into whether CAI is being used in secondary schools in Kirinyaga County. The study therefore intended to investigate the challenges faced and efforts made to address them in a bid to create a dynamic learning experience that directly benefits students.

1.2 Purpose of the Study

The purpose of this study was to assess the use of computer assisted instruction in teaching and learning in selected public secondary schools in Kirinyaga County, Kenya.

1.3 Objectives of the Study

CAI in the teaching and learning process should be the norm rather than the exception, the key objective of the study was to assess the use of computer assisted instruction in teaching and learning in selected public secondary schools in Kirinyaga County, Kenya.

This study was guided by the objectives below;

a. To establish availability of computers in the schools for use by teachers and students in teaching and learning.

b. To examine accessibility of computers for use by the teachers and students.

c. To ascertain the extent of knowledge and skills on the use of these technologies by both the teachers and the students.
d. To determine the perception of teachers and students’ towards the use of CAI in teaching and learning.

e. To establish whether the use of CAI has support from other stakeholders in the schools.

1.4 Research Questions

Below are the research questions that guided the researcher in order to achieve the stated objectives;

a. What is the computer-learner ratio in the school?

b. Are these computers always available /accessible for use any time there is need to use them for teaching and learning?

c. To what level are the teachers and students prepared in terms of training in embracing use of CAI?

d. Is it necessary to use CAI for the teaching and learning of different subjects in the school?

e. How ready/willing are the stakeholders in as far as supporting CAI in schools is concerned?

1.5 Significance of the Study

Tomorrow belongs for those who prepare for it today and since education is our passport to the future, use of CAI in teaching and learning to a great extent prepares the students to achieve better grades and also help them enhance their learning rates. This study therefore is important as it will expose the challenges public secondary schools face in an effort to use CAI. To begin with, it is particularly important to the students since addressing these challenges will help prepare them better for their careers tomorrow as they will be better prepared for achievements across various subject areas.
Secondly, it will enable the teachers inculcate within themselves a result oriented culture producing students who will compete favorably in the global job market. The findings will also be helpful to the MOEST for the purpose of formulating and effectively implementing ICT Policy of 2006. Moreover, the findings of the study will be of benefit to the curriculum developers in developing ICT curriculum that would maximize the potential of CAI in Education. The study will also attempt to contribute to the research in this area by reporting on the challenges of using CAI in secondary schools with a view to having them addressed and hence establish best practice in education.

1.6 Limitations of the Study

Financial constraints were experienced especially during data collection while time constraints limited the researcher to Kirinyaga County. Another limitation was that the study was confined to public secondary schools only. Consequently, the findings of the study may not be a reflection of a true picture of the whole country and may be difficult to generalize. The study involved form three (3) students, teachers and principals. Other stakeholders were not involved.

1.7 Basic Assumptions

The study was based on the basic assumptions that:

a. The respondents were willing to participate in the study freely without fear.

b. The respondents were co-operative in providing reliable responses.

c. That the respondents were honest and responded to the research instruments truthfully so that the findings were objective.

1.8 Theoretical framework

According to Orodho (2009) the importance of a theoretical framework is to bring order, unity and simplicity to what is being investigated. It helps to clarify the
statement of the problem and enhance the development of explanation. This study was be guided by Bates’ 1995 model on learning – The ‘ACTIONS’ Model.

‘ACTIONS’ stand for:

A- Access: Refers to how a particular technology is accessible for learners.
C- Costs: How much does each technology cost?
T- Teaching and learning functions: Considers some of the best teaching applications for this technology.
I- Interactivity and user friendliness: Is the technology easy to use?
O- Organizational issues: Are there changes in organization that require to be made?
N- Novelty: Is the technology the latest in the market?
S – Speed: With what speed can courses be integrated with this technology?

It’s important to note that technologies ought to be adopted only if they contribute positively to students’ learning.

1.8.1 Access

Students and staff need to access the technology adequately. Provision of sufficient computers and network access is also necessary. It’s also necessary to consider the various needs of learners and develop a policy to help students and staff feel at ease using proposed technology. The basic requirement for teachers as well as students in use of CAI is therefore a computer, digital content, plus access to the internet. There is need to consider the issue of access to the computer and the internet. Schools need to have enough computers to enable students and teachers to use CAI effectively. Where the computers are located in a school can have great impact on their utilization and acceptance by a school staff. One of the main considerations in deciding where to place computers should be ease of access. (Coburn, et al, (1982)).
1.8.2 Costs
The cost connected with using CAI normally includes principal cost for buying the equipment. Operational costs together with instructional development costs, staff costs and cost of maintenance also need to be factored in. It is imperative to address how funds will be raised for sustenance of systems and services. The main recurrent cost elements which need to be considered are cost of internet connections; cost of maintaining the equipment and applications coupled with cost of replacement of equipment bearing in mind that a computer which is bought today has to be replaced in either three to four years time. Allowances for ICT professionals must also be considered. According to Bates, (1995) cost is a strong discriminator between technologies and is normally the first issue considered by institutional decision-makers. Differentiating between the costs of one – way and two – way technologies is therefore necessary. Generally, one – way technologies for instance print and audio have high initial production costs but on the other hand lower on-going costs while technologies that are two – way for instance conferencing which is computer based are relatively less expensive to set up but may have higher ongoing costs.

1.8.3 Teaching and learning functions
The use of technology is effective only when the user has a deep understanding of the subject as well as an imagination and idea of how best the subject can be taught using technology. There is therefore need for a clear understanding of the advantages and weaknesses of different technologies used to support learning. In reality, the computer is just a tool-a very powerful multimedia tool-that can be used with any strategy the teacher may employ, from lecture presentation to individual work (Marsh, (1993)).
1.8.4 Interaction and user friendliness

It’s imperative for the learners and learning materials, other learners and the teacher to interact for the learning process to go on. It’s necessary that learning resources and activities are made as interactive as possible in order to achieve quality in teaching and learning. The degree and type of interaction differs to a great extent between technologies. Online conferencing generally encourages learner-learner exchanges and two-way learning while websites produced by simply repackaging the existing paper based-resources simply offer negligible interactivity and produce slight effect on learning outcomes.

1.8.5 Organizational issues

The extent of support offered by the organization to a technology is a major determiner of its long-term success. Besides insufficient training, educators frequently note that lack of computer support prohibits their use of technology (Ivers, (2003)). In order to ensure effective adoption of technologies it is necessary to consider additional staff development and training, changes in administrative structures and procedures together with improving technical support for staff and students. Eventually, schools will have to go through considerable structural adjustments to keep at the same pace with technological advances.

A requirement of CAI will be that a number of organizational arrangements are made and barriers removed. It is also necessary to create awareness and change mindsets within the schools since lack of awareness goes along with mindset in that people get stuck to old ways of doing things. A means to addressing change of mindset is full involvement of teachers and students in the process of creating a CAI environment and benchmarking in schools where CAI has been implemented and the benefits can be seen. Educational organizations capable of exploiting the new
technologies to help meet the needs of the twenty-first century are needed. (Bates, (1997)).

1.8.6 Novelty

The newness of a technology may be an essential factor in attracting initial funding or obtaining new equipment. Students tend to react excitedly to the use of new technologies in instruction which may then lead to improved performance. This improvement is bound to be short lived unless the technology is able to deliver more effective learning in a sustainable and consistent way.

1.8.7 Speed

Teachers need to consider the time required for developing, updating and delivering educational resources, for instance consideration of delivery of text compared to that of video over the internet needs to be made.
Table I.1: The ACTIONS Model used for selecting educational technologies

<table>
<thead>
<tr>
<th>A</th>
<th>Access</th>
<th>How accessible and flexible is a particular technology for learners in a certain target group?</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Costs</td>
<td>How much does a unit for each learner cost?</td>
</tr>
</tbody>
</table>
| T  | Teaching and learning functions | What are the best instructional approaches for the learning needed?  
What are the best technologies necessary to support this teaching and learning? |
| I  | Interactivity and friendliness | What type of interaction is possible with this technology?  
How effortless is it to use it? |
| O  | Organizational issues | Are there any barriers in the organization that require to be removed, before this technology can be used effectively? |
| N  | Novelty | How up-to-the-minute is the technology?                                                        |
| S  | Speed | How speedily can courses be integrated using this technology?  
Can materials be changed swiftly? |


1.8.8. Summary of the theory

Bates’ model on learning argues that in order to meet secondary and workplace lifelong learning in an increasingly complex society, changes are required in the post secondary and workplace training systems. The author therefore proposes a practical decision making frame—work—the ACTIONS model which appears to follow the constructivism philosophy. Learning is viewed by social constructivists such as Skinner as an active process where students ought to learn to find out principles, concepts as well as facts for themselves. Bates’ Actions concept is a good model to
use for the design of e-instruction and is also useful in the development of classroom learning.

1.9 Conceptual framework

A conceptual framework basically uses drawings and diagrams to explain the interrelationships between the main variables. These variables together with other related factors are put in boxes and arrows are used to indicate the interconnections between them (Orodho,(2009)). The conceptual framework for this study was developed from the reviewed related literature and the theoretical framework.

The conceptual framework below (figure 1) shows how dependent and independent variables relate. The independent variables for this study included:

a. Availability of resources.

b. Teacher/student perception towards use of CAI.

c. Teacher preparedness.

d. Availability of relevant digital content.

The dependent variable in the study was the effective use of CAI in Instruction.
Figure 1.1. Conceptual Framework

1.10 Operational Definitions of terms

**Blue print**: A guide for making something—It’s a design or pattern that can be followed.

**Computer Assisted Instruction (CAI)**: This is a teaching process whereby the education of learners is enhanced using a computer often in a way that requires the learners to interact with it.

**Digital age**: A time in the final quarter of the 20th century when information became easy to get to through publications and management of information by computers and computer networks.

**Digital divide**: This is the inequality of access to ICT services such as telephone, computer and internet.

**Discovery learning**: This refers to a powerful instructional approach used to guide and motivate learners to search information and concepts, while embracing new knowledge and applying new behaviors back on the job.

**Effective use of CAI**: Adequate use of CAI in order to produce the intended result.

**e-Learning** :( electronic learning) this is learning where ICT resources, tools and applications are used to focus on interactions among teachers, learners and online environment.

**Globalization**: This is the idea that the world is developing a single economy as a result of better technology and communications.

**ICT Infrastructure**: This is the physical equipment/hardware and software that makes it possible for a network to function.

**Information Communication Technologies**: ICT includes traditional technologies (e.g. radio, TV, print, video) and newer technologies (e.g. internet, virtual reality, mobile phones etc) all intended to fulfill information processing and communication.
**Innovation:** An idea, practice or object that is regarded as new by an individual.

**Internet:** This is a communication network which enables computers to share information in an electronic form.

**Intranet:** Refers to a local or restricted computer communications network, particularly a private network created using World Wide Web.

**Knowledge economy:** A financial system in which growth depends on the quantity, quality, and accessibility of the information available rather than on the means of production.

**Learning society:** An educational philosophy that positions education as the means to a nation’s economic progress, and holds that education should broaden beyond formal learning (based on traditional educational institutions- schools, universities etc) into informal learning centers to support a knowledge economy.

**Software:** Computer programmes that provide instructions that enable tasks to be performed by the computer.

**Technical support:** These are the basic skills required to overcome technical challenges when ICT are applied. The support can either be provided by in-school staff or external service provider.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

A literature review is can be defined as an account of what has been published on a topic by recognized scholars and researchers. It critically looks at the existing research that is significant to the work that the researcher will be carrying out. In order to achieve growth and empowerment in education, our curriculum delivery methods must change and improve.

CAI is essentially an interactive instructional technique in which a computer is used to present the instructional material at the same time monitor the learning that takes place (www.readingrockets.org/article/4185). One of the primary aims of CAI is definitely to optimize the learning process since computer programs are interactive and can display a concept through attractive animation, sound and demonstration. According to Adams, (1985) Computer Assisted Instruction (CAI) involves the use of the computer as an aid to teaching a particular subject. In enhancing the learning process in the classroom it uses a combination of text, graphics, sound and video and can be utilized to aid a student in selected areas of the curriculum. CAI has a rich and intriguing potential for answering today’s most critical need in education-the individualization of instruction (Atkinson and Wilson, (1969)). It makes use of the computer as a tool to make easy and improve teaching. The use of CAI in education is hence seen as a way not only of enhancing and extending the instructional methods but also the learning procedure in the 21st century.
Advantages of CAI

a. Big motivator.

b. Gives liberty to experiment with different options.

c. Provides immediate response/instant feedback to the answers elicited.

d. Self pacing by allowing students to progress at their own pace.

e. Allows teacher to dedicate more time to individual learners.

f. Time alone helps the shy and slow learner to learn.

g. Provides for individual attention.

h. Students can study more and more rapidly.

i. Multimedia aids in understanding difficult concepts through a rather multi sensory approach.

j. Since learning is self directed – students can make decision when, where, and what to learn. (www.educator.org/computer assisted instruction CAI).

Limitations of CAI

a. The information and resources available may overwhelm the students.

b. Over use of multimedia may divert some students’ attention from the content.

c. Good CAI packages are not available.

d. Lack of infrastructure to support CAI use.

Clearly the benefits of utilizing CAI outweigh the limitations and CAI being one of the newest instructional innovations for the learning environment it’s evidently a very useful instructional tool since its use as an addition to traditional, teacher directed instruction produces achievement effects better than those obtained with traditional instruction alone. It is rational to expect that use of the computer will play a major role in reshaping education and that the potential for positive change is enormous (Schofield, (1995)). Traditional instruction and CAI are of greatest value
when complementing each other. Throughout the world, computers are changing the face of education. It has been argued that the transformation of education may be the most important of the various practical revolutions sparked by computer technology. We are living in the digital age and hardly any aspect of human endeavour can be carried out effectively without computers.

It’s equally important to the note that the ICT projects in the Ministry of Education have not been fully implemented in Kenya. This chapter will therefore present a review of Literature related to the study.

2.1 Review of related Literature outside Kenya.

Lee (2002) carried out a study entitled: Creating ICT- Enriched Learner- Centered Environment; Myths, Gaps and Challenges in Hong Kong. In the study Lee paid attention to the most important issues confronted by teachers in the creation of ICT-enriched learner-centered environment. Lee used Hong Kong as an example to draw attention to the challenges. The researcher found pieces of evidence suggesting that ICT makes a difference in school education. Lee found that in the schools where ICT have been used, teachers have been able to push beyond the four walls of the classroom thereby successfully shaping the students to become lifelong learners. This helps cater for the different individual learning styles of students and in achieving different levels and dimensions of impact on student attainment.

Despite this, many teachers, school principals and policy makers still tend to point out that there is lack of evidence to demonstrate the desirable results that stakeholders have expected from the introduction of ICT into Hong Kong classrooms since the late 1990’s. Lee therefore felt that there was need for a better
understanding of the problems and issues of enhancing teaching and learning with the support of ICT. He noted that to a great extent, such an understanding is essential in helping teachers realize the benefits of ICT driven learner centered education. Some of the obstacles affecting use of ICT in learning and teaching were lack of teacher skills in the application of IT to enhance the effectiveness of teaching and learning, access to ICT coupled with effective management of ICT resources. Lack of appropriate training in ICT skills and ongoing support to encourage progression beyond initial teacher education also hinder effective ICT use. The recommendations were to make internet widely accessible and user-friendly, addressing affordability of web servers and setting up of intranet at all schools. Teachers also need to be supported by parents, administrators and policy makers to make leaner-centered learning a reality.

Romeo (2003) carried out a study on: Engage, Empower and Enable: Developing a Shared Vision for Technology in Education in Australia. The researcher found out that even after more than two decades of computers in education in Australian schools, there was confusion and reluctance at all levels about why the technology matters and why it is necessary to integrate it across the curriculum. Romeo noted that the confusion and reluctance originates from lack of a shared vision at both the school and Classroom level. The fact that teachers don’t see that technology matters and lack of practical teaching frameworks that considers the realities of teaching in the 21st century compounds the problem. He further noted that Computers in education, or learning with computers, is about the use of the technology to build great learning environments. It’s necessary to develop practical teaching methods that integrate ICT in meaningful ways, convince teachers that technology matters
and assist them understand the impact that technology can have on learning environments and processes.

2.2 Review of related literature in Kenya

In Kenya the Ministry of Education developed the Kenya Education Sector Support Programme (KESSP) in 2005. KESSP featured ICT as one of the priority areas with the intention of mainstreaming computers into the teaching and learning process. That an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy is a fact that the government recognizes and appreciates. The key objective of ICT in education is to expand learning opportunities, facilities and channels of curriculum delivery in schools. All the same, only about 2% of schools have computer laboratory, some desktop computers and or limited connectivity to the internet. The MOEST policy on ICT is to integrate ICT education and training into education and training systems in a bid to prepare the learners and staff of today for the Kenyan economy of tomorrow through the use of CAI. Insufficient ICT resources in the schools make it difficult even for teachers who have had some ICT training to be able to use CAI.

2.2.1 Availability of computers in schools in Kenya

Odera (2011) carried out a study on: Emerging Issues in the Implementation of Computer Technology into Kenyan Secondary School Classrooms in secondary schools in Nyanza province. He noted that Kenyan schools lack computers for teachers to use in teaching and learning. In the research, Odera concluded that in order to integrate computers in the school curriculum, all schools need to have adequate supply of computers and other related resources, including computer software, diskettes/flash discs, printers, teachers’ guide notes, students’ manuals and
computer textbooks. Even when the computers are available there is need for timetabling and booking the computer laboratories.

Elisha (2011) posted an article in a BlogSpot in the internet (Elisha’s CIMA, November 12/2011). The article highlighted several challenges facing ICT integration in schools. Among the challenges include lack of computers. Although government agencies, NGOs, corporate organizations and individuals have continued to donate computers to schools, there is still a big percentage of the schools unable to purchase computers for use by the students and teachers since computers are still very expensive. He further noted that since computers are still very expensive in Kenya, majority of individuals and schools cannot afford to buy a computer and hence consider it a luxury item. Furthermore, maintenance and repair calls for a substantial amount of money.

Mwangi, Nchenge and Sakwa (2012) In a study, Users Perception on ICT Adoption and its Support in Schools- a survey of secondary schools in Thika district Kenya found out that adoption and use of ICTs in educational institutions in developing countries, Kenya included remains very limited despite a decade of large investments in ICT. Availability and use of ICT in teaching and learning is still patchy. About 1300 secondary school out of more than 6000 schools have computers. Majority of these schools with computers use less than 40% of the available infrastructure and very few of them actually use ICT as an alternative method in curriculum delivery. This is an indication of a very slow integration pace which may lead to all benefits of ICT in schools being inequitably realized or nothing at all being realized in the near future.
2.2.2 Accessibility of computers for use by teachers and students

Elisha (2011) in an article in a BlogSpot in the internet on Saturday November 12, 2011 highlighted challenges facing ICT integration in schools in Kenya. He noted that lack of electricity or even frequent power disruptions affect access to the use of computers. Kenya is yet to have all parts of the country connected to the national electricity grid; as a result, those schools that fall under such areas are left handicapped. He adds that lack of internet or high connectivity charges also does frustrate the efforts of teachers and students to use the internet. It’s important to note that ICT integration in teaching and learning can play a significant role in equalizing opportunities for marginalized groups and communities. Paradoxically, for those groups that are unable to cross the technology divide, ICT is yet another means to further marginalize them.

According to Odera (2011) In order to integrate computers into the school curriculum, all schools need to have adequate supply of computers and other related resources. Teachers and students’ access to computer is further limited by unavailability of time to use computers in teaching and learning. The school can purchase many computers to support teaching and learning but if teachers and students cannot access the technology, it’s all wasted investment. The extent to which teachers and students can use computers depends to a great extent upon how accessible the technology is to them when they want to use it. More often than not the teachers are not able to effectively utilize computers in the classroom since they have heavy teaching load, planning duties in addition to other school work.
In a recent study, Kiptalam (2010) observed that access to ICT facilities is a major drawback for most African countries with a computer ratio of 1:150 students against the ratio of 1:15 students in developed countries. This continues to widen the digital divide as well as the knowledge divide. These ratios have hindered penetration of use of CAI in the education system even when we know that computers are being used in other sectors including banking, communication and medical services.

2.2.3 Teacher and student’s knowledge and skills on computer use.


In the study the research findings revealed that inadequate training of teachers in the use of computers plays a critical role in as far as the successful integration of computers in teaching is concerned. How well teachers have been prepared to use computers determines how successful the integration will be. This means that integration of computers into the classroom is strongly influenced and determined by the ability and skills of the teachers. The existing teacher training courses need to be built around developing teachers’ personal skills in computer utilization to ensure effective computer use in schools. Teachers being the backbone in any curriculum innovation, have to be conversant with computer hardware and software. The teachers need to accept to use the technology; further noted was the fact that teachers need encouragement to continue their professional development by acquiring new knowledge of computer skills through in-service courses, self instructional programmes, tutorials and formal training.
Mwangi, Nchunge and Sakwa (2012) in their study User’s Perception on ICT Adoption for Education Support in Schools: A survey of secondary school teachers in Thika District Kenya, recommended an increased investment strategy for improving the schools with ICT literacy facilities and resources for both teachers and students in Kenya. This is in a bid to address psychological as well as technical skill readiness for ICT integration. They also recommend that there is need for mass training and retraining of teachers on e-learning skills through computer training sessions, workshops and conferences. This training can impart the needed skills for teachers.

Nyaga (2011) carried out a research comparing CAI and Conventional Instruction Techniques (CIT) in Science among Selected Secondary Schools in Embu District Kenya. He found out that majority of teachers and learners lack computer skills which is a demotivating factor. Lack of instructional programmes complicated matters further.

2.2.4 Teachers’ and students’ perception towards the use of computers in teaching and learning.

According to Odera (2011), attitude of teachers towards computers in education is a significant factor in the effective integration and use of computers in teaching and learning. Teachers have to accept the new technology. Furthermore teachers’ attitude about computers, she notes, can either positively or negatively influence the attitude of their students towards computer integration in teaching and learning. Factors such as lack of experience with use of computers, lack of interest and lack of support from school administration could make teachers develop a negative attitude towards computers. No matter how superior the techniques employed are, it’s only
through positive attitudes of teachers that the benefits of computer integration into the curriculum instruction could be realized.

Elisha (2011) noted that teachers may fear being rendered irrelevant by the introduction of computers in their classes. They feel that if the learning process takes the student centered approach they may lose their authority in class, something that they really cherish. Obsolete computers can still be found in some schools – very old computers some running on windows 98 or even Windows 95. This lowers the morale of both the teacher and the student. Computers can also increase moral degradation whereby unsupervised students access internet pornography, cyber bullying and other anti-social behavior. This is an emerging problem which is worrying and affecting teachers’ attitude towards computer integration in teaching and learning.

Mwangi Nchunge and Sakwa (2012) also found out that insufficient psychological preparedness has delayed perception change which has in turn hampered technology acceptance and usefulness in secondary schools. This has created fear of sustainability of ICT programmes.

2.2.5 Computer Assisted Instruction support from stakeholders

Research has found out that using CAI makes lessons not only more interesting and easier but also fun for the teachers and the students. It makes learning more diverse and motivating for the students and definitely more enjoyable. Some of the benefits include:

a. Improves presentation of materials.

b. Internet provides professional support.
c. Allows greater access to computers for personal use.

d. Makes teachers’ administration more efficient.

Odera (2011) in the study on Emerging Issues in the Implementation of Computer Technology into Kenyan Secondary School Classrooms found out that lack of technical support hampered computer integration in teaching and learning. The issue of technical support and maintenance of educational equipment is one of the major factors hindering integration of computers into the school curriculum in countries like Kenya which are still developing. The researcher also argued that support provided by technical assistants is very valuable to teachers as it serves as an ideal help for integration of computers in secondary schools. The research recommended technical support for effective use of computers in schools. This, together with maintenance of educational technology equipment is essential. The administration also needs to support ICT integration. It’s obvious the principals of schools need to encourage teachers to use computers in teaching and learning in order to improve the quality of education, motivate students and provide quality in lesson presentation.

2.3 Chapter summary

Kenya is rapidly and heavily investing in computer technology for use in curriculum delivery in schools. Although efforts are being made, the country still faces major challenges such as teachers’ attitude to change. Anxiety about using computers has been found to be a major cause of resistance to use them. Hannafin and Sevenye (1993) reported several possible explanations as to why teachers resist the use of computers. These include;

a. Doubt that computers can improve learning outcomes.

b. Resentment of the computer viewing it as a competitor for student attention.
c. Lack of support from administrators.

d. More time and effort required for teachers to integrate computers.

Teachers also fear losing control of center stage as well as looking stupid in front of the class.

Teachers need to be confident and familiar with the use of computers since they are the main gatekeepers in allowing innovation to diffuse into the classroom. Intensive professional development and up-skilling of the teachers is necessary as bringing computers into the school system certainly requires a careful and deliberate planning. High computer-student ratio, lack of access to the computers, lack of electricity especially in the rural areas coupled with frequent power disruptions, poor and unreliable internet connectivity, lack of technical support, failure to allocate funds for maintenance of the computers and purchase of software as well as lack of relevant digital content are some of the challenges which together aid in creating a digital divide between the developed and the developing countries. A more recent challenge occasioned by the Kenyan government’s pledge to issue laptops to all pupils joining standard one in the year 2014 in the public primary schools as part of the fulfillment of their manifesto is the e-waste management as a result of broken down computers which are beyond repair and must be disposed off. John Dewey a philosopher and education reformer once said, that ‘if we teach today’s students as we taught yesterdays’, we rob them of tomorrow’. (Dewey, (1994)).

There is a definite gap between the language of those advocating for use of CAI in secondary schools and the reality on the ground. While most research done outside Kenya shows positive effects of CAI, not much has been done in Kenya and in specific Kirinyaga County. Information about the challenges facing public
secondary schools in Kirinyaga County as they try to bring CAI on board is quite elusive. The current study therefore seeks to investigate and report these challenges in order to fully exploit the potential of CAI in schools. This is a research gap that this study wishes to bridge.
CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter describes the research methodology that was used to carry out the study. The main focus of this chapter was on the research design, locale of the study, target population, sampling techniques and sample size, research instruments, pilot study, reliability and validity of research instruments, data collection techniques, data analysis and logistical and ethical considerations.

3.1 Research design

Research design refers to the blue print for collection, measurement and analysis of data. It’s the plan and structure of investigation so conceived as to obtain answers to research questions (Kothari, (2004)). The research used a descriptive survey research design which enabled the researcher to look at the problem at hand thoroughly, define it, clarify it and obtain relevant information that could be of use to policy makers in basic education especially at a time when computerization of schools in Kenya is underway.

The design was therefore relevant for the study since it involved collecting data from the population in order to answer the research questions.
Fig 3.1 Research design and process of the study
3.1.1 Study Variables

The study focused on the interaction between the variables that influence the use of Computer Assisted Instruction in secondary schools in Kirinyaga County. The independent variables are the variables believed to affect the dependent variable. They can be manipulated by the researcher or by nature. The researcher can therefore handle or manipulate these variables in order to ascertain whether or not the result he/she obtains is due to it. The independent variables in this research included: Availability of resources, teacher/student, perception towards use of CAI, teacher preparedness and the availability of relevant digital content. On the other hand dependent variables are the ones a researcher measures in order to establish the change of effect created on them. In the case of this research, the dependent variable was the effective use of CAI in instruction.

3.2. Locale of the study

The study was carried out in Kirinyaga County, Kenya. The county has five sub-Counties namely, Kirinyaga Central, Kirinyaga West, Kirinyaga East, Mwea East and Mwea West. According to Singleton (1993), the ideal setting for any study should be within reach of the researcher and at the same time permit instant rapport with the informants. Wamahiu and Karugu (1995) also reveal that, sometimes being familiar with the research locale helps one gain acceptance. As such the researcher chose Kirinyaga County since, she works and lives within the area and is thus well familiar with it. Also, to the best knowledge of the researcher, no such similar study has been conducted within the area, which drew the interest to conduct this study there.
3.3. Target population

The target populations for this study were all the 105 public secondary schools in Kirinyaga County. The participants targeted were the students, teachers and principals of these schools.

3.4. Sampling techniques and sample size

3.4.1. Sampling techniques

The researcher used a sample population, which is a small part of a large population. The researcher made use of a list of all public secondary schools in Kirinyaga County to derive the sampling frame. All the secondary schools in the County were stratified into two categories: One category for public day schools and the other for public boarding. All public day secondary schools in the County are mixed. Purposive sampling was used to select schools that had computers to allow the researcher to use cases that had the required information in order to meet the objectives of the study. Five schools were purposively selected from the public day schools. The public boarding secondary school category was further stratified into boys’ and girls’ boarding. Three schools were purposively selected from each stratum to come up with six public boarding schools; three for boys and three for girls. A total of eleven schools were sampled; five day schools and six boarding schools.

3.4.2. Sample size

Form three class participated in the study. The form three students were selected since, the form four class was busy preparing for their second term examinations and for K.S.C.E. On the other hand, the form two and one classes were considered not to
have had enough experience with CA. I use in learning and teaching, the form one students were still transiting from primary school life. The researcher thus considered the form three class the most suitable for participation in the study. Forty (40) form three students from each school constituted the study sample size. This made a total of four hundred and forty (440) students. Eleven (11) principals and eleven (11) teachers also participated in the study. Mugenda and Mugenda (1999) suggest that one may use a sample size of at least 10% but for better results, a higher percentage is better.

Table 3.1: Sample Grid for Schools

<table>
<thead>
<tr>
<th>School category</th>
<th>Total number</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public day (mixed)</td>
<td>71</td>
<td>5</td>
</tr>
<tr>
<td>Public boarding (Boys’)</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Public boarding (Girls’)</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>105</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

Source: CDE’s Office Kirinyaga County

Table 3.2: Sample Grid for Students, Teachers and Principals

<table>
<thead>
<tr>
<th>School category</th>
<th>Students</th>
<th>Teachers</th>
<th>Principals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public day (mixed)</td>
<td>200</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Public boarding (Boys’)</td>
<td>120</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Public boarding (Girls’)</td>
<td>120</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>440</strong></td>
<td><strong>11</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

3.5. Construction of the Research instruments

The researcher employed questionnaires, interview guide and observation checklist (Appendix V) to collect information from the respondents. The questionnaires were two: One for the students (Appendix iii) and the other for the teachers (Appendix ii).
For the principals, the researcher used an interview schedule (Appendix IV). These instruments were all constructed by the researcher.

### 3.5.1. Interview schedule for Principals

Personal interviews as a method of collecting information are usually carried out in a structured way. (Kothari, (2004)). Merits of these systems are that:

- a. More information and in greater depth can be obtained from the respondents.
- b. There is always an opportunity to restructure questions for the interviewee.
- c. Interviewer can observe reactions to questions and answers to various questions.
- d. Unlike questionnaires where some might not be returned, with interview schedules there is no difficulty of missing returns.
- e. Using his/her own skills, the interviewer can overcome respondents’ resistance to respond to questions.

The interview schedule (Appendix IV) was constructed and administered to the respondents by the researcher.

### 3.5.2. The questionnaires for teachers and students

Using questionnaires, one can:

- a. Collect information from a large sample and from diverse regions.
- b. Uphold confidentiality since they’re presented in paper format.
- c. There is no opportunity of interviewer bias.

The questionnaires (Appendix II and III) were constructed and administered to the respondents and collected by the researcher for data analysis.
3.5.3 Observation Checklist

This instrument was used to record observable information during the researcher’s visit to the schools. It is an important instrument which the researcher utilizes to record what he/she observes during data collection. The observation checklist had guidelines seeking information such as availability of computers, computer software, connection to the internet and availability of electricity or standby generators. Observation checklist helps to gather crucial information first hand. The researcher witnesses situations and issues personally without relying on other people. The observation was conducted in the computer lab where the researcher observed the resources in the lab. The checklist (Appendix V) was constructed by the researcher.

3.6. Pilot study

The researcher carried out a pilot study prior to visiting the schools for actual data collection in order to establish validity and reliability of the research instruments. Two schools which did not participate in the actual study were used for the pilot study. The questionnaires were refined before being administered to check for ambiguity.

3.6.1. Validity

Validity implies that the research instruments used in the research are accurate, correct, true, meaningful and right. To ensure this, the instruments were submitted to the researchers’ two university supervisors for expert advice with regard to content validity. The researcher also gave the same instruments to colleagues to scrutinize. By subjecting the instruments to piloting, content validity was also enhanced. Piloting is necessary because, through it, items in the research instruments that elicit irrelevant information are identified and modified.
3.6.2. Reliability

Reliability refers to a measure of the extent to which a research instrument yields steady results after repeated trial. (Mugenda and Mugenda, (1999)). A research instrument ought to be consistent, stable, and dependable to enable the researcher obtain the correct information. The researcher submitted the instruments to her university supervisors for their opinion and expert advice. A test-retest method was conducted using the pilot sample to ensure the reliability of the measuring instruments. Respondents were the students, teachers and principals. During the first instance, questionnaires were administered and responses recorded. After two weeks, the same instruments were administered to the same respondents. The first and second sets of responses were compared in order to establish the consistency of the measuring instrument in yielding similar responses. The results were compared using Pearson’s Product Moment Correlation co-efficient. A correlation coefficient of (0.6976) was obtained for teachers’ questionnaire, (0.6778) for students’ questionnaires and that of (0.6892) for principals’ questionnaires. According to Gay (1992), any research instrument with a correlation coefficient between 0.7 and above is accepted as reliable enough.

3.7 Data collection procedures

The procedures for data collection entailed the use of questionnaires. These were administered through drop and pick method to the respondents who were students and teachers. Two sets of questionnaires tailored for the two categories of respondents were administered. Interview schedules were used for the principals and the researcher conducted personal interviews with them. For the questionnaires, the class teachers of the classes involved helped the researcher in their administration.
This was done when the respondents were free. All the respondents were assured of confidentiality of the information they gave before filling in the questionnaires. The interviews for the principals were also conducted when these principals were free. This was in a bid to ensure that the school programmes and routines were not interfered with. The researcher filled in the observation checklist from the computer labs where the observations were made.

3.8. Data analysis

The study depended largely on the data collected. These data were generated from the filled in questionnaires of the teachers and students and the completed interview schedules for the principals. The researcher examined all the questionnaires for completeness. The raw data in the questionnaires was edited so that errors and omissions were corrected. Editing also helped ensure that the data collected was accurate and consistent for ease of coding and analysis. The questionnaires were serially numbered and these numbers were used to identify each case or individual respondent. The edited data was then coded. This entailed assigning numerals to answers gotten so that responses were put into a limited number of categories for analysis. The data was then analyzed using Statistical Package for Social Sciences (SPSS) and presented in pie charts, bar charts and graphs. To present the characteristics of the data, descriptive statistics such as frequency distribution and percentages were used.

3.9. Logistical and ethical considerations

Researchers whose subjects are people or animals are obliged to consider the conduct of their research. They have to give attention to the ethical issues associated with carrying out their research.
After the proposal was approved by the supervisors, the researcher collected a letter of introduction from the Department of Educational Communication and Technology, Kenyatta University. It’s equally important for the researcher to obtain authorization to conduct research by obtaining a permit from administrative authorities. The researcher therefore visited the Ministry of Education to get a permit. An introductory letter to the schools where the research was to be carried out was obtained from the County Director of Education, Kirinyaga County. After this, the researcher proceeded to the schools where the research was done to book for appointments with the principals of the schools on when to administer the research instruments. The piloted and modified questionnaires were administered to the respective sample population. The researcher clarified to the respondents what was expected of them before they filled in the questionnaires and responded to the interview schedules and they were assured of confidentiality of all the information that they gave.

3.10 Chapter summary

Data collection is a vital component in research. The information collected forms a basis for major research findings, recommendations and way forward, either with the view to generating light of knowledge about the problem or solving the problem. This chapter has therefore highlighted the methodology that was used in collecting data, sampling techniques, and the research instruments that the researcher employed in the actual data collection process.
CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents data analysis and discussion of the study findings. The purpose of the study was to assess the use of Computer Assisted Instruction in teaching and learning in selected public secondary schools in Kirinyaga County, Kenya. The chapter is organized into seven sections. The first section covers the demographic information of the study respondents. The other six sections are organized based on the study objectives listed below:

a. To establish the availability of computers in schools for use by teachers and students in teaching and learning
b. To examine accessibility of computers for use by the teachers and students.

c. To ascertain the extent of knowledge and skills on the use of technologies for both the teachers and the students.

d. To determine teachers and students’ perception towards the use of CAI in teaching and learning.

e. To ascertain whether the use of CAI has support from other stakeholders in the schools.

To meet the objectives of this study, both qualitative and quantitative data was generated. The data was obtained through the use of; questionnaires which were distributed among 440 students and 11 teachers from all of the selected schools; an interview guide which was used to collect data from 11 principals and an observation checklist that the researcher used to document information on the availability of various CAI resources.
4.2 Demographic information of the study respondents

This section presents the demographic information of the study respondents. It consists information on the gender of students, age, and level of education and teaching experiences of the teachers. Such description is important as it helps the researcher and the reader better understand the study respondents and therefore creates a good foundation for a detailed discussion of the specific objectives of the study.

4.2.1 Teachers demographic information

The 11 teachers who participated in the study were required to indicate their gender, level of education and teaching experience as a source of information for their background information. The analyses of their responses are shown in table 4.1.

Table 4.1: Demographic characteristics of the teachers

<table>
<thead>
<tr>
<th>Gender</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>9</td>
<td>81.8</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age category in years</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 30 years</td>
<td>3</td>
<td>27.3</td>
</tr>
<tr>
<td>31-40 years</td>
<td>5</td>
<td>45.5</td>
</tr>
<tr>
<td>41-50 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>51 and above</td>
<td>3</td>
<td>27.3</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of education</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post graduate degree</td>
<td>3</td>
<td>27.3</td>
</tr>
<tr>
<td>Bachelors degree</td>
<td>6</td>
<td>54.5</td>
</tr>
<tr>
<td>Diploma</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching experience</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 5 years</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>5-9 years</td>
<td>1</td>
<td>9.1</td>
</tr>
<tr>
<td>10-14 years</td>
<td>4</td>
<td>36.4</td>
</tr>
<tr>
<td>15 years and above</td>
<td>4</td>
<td>36.4</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Information presented in table 4.1 shows that of the 11 teachers who participated in the study, 9 (81.8%) of them were males while 2 (18.2%) were females. This shows...
that there was a gender imbalance of teachers selected to participate in the study with majority of them being male. In terms of age distribution, 5 (45.5%) of the teachers were aged between 31-40 years; similar scores of 3 (27.3%) were achieved for teachers who were aged below 30 years and above 51 years while there was no teacher who was in the age bracket of 41-50 years. This reveals that majority of the teachers who took part in the study were aged between 31-40 years. This indicates that they were still young and would positively incorporate CAI in their teaching. The results in the table further indicate that 54.5% of the teachers had achieved educational qualifications up to a bachelor’s degree, 27.3% had attained a post graduate degree, 2 (18.2%) of the teachers had a diploma. This findings show that with the majority of teachers having attained a bachelors degree, they were well trained to efficiently perform their teaching roles. With regard to the teaching experience, similar scores of 4 (36.4%) teachers were achieved for the teachers who had a teaching experience more than 15 years and those with an experience of 10-14 years. 2 (18.2%) of the teachers had taught for less than five years and only one teacher had been in the teaching practice for a period of between 5-9 years. This clearly indicates that majority of the teachers from the sampled schools had taught for a very long time, and thus had seen computer aided teaching and learning take its course in schools. They would therefore to be able to give adequate information on its use in teaching and learning in their particular schools.
4.2.2 Students demographic information

This section describes the gender categories of the 440 students who participated in the study. Figure 4.1 presents this information.

![Students gender chart]

**Figure 4.1: Students gender**

As shown in figure 4.1 that out of the 440 students who took part in the study, 226 (51.4%) of them were male while 214 (48.6%) were female. This indicates a slightly higher proportion of male participants than female participants. This shows that gender equality in the selected public secondary schools in Kirinyaga County was almost achieved as noted by Wango (2011) that in Kenya, gender parity at primary and secondary level is being realized.

4.3 Availability of CAI resources in schools

The first objective of the research aimed at determining the availability of CAI resources in public secondary schools in Kirinyaga County. To achieve this objective, the researcher first asked the teachers to indicate the availability of CAI resources such as computers, LCD projectors, DVDs and VCDs in their schools. Table 4.2 shows their responses.
Table 4.2: Teachers responses on availability of CAI resources in schools

<table>
<thead>
<tr>
<th>Resource</th>
<th>Availability</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Computer laboratories</td>
<td>11</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Computers</td>
<td>11</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>LCD projector</td>
<td>11</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DVDs/VCDs</td>
<td>10</td>
<td>90.9</td>
<td>1</td>
</tr>
<tr>
<td>Flash discs</td>
<td>10</td>
<td>90.9</td>
<td>1</td>
</tr>
<tr>
<td>CD ROMs</td>
<td>10</td>
<td>90.9</td>
<td>1</td>
</tr>
<tr>
<td>Internet access</td>
<td>8</td>
<td>72.7</td>
<td>3</td>
</tr>
</tbody>
</table>

From Table 4.2 it can be seen that all the 11 teachers indicated that computer laboratories, computers and LCD projectors were available in their schools. More than 90% of the teachers also said that there was availability of DVDs/VCDs, flash discs and CD ROMs that were used as CAI resources in teaching and learning in their schools. The least available CAI resource that was mentioned by the teachers was internet access, where 8 (72.7%) teachers acknowledged its availability. The results therefore implies that majority of the schools had a variety of CAI resources available to aid in teaching and learning. The availability of computers as one of the most available CAI resource in the schools sampled contradicted with Elisha (2011) who said in his Blog-post article that among the challenges facing ICT integration in schools was lack of computers.

The researcher further sought to determine the computer-learner ratio in the sampled schools. Principals were asked to indicate the number of student populations in their
schools and the available computers, in a bid to deduce the computer-learner ratio. Table 4.3 illustrates the information that they gave.

**Table 4.3: Computer-learner ratio**

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Number of computers</th>
<th>Computer-learner ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>16</td>
<td>1:63</td>
</tr>
<tr>
<td>452</td>
<td>20</td>
<td>1:23</td>
</tr>
<tr>
<td>235</td>
<td>26</td>
<td>1:9</td>
</tr>
<tr>
<td>450</td>
<td>21</td>
<td>1:21</td>
</tr>
<tr>
<td>791</td>
<td>30</td>
<td>1:26</td>
</tr>
<tr>
<td>644</td>
<td>18</td>
<td>1:36</td>
</tr>
<tr>
<td>453</td>
<td>31</td>
<td>1:15</td>
</tr>
<tr>
<td>918</td>
<td>50</td>
<td>1:18</td>
</tr>
<tr>
<td>570</td>
<td>10</td>
<td>1:57</td>
</tr>
<tr>
<td>680</td>
<td>25</td>
<td>1:27</td>
</tr>
<tr>
<td>530</td>
<td>27</td>
<td>1:20</td>
</tr>
</tbody>
</table>

As shown in Table 4.3 majority of the 11 schools sampled had a computer-learner ratio of more than 1:20 which the principals acknowledged as undesirable and expressed their desire of having a computer-learner ratio of at least 1:10 to increase access. The highest case was recorded in a school where 63 students shared one computer. The table further indicates that it was only in three schools where a single computer was shared by less than 20 learners. This was seen in one case where nine students shared one computer (1:9), in another 15 learners (1:15) and yet another 18 students (1:18). Although all the sampled schools had made a milestone in availing computers in each school, the principals confirmed that most of them had been acquired through government initiatives. None of the 11 schools had however met
the one to four (1:4) student-computer ratio recommended by the ministry of education (MOE 2006). The results also agrees with the findings of Tanui et al (2008) that, although computers may be present in Kenyan secondary schools they are hardly enough for pedagogical purposes. This finding implies that most schools had inadequate number of computers in their schools to meet the learning and teaching needs of both the teachers and the students, thus hindering the use of CAI in these schools.

4.3.1 Observation checklist

During the fieldwork, the researcher also sought to confirm the information that the teachers, students and principals had provided concerning the availability of various CAI resources. The researcher therefore clearly stated the availability of resources in the observation checklist carried along as shown in Table 4.4.

Table 4.4: Availability of CAI resources

<table>
<thead>
<tr>
<th>Availability</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>Computer laboratory</td>
<td>11</td>
<td>100.0</td>
</tr>
<tr>
<td>Computers</td>
<td>11</td>
<td>100.0</td>
</tr>
<tr>
<td>Electricity supply</td>
<td>11</td>
<td>100.0</td>
</tr>
<tr>
<td>Availability of generator/power supply backup</td>
<td>5</td>
<td>45.5</td>
</tr>
<tr>
<td>Internet connection</td>
<td>7</td>
<td>63.3</td>
</tr>
<tr>
<td>Computer software available</td>
<td>11</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Results presented in table 4.4 depicts that all the schools observed by the researcher had computer laboratories, computers, electricity supply and computer software available. It was among 7 (63.3%) schools where internet connection was available.
and in 5 (45.5%) schools where there was generators/ power supply back up available.

4.4 Accessibility of computers for use by teachers and students

Computers can be available in a school but their accessibility both by the teachers and the learners determines their effective use as a teaching and learning tool. To establish the accessibility of CAI resources in the sampled schools, the study first presented both the students and teachers with a question to indicate whether they accessed academic information using computers on either a daily, weekly or monthly basis or whether they never had any access to computers. Table 4.5 indicates the responses that were given by the students and teachers.

Table 4.5: Students’ accessibility to computers for learning

<table>
<thead>
<tr>
<th>Question</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you use a computer to access academic information?</td>
<td>79</td>
<td>155</td>
<td>64</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>18.0</td>
<td>35.2</td>
<td>14.5</td>
<td>32.3</td>
</tr>
</tbody>
</table>

As portrayed in table 4.5 more than 30% of the students said that they had weekly access to academic information using computers while 142 (32.3%) of them noted that they never accessed computers. Of those who said that they never had computer access reported the main reason being that once they had completed subject selection at form two, they were denied access to computer labs if one had not chosen to continue pursuing computer studies up to form four. 155 (35.2%) students also stated that they never used computers for learning and it was clearly revealed that only 79 (18.0%) of the sampled learners accessed academic information daily.
by use of computers. The remaining 64 (14.5%) students used computers once in a month. This therefore means that computers in the sampled schools were accessible which was backed up by 7 (63.6%) out of the 11 sampled principals who agreed that computers were always available for use by the teachers and students any time they needed to use them. To further establish whether CAI resources were accessible for use in learning, the researcher provided the students with statements that rated the accessibility of CAI resources on a four point Likert scale. From the scale, 1 denoted strongly agree, 2 agree, 3 disagree and 4 was for strongly disagree. Using the scale, a midpoint of 2.5 was achieved. Any mean score below the midpoint meant that the respondents agreed with the statements while a midpoint of 2.5 and above denoted that the respondent disagreed with the statements. Table 4.6 highlights the information

**Table 4.6: Students responses on CAI resources accessibility**

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>It is easy to access a computer in this school</td>
<td>148</td>
<td>33.6</td>
<td>139</td>
<td>31.6</td>
<td>60</td>
<td>13.6</td>
</tr>
<tr>
<td>It is easy to access computer software in this school</td>
<td>100</td>
<td>22.7</td>
<td>154</td>
<td>35.0</td>
<td>77</td>
<td>17.5</td>
</tr>
<tr>
<td>Internet is easily accessible in this school</td>
<td>45</td>
<td>10.2</td>
<td>82</td>
<td>18.6</td>
<td>83</td>
<td>18.9</td>
</tr>
</tbody>
</table>
As portrayed in table 4.6 the mean scores obtained by the students on the extent of agreement regarding the accessibility of CAI resources ranged from a mean of 2.22 to 3.13. Teachers agreed to the statements: it is easy to access a computer in this school (2.22) and that it is easy to access computer software in this school (2.44). A disagreement to the statement internet is easily accessible in this school was obtained which recorded a mean of 3.13. The findings therefore imply that though computers and computer software were accessible in the school, internet access was a major challenge. This also came out strongly during the principals’ interviews where though 10 out of 11 principals said that though they had internet connection in their schools, it was not accessible mainly due to the high connectivity charges. This thus shows that even though the United States Department of Education (1996) considered internet as the blackboard of the future, the situation in the selected public secondary schools in Kirinyaga County are yet to agree which concurs with findings by Elisha (2011) who identified that a lack of internet or high connectivity charges does frustrate the efforts of teachers and students to use the internet in their schools. The study then asked the learners another question on how often they used DVDs, VCDs, CDs, flash discs or online resources and their responses are illustrated in figure 4.2.
Figure 4.2: Students’ accessibility to DVDs, VCDs, CDs, Flash discs and online resources

From figure 4.2 above the highest percentage of 139 (31.6%) students never accessed the CAI resources mentioned while at least more than 25% could access the resources at times. The least number of students 60 (13.6%) said that they often accessed the mentioned resources. These results could be interpreted to mean that the most available CAI resource in the sampled school was the computer while the other available resources were not very accessible to students for their learning.

The study further provided the teachers with statements to establish the extent to which they agreed or disagreed on the accessibility of CAI resources for use. Table 4.7 shows responses to these statements made on a four point likert scale where 1 represented strongly agree, 2 agree, 3 disagree and 4 strongly disagree.
Table 4.7: Teachers response on the accessibility of CAI resources for use

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>It is easy to access a computer in this school</td>
<td>5</td>
<td>45.5</td>
<td>4</td>
<td>36.4</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>The computers in this school are adequate for my teaching and learning</td>
<td>3</td>
<td>27.3</td>
<td>4</td>
<td>36.4</td>
<td>3</td>
<td>27.3</td>
</tr>
<tr>
<td>The computer software is accessible any time I need for teaching and learning</td>
<td>1</td>
<td>9.1</td>
<td>2</td>
<td>54.5</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>Internet in this school is accessible</td>
<td>1</td>
<td>9.1</td>
<td>4</td>
<td>36.4</td>
<td>5</td>
<td>45.5</td>
</tr>
</tbody>
</table>

The mean scores obtained by teachers on the accessibility of CAI resources for use ranged from 1.73 to 2.55. Most teachers agreed to the following statements, with mean scores of below 2.5: It is easy to access a computer in this school (1.73), the computers in this school are adequate for my teaching and learning (2.18) and that the computer software is accessible any time I need for teaching and learning (2.45). The statement to which teachers agreed, with a mean score of 2.55 was: internet in this school is accessible.

A question on how often the teachers asked the students to access academic information through the use of DVDs, VCDs, CDs, flash disks or online materials was provided in the teacher’s questionnaire. A cumulative thirty six point four percent (36.4%) of the teachers agreed that it is easy to access academic information using the mentioned CAI resources while 3 (27.3%) of them responded that they never asked their students to use these resources. Similar percentage scores of 2 (18.2%) teachers either rarely or often asked their students to use the resources. These results indicate that most of the learners initiated the idea to use DVDs,
VCDs, and CDs, flash disks or online resources on their own. Compared with findings in figure 4.2, where majority of the students never used the resources, it could be said that the CAI resources were not used by the students unless when asked by the teachers.

Based on this objective the study finally asked the teachers on how often they used computers within the school to access academic information. The aim was to find out whether similar responses as those of students would be obtained. Results showed that 8 (72.8%) teachers accessed academic information using computers on either a daily or weekly basis. Another 2 (18.2%) teachers stated using computers at least once a month while only one teacher claimed of never using computers to access academic information. When compared to the results obtained in table 4.4 on student’s responses on the use of computers, it emerges that teachers more often used computers. For example, a cumulative frequency of 67.7% students compared to 90.9% teachers was achieved on the use of computers on either a daily, weekly or monthly basis.

4.5 Knowledge and skills on the use of technologies by teachers and students

Adequate knowledge and skills to use various technologies is very key in determining how efficiently a person will use the particular technology. After establishing the accessibility of computers for use by teachers and learners, the study sought to ascertain the extent of knowledge and skills that the students and teachers had in the use of CAI technologies. The researcher asked both the students and teachers on how they rated themselves in terms of their abilities to use computers. The feedback they gave is displayed in table 4.8 below.
Table 4.8: Students and teachers rating on their ability to use computers

<table>
<thead>
<tr>
<th>Rating</th>
<th>Poor</th>
<th>Average</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Teachers</td>
<td>1</td>
<td>9.1</td>
<td>7</td>
<td>63.6</td>
</tr>
<tr>
<td>Students</td>
<td>105</td>
<td>23.9</td>
<td>186</td>
<td>42.3</td>
</tr>
</tbody>
</table>

Table 4.8 reveals that majority of the teachers 7 (63.6%) and students 186 (42.3%) rated their skills and knowledge to interact with computers as being average. This was followed by a percentage of 3 (27.3%) teachers who rated their skills as excellent and 105 (23.9%) students who said they had poor computer skills. The study results also revealed that none of the teachers had good computer skills while among the students, this was the rating that received the lowest percentage score of 89 (20.2%). The students said that though they had received basic training on computer use during the first and second years in secondary school, they still were not able to confidently use computers as they had even forgotten the concepts they had been trained due to inadequate exposure to computers. This shows that most learners just like their teachers found challenges in their interaction with computers which is in line with the results obtained by Nyaga (2011) who found out that majority of teachers and learners lacked computer skills which was a demotivating factor on CAI use among secondary school. After rating the respondents’ ability to interact with computers, the study further asked the teachers on whether they had received any training on computer use. Figure 4.3 has the responses the teachers gave.
From figure 4.3 above, 10 (90.9%) teachers who took part in the study agreed that they had received computer training with only one teacher saying that they had not received such training. This shows that most teachers in the selected schools had computer literacy skills which differed with Odera (2011) whose study findings revealed that inadequate training of teachers in the use of computers plays a key role in as far as the successful integration of computers in teaching is concerned.

There was further need to determine where the teachers had received their training on computer use. Teachers were asked to state whether they had received their training through self-sponsored means, at the colleges/universities or whether in the schools that they were currently teaching. The results obtained evidently showed that 7 (72.7%) teachers said that they had self-sponsored themselves to receive computer training, 4 (36.4%) had received the training at the colleges or universities they had attended and the remaining 1 (9.1%) teacher had received the training in the school that they were teaching. This confirmed what many researchers such as
Ivers (2003); Carrington & Robinson, (2009) and Tanui et al. (2008) have seen that many teachers who have had long experience in teaching have had to learn how to use computers in the classroom on their own. The study was also interested in determine the level of computer training that the teachers had received. The importance of this information was to determine whether the teachers were well equipped with necessary knowledge and skills to be able to handle the CAI resources. Figure 4.4 presents the results derived.

![Figure 4.4: Teachers level of computer training](image)

When asked on the level of computer training the teachers had attained, similar scores of 4 (36.4%) was obtained for a computer training achievement of either computer packages or a certificate level training. Two (18.2%) of the remaining teachers had a diploma in computer while only one teacher said they had received training up to a degree level. These results were unlike those obtained from the principals’ interviews where 8 (72.7%) principals reported of having had training in computer packages. Most teachers also added that the training they had was obtained during their earlier years in school which shows that though they had basic computer
skills, they could be lacking up to date skills due to the advancement in computer technology and therefore more computer training could be necessary. This could be a goal towards implementing Mwangi, Nchunge and Sakwa (2012) recommendations that there is need for mass training and retraining of teachers on e-learning skills through computer training sessions, workshops and conferences. After the study had realized that most teachers and students had some knowledge and skills in computer use, the researcher was then interested in knowing what the teachers and students did when they experienced a problem with their computers. Table 4.9 gives an illustration of the results.

**Table 4.9: Teachers and students responses on alternatives taken when a computer problem is experienced**

<table>
<thead>
<tr>
<th>Alternative solution</th>
<th>Solve it myself</th>
<th>Ask a teacher/student</th>
<th>Ask a lab/computer technician</th>
<th>Consult online help</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Teachers</td>
<td>2</td>
<td>18.2</td>
<td>5</td>
<td>45.5</td>
</tr>
<tr>
<td>Students</td>
<td>52</td>
<td>11.8</td>
<td>119</td>
<td>27.0</td>
</tr>
</tbody>
</table>

When asked of the solution they opted for when they faced a challenge when using computers, 5 (45.5%) teachers said that they asked a fellow teacher. Students were however of a different opinion as majority of them 236 (53.6%) said that they consulted help from the laboratory technicians. The least percentages of both teachers and students said that they consulted online help forums for computer problems that they encountered. This could be attributed to the low frequency of internet use as earlier revealed in table 4.4 or the lack of awareness of the existence of online help forums.
4.6 Perceptions towards use of CAI in teaching and learning

The attitude that teachers and students have towards CAI determines how frequently they will accept and easily adopt its use in teaching and learning. It is however common to identify that people hold different perceptions towards CAI use in secondary schools. In an effort to investigate the perceptions held towards the use of CAI in schools, the current study provided statements to the teachers and students where they rated their experience with computers. The results for this analysis is in table 4.10 below

Table 4.10: Teachers and students rating on their experience with computers

<table>
<thead>
<tr>
<th>Experience with computer</th>
<th>Never used a computer and not interested</th>
<th>Never used a computer but interested to learn</th>
<th>Use computer applications like Ms Word, Ms Excel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>f %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 11</td>
<td>0.0</td>
<td>100.0</td>
<td>3</td>
</tr>
<tr>
<td>Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 41</td>
<td>6.0</td>
<td>93.2</td>
<td>18</td>
</tr>
</tbody>
</table>

As observed in table 4.10 all the teachers and majority of the students (93.2%) disagreed to the statement that they had never used a computer and that they were not interested. The researcher interpreted this to mean that both the teachers and students at least had had an experience with computers. The table further shows that more than 70% of the teachers use computer applications compared to a relatively lower percentage of students 242 (55.0%). An interview of the principals also showed high scores similar to those of the teachers where it was revealed that 8 (72.7%) principals used computer applications like Ms Word and also applied...
computer use in their administrative roles. These results show that the teachers were more exposed to interact with computers than the students. It is also evident from the results obtained that very few teachers admitted to having never used computers. This could instead result to development of a negative attitude of computers which could further inhibit the adoption of CAI in teaching by teachers. As noted in a study by Odera (2011) it was found out that teachers’ attitude about computers, positively or negatively influenced their students’ attitude towards computer integration in teaching and learning. Another one by Molnar (1997) also agreed that the successful use of computers in the classroom is dependent on positive teacher attitudes toward computers. The researcher also provided statements designed to measure teacher’s perception towards the use of CAI on a four point likert scale. Using the scale one represented strongly agree, 2 agree, 3 disagree and 4 strongly disagree. A mid point of 2.5 was calculated and any scores below 2.5 were interpreted by the researcher to mean an agreement to the statements while a mean of 2.5 and above meant that the respondent disagreed to the provided statement. The results are outlined in the table 4.11.
Table 4.11: Teachers perceptions towards use of CAI

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f %</td>
<td>f %</td>
<td>f %</td>
<td>f %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers help me find heaps of relevant information</td>
<td>5 45.5</td>
<td>6 54.5</td>
<td>0.0</td>
<td>0.0</td>
<td>1.55</td>
<td>.522</td>
</tr>
<tr>
<td>I believe computers are an important teaching tool</td>
<td>7 63.6</td>
<td>3 27.3</td>
<td>1 9.1</td>
<td>0.0</td>
<td>1.45</td>
<td>.688</td>
</tr>
<tr>
<td>I don’t have appropriate skills to use it effectively</td>
<td>1 9.1</td>
<td>3 27.3</td>
<td>4 36.4</td>
<td>3 27.3</td>
<td>2.82</td>
<td>.982</td>
</tr>
<tr>
<td>I enjoy teaching using LCD projector than chalk and board</td>
<td>4 36.4</td>
<td>6 54.5</td>
<td>1 9.1</td>
<td>0.0</td>
<td>1.73</td>
<td>.647</td>
</tr>
<tr>
<td>I expect CAI to help enhance students performance</td>
<td>7 63.6</td>
<td>3 27.3</td>
<td>0.0</td>
<td>0.0</td>
<td>1.55</td>
<td>.934</td>
</tr>
<tr>
<td>I find CAI time consuming</td>
<td>0.0</td>
<td>0.0</td>
<td>3 27.3</td>
<td>3 27.3</td>
<td>5 45.5</td>
<td>.874</td>
</tr>
<tr>
<td>I can never find anything relevant to my subject</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1 9.1</td>
<td>10 90.9</td>
<td>.302</td>
</tr>
<tr>
<td>I don’t feel supported in my use of CAI</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>6 54.5</td>
<td>5 45.5</td>
<td>.522</td>
</tr>
<tr>
<td>Computers scare me</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>11 100.0</td>
<td>.000</td>
</tr>
</tbody>
</table>

The mean scores obtained by the teachers on their perception towards CAI use ranged from a mean of 1.45 to 4.00. All the teachers’ strongly disagreed to the
statement that computers scare me. Other statements to which the teachers disagreed with a mean score range of more than 3.00 were: I can never find anything relevant to my subject (3.91); I don’t feel supported in my use of CAI (3.45) and I find CAI time consuming (3.91). The table also evidently shows that the statements to which most teachers agreed to, with mean score of below 1.8 were: computers help me find heaps of relevant information (1.55); I believe computers are an important teaching tool (1.45); I enjoy teaching using LCD projector than chalk and board (1.73) and I expect CAI to help enhance student’s performance (1.55). Of these statements, I believe computers are an important teaching tool was the highest ranked statement, with 10 out of 11 teachers agreeing to it. This findings show that most teachers valued the importance of using computers and were aware of the benefits it would result to if they were used as a teaching tool. This concurs with a statement by Mann (2006) that: “it is clear that the use of computers could improve student achievement and enhance motivation”

4.7 CAI support form stakeholders

This objective focused on establishing whether the use of CAI had support from other stakeholders such as the ministry of education and the private organizations such NGO’s. Teachers were asked to state, in their own opinion whether the computers they had in their schools were adequate to support CAI use in the school. Their responses are displayed in the figure 4.5
Figure 4.5: Computer adequacies to support CAI use in schools

As portrayed in figure 4.5, teachers who said that the computers in their schools were inadequate to support the use of CAI were more than seventy percent (72.7%) with the remaining percentage (27.3%) agreeing that computers in their schools adequately supported CAI use. From these results it can be said that the teachers failed to use CAI in their schools due to the lack of enough computers to support CAI. It was after determining the impact that computers availability had in the support of CAI that the researcher then sought to know the effort the school management played in promoting CAI use in the selected schools.

Teachers were presented with a statement that their school had organized courses to train teachers on use of CAI in an effort to support CAI in schools where they were expected to agree or to disagree to this statement. From the study findings, almost similar percentage scores were obtained when the teachers were asked whether their schools had organized courses to train the teachers on CAI use. This was marked by 5 (45.5%) teachers who agreed that such courses were organized and 6 (54.6%) who
disagreed to the statement. This implies that many of the boards of management in the schools which participated in the study were making an effort in familiarizing CAI use among the teachers which was a positive milestone. This was also backed up by 6 (54.5%) principals who strongly agreed that the schools frequently organized CAI training for teachers.

The study developed an interest to determine whether the ministry of education supported the use of CAI in education through organizing in-service training workshops for teachers. Information obtained from teachers responses to this question held that eight out of ten teachers (72.7%) agreed that the ministry of Education had supported CAI in education in schools in Kirinyaga County. The remaining 3 (27.3%) teachers however differed with the statement. These results married to those obtained by the interview guides where similar number of principals (8 out of 11) agreed to the immense support by the ministry of education. The research therefore agrees that CAI has received support from the government and this could be used as a basis to conclude that the CAI programme in schools in Kirinyaga County is likely to be sustainable.

In an effort to determine other stakeholders that supported CAI training in the selected schools, teachers were asked to agree or disagree with the statement that the private sector has organized ICT training through the school. It was clearly shown from the information generated that ten out of eleven teachers who participated in the study disagreed to the statement that the private sector had organized ICT training for teachers through the school with only one teacher agreeing to the statement. This was strongly backed up by all the 11 principals who stated that they had not seen any private sector support in CAI training to teachers. The researcher interpreted this to mean that the private sector in Kirinyaga was not actively
involved in the support of CAI through ICT training in the sampled schools in the County.

Finally, the researcher posed a question to both the students and the teachers as to whether there were computer technicians in their schools. The responses given were that majority of the teachers and students said that there were no computer technicians in their schools. This was represented by percentages of: 7 (63.6%) teachers and 4 (53.2%) students. Reviewing the interview schedules also deduced similar results whereby 9 (81.2%) principals stated that there were no technicians in the schools that they headed. This therefore means that the few technicians who were available in the schools did a commendable job since as revealed from table 4.9, majority of the students said that they sought help from lab technicians in case they got a challenge in computer use. It also implies that in the schools sampled there could be need of adding more technicians to help both the teachers and students in the use of computer and other equipments like projectors while also repairing any computer problems.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter consists of the summary of the study, conclusion and recommendations made based on the study findings. It also gives areas for further research.

5.2 Summary of the study.

The main purpose of this study was to assess the use of computer assisted instructions (CAI) in public secondary schools in Kirinyaga County, Kenya. The specific objectives in the study were to: determine availability of computers in the schools, establish accessibility of computers for use by the teachers and students; ascertain the extent of knowledge and skills on the use of these technologies by both the teachers and the students; investigate the teachers and students’ perception towards the use of CAI in teaching and learning and to establish whether the use of CAI has support from other stakeholders in the schools.

The study was based on Bates’ (1995) model on learning and used descriptive survey design to target principals, teachers and students in selected public secondary schools in Kirinyaga County. Purposive sampling was employed to select 11 principals while simple random sampling was used to select 11 teachers and 440 students from the eleven schools to participate in the study hence giving a total of 462 respondents. The study employed questionnaires and interviews as the main tools for data collection. The following are the main study findings.

5.2.1 Availability of CAI resources in schools

From the analysis and interpretation of the findings, it was revealed that the teachers, students and principals almost held similar views on the availability of various CAI
resources. The results established that all the teachers, students and principal acknowledged that computers were available in their schools. Other resources mentioned to be available were: computer labs, LCD projector, DVDs/VCDs, Flash discs, CD ROMs and internet access. From the principals’ responses it also emerged that majority of the schools had a computer-learner ratio of 1:20, a bit far from the desired ratio of 1:10.

5.2.2 Accessibility of computers for use by teachers and students

In relation to this objective, the study findings established that majority of the students used computers to access academic information on either a daily, weekly or monthly basis. This was seen with the highest number of students 155 (35.2%) accessing computers on a weekly basis. Eight (72.8%) teachers also said that they could use computers to access academic information on either a daily or weekly basis. It was further revealed that relatively high number of students 142 (32.3%) also did not have access to computer use. In terms of accessibility to other CAI resources: majority of the students and teachers disagreed to the statement that internet is easily accessible in this school (3.13 students and 2.55 teachers). There was however an almost similar number of teachers and students who agreed that it is easy to access computer software in this school (2.44 students and 2.45 teachers). In line to this objective the study also revealed that majority 139 (31.6%) students claimed that they never had access to DVDs, VCDs, CDs, Flash disks and online resources.
5.2.3 Knowledge and skills on the use of technologies by teachers and students

The study found out that majority of the teachers and students rated their skills and knowledge to interact with computers as being average. Other ratings by both teachers and students were: 3 (27.3%) teachers said they had excellent computer skills; 105 (23.9%) students had poor computers skills and 89 (20.2%) students also had computer skills which they rated as being good. It also emerged that out of 11 teachers 10 (90.9%) had received computer training with majority of them 8 (72.7%) reporting that they had self-sponsored themselves to receive the training. 8 (72.8%) teachers had computer packages or a certificate in computer, 2 (18.2%) had a diploma in information technology while only one (9.1%) teacher had attained qualifications to a degree level. In terms of actions taken when a computer problem is encountered, majority 236 (53.6%) of the students said that they consulted the lab technicians in their school. On the other hand, teachers were of a different view and most of them 5 (45.5%) reported that they asked their fellow teacher for assistance in case they encountered any computer problem.

5.2.4 Teachers and students’ perception towards the use of CAI in teaching and learning

From the study findings focusing on this objective, all the teachers and majority of the students (93.2%) disagreed to the statement that they had never used a computer and that they were not interested. Based on teachers’ perceptions towards the use of CAI, All the teachers’ strongly disagreed to the statement that computers scare me. Analysis of results showed that the teachers had a positive attitude towards CAI. They therefore agreed to the following statements: I believe computers are an important teaching tool; I enjoy teaching using LCD projector than chalk and board.
and I expect CAI to help enhance student’s performance. There was also a disagreement to statements like: I can never find anything relevant to my subject; I don’t feel supported in my use of CAI and I find CAI time consuming.

5.2.5 CAI support from stakeholders

Regarding this objective, the study findings showed that computers in the schools were inadequate to support CAI use. This was backed up by 8 (72.7%) of the 11 teachers who took part in the study. 5 (45.5%) teachers agreed that the school had organized CAI training courses for teachers. 8(72.7%) of the teachers also agreed that the MOEST supported CAI education in schools and all the teachers claimed that they never got any support from the private sector in training teachers on CAI use.

5.3 Conclusions

Based on the study findings presented above, the study concludes that:

a. All the sampled schools had computers in their schools. Other CAI resources that were found available include: computers, computer labs, LCD projector, DVDs/VCDs, Flash discs, CD ROMs and internet access.

b. Although there were computers available in schools, they were not accessible to all students for learning. Other resources e.g. internet, DVDs/CDs and online resources were also not accessible to students in the schools.

c. Teachers and students had basic knowledge on computer use though they rated they experience and skills not being good enough for them to comfortably use computers.

d. Both teachers and students acknowledged that CAI was an important tool for use in both teaching and learning.
e. The school boards of management were partly involved in the training of teachers on CAI use and that the ministry of education also organized training courses for teachers on CAI use.

f. The study further concludes that the private sector was not involved in any training of teachers on CAI use.

5.4 Recommendations of the study

Based on the study findings and conclusions made, the following recommendations were made:

a. The study suggests that Parents Associations (PA) in schools should develop a PA fund and organize equipping schools with more computers and other CAI resources in order to make teaching and learning using CAI easier.

b. The current study suggests that there is need to organize in-service training for teachers in order to equip them with expertise skills and knowledge and build their confidence with ICT tools.

c. The study recommends the private sector involvement in support of CIA in schools as part of their corporate social responsibility.

d. The government through the ministry of education should conduct a national upgrading programme of all computer systems in secondary schools to ensure that they are up to date.

e. The study suggests that more computer trained teachers be added in schools to facilitate in teaching using CAI.
5.5 Areas for further research

a. Due to time and financial constraints, the study was carried out only in Kirinyaga County. The study findings therefore cannot be generalized in the whole country and as such there is need to conduct a similar study in other Counties to find out whether the same results would be obtained.

b. A study should be conducted to establish whether the use of CAI in secondary schools has any impact on the student’s academic performance.
REFERENCES


Ministry of Education Science and Technology, GOK. *ICTs in Education Options Paper Draft* 14th June 2005.


APPENDICES
APPENDIX I
CONSENT FORM

Introduction
The researcher is a Master of Education student at Kenyatta University, carrying out a thesis research in Kirinyaga County on the topic; USE OF COMPUTER ASSISTED INSTRUCTION (CAI) IN TEACHING AND LEARNING. The thesis is in partial fulfillment of the requirement for the M.Ed degree. To achieve this, your school has been selected to participate in the study. You are advised not to write your name on the questionnaire. Please answer the questions as objectively as possible and provide accurate information to the best of your knowledge. Kindly indicate by use of a tick to show your preferred response where choices are provided or by filling in the appropriate response in the spaces provided. All the information you give will be treated with utmost confidentiality and will only be used for the purpose of this research. Your assistance and co-operation will be highly appreciated.
APPENDIX II
QUESTIONNAIRE FOR TEACHERS

SECTION A: DEMOGRAPHIC DETAILS
1. Gender   Male (  )   Female (  )
2. Your age category (Tick appropriately)
   Under 30 Years  (  )
   31-40 Years (  )
   41-50 Years  (  )
   51 and above  (  )
3. Level of education
   Post graduate degree  (  )   PGDE (  )
   Bachelors degree  (  )   Diploma (  )
4. What are your teaching subjects? ..............................................................
5. Teaching experience
   15 years and above  (  )   5-9 years  (  )
   10-14 years  (  )   below 5 years  (  )

SECTION B: AVAILABILITY OF CAI RESOURCES IN SECONDARIESCHOOLS IN KIRINYAGA COUNTY

1. The following are some of the resources necessary for proper use of CAI. Please indicate whether they are available in your school

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>AVAILABLE</th>
<th>NOT AVAILABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer laboratories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD projector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVDs/VCDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash discs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD ROMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet access</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any other (Specify ........................................................................................................
2. If the school has computers for use by the teachers and students for teaching and learning how many are they? .......................................................... 
3. What is the computer student ratio in your school? ................................. 
4a) Are the computers adequate to meet the needs of all the teachers and students? 
   Yes ( ) No ( ) 
b) If no, how many more computers are needed? _________________________ 

SECTION C: ACCESSIBILITY OF COMPUTERS FOR USE BY TEACHERS AND STUDENTS. 

1. Please indicate the extent to which you agree or disagree with the following statements. 
   
<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is easy to access a computer in this school</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The computers in this school are adequate for my teaching and learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The computer software is accessible any time I need it for teaching and learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet in this school is accessible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. How often do you ask your students to access academic information through use of DVDs, VCDs, CDs, flash discs or online resources? 

   Never ( ) Sometimes ( ) 
   Rarely ( ) Often ( ) 

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you use a computer within the school to access academic information?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you access the internet within the school?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Does your subject have access to subject specific softwares? Yes ( ) No ( )
SECTION D: KNOWLEDGE AND SKILLS ON THE USE OF THESE TECHNOLOGIES BY TEACHERS.

1. How would you rate yourself in terms of ability to use computers?
   - Poor ( )
   - Average ( )
   - Good ( )
   - Excellent ( )

b) Give reasons for your answer
   ...................................................................................................................
   ...................................................................................................................
   ...................................................................................................................
   ...................................................................................................................

2 a) Have you been trained on how to use computers? Yes ( ) No ( )

b) If yes, where did you receive the training (Tick all those that apply)
   - Self sponsored ( )
   - School organized ( )
   - College or university ( )
   - Others (specify) ......................................................................................

c) What level of training did you receive?
   - Computer packages ( )
   - Certificate level ( )
   - Diploma level ( )
   - Degree ( )
   - Others (Specify) ......................................................................................

d) What content was covered? E.g. Ms Word, Ms Excel.................................
   ...................................................................................................................

4. What do you do when you experience a problem with your computer? (Tick as appropriate)
   - Solve it myself ( )
   - Ask a colleague ( )
   - Ask a computer technician ( )
   - Consult online help forums ( )

5a) Do you experience any challenges as you interact with the computers?
   - Yes ( ) No ( )
b) If yes, briefly explain the nature of the challenge
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c) If No, briefly explain why
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d) Do your students experience any challenges as they interact with the computers?
Yes ( )  No ( )
e) If yes, explain the nature of the challenge .............................................................
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f) If No, briefly explain why...................................................................................................
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SECTION E: PERCEPTION OF TEACHERS TOWARDS THE USE OF CAI
1. a) How would you rate your experience with computers (Tick appropriately)
   I have never used CAI and am not interested. ( )
   I have never used CAI but would be interested to. ( )
   I employ use of CAI in computer applications like Ms Word, Ms Excel etc. ( )
   b) Briefly explain the reason for your answer above...........................................
      .........................................................................................................................................................
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2. a) How do you think the use of CAI in secondary schools affects education in this country?
   Positively ( )
   Negatively ( )
   Both positively and negatively ( )
   b) Briefly explain your answer ...................................................................................
      .........................................................................................................................................................
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3. Do you plan for the use of CAI in your schemes of work? Yes ( ) No ( )

4. Please indicate the extent to which you agree or disagree with each of the statements below by ticking the most appropriate box.

   Strongly agree (SA)
   Agree (A)
   Disagree (D)
   Strongly disagree (SD)

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers help me find heaps of relevant information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe computers are an important teaching tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I don’t have the appropriate skills to use it effectively</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I enjoy teaching using LCD projector than chalk and board</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I expect CAI to help me enhance students performance</td>
<td></td>
<td></td>
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<tr>
<td>I find CAI time consuming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can never find anything relevant to my subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t feel supported by my use of CAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers scare me</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SECTION F: CAI SUPPORT FROM STAKEHOLDERS**

1. a) How many computer teachers does your school have? .................................................

   b) According to you, do you think they are adequate to support use of CAI in the school?

       Yes ( ) No ( )

   c) Give reasons for your answer

       .................................................................................................................................
       .................................................................................................................................
       .................................................................................................................................
       .................................................................................................................................
       .................................................................................................................................
       .................................................................................................................................

2. a) The school has organized courses to train teachers on use of CAI in an effort to support CAI in schools. True ( ) False ( )

   b) If true, did you participate? Yes ( ) No ( )

3. a) The MOEST has supported the use of CAI in education through organizing in-service training workshops for teachers. True ( ) False ( )

   b) If true, did you participate? Yes ( ) No ( )
4. a) The private sector has organized ICT training for teachers through the school.
   True ( )  False ( )
   b) If true, did you participate?   Yes ( )  No ( )
5. a) Is there a computer technician in your school?   Yes ( )  No ( )
   b) If yes, how many? ..........................................................
   c) Are they professionally qualified?   Yes ( )  No ( )
6. Give suggestions on how the use of CAI in secondary schools can be enhanced
   ..........................................................................................
   ..........................................................................................
   ..........................................................................................
   ..........................................................................................
   ..........................................................................................
   ..........................................................................................

THANK YOU
APPENDIX 111
QUESTIONNAIRE FOR STUDENTS

SECTION A: Please fill in the following details.
Gender  Male ( )  Female ( )

SECTION B: AVAILABILITY OF CAI RESOURCES IN SECONDARY SCHOOLS IN KIRINYAGA COUNTY.
1 a) Is there a computer laboratory in your school?  Yes ( )  No ( )
b) If yes, are there computers in the lab?  Yes ( )  No ( )
c) How many? ..............................................................
d) If no, where are the computers used in teaching and learning kept?
..............................................................
e) How many are they? ..............................................................

2. Is there internet connection in the lab?  Yes ( )  No ( )
3. What computer software is available to you in this school? ..............................................................

SECTION C: ACCESSIBILITY OF CAI RESOURCES FOR USE IN LEARNING.
1. Fill in the following table by ticking where appropriate.

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you use a computer within the school to access academic information?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you access the internet within the school?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Please indicate the extent to which you agree or disagree with the following statements.

Strongly Agree  SA
Don’t Agree  DA
Agree  A
Strongly Disagree  SD
3. How often do you use DVDs, VCDs, CDs Flash discs or online resources to access academic information?
   Never ( )  Rarely ( )
   Sometimes ( )  Often ( )

SECTION D: KNOWLEDGE AND SKILLS ON THE USE OF THESE TECHNOLOGIES.

1a) I have been given basic training on computer use by the school.
   True ( )  False ( )

b) If false, would you be interested in such training? Yes ( )  No ( )
c) Why?.................................................................................................................................
........................................................................................................................................
........................................................................................................................................

2a) In general how would you rate your ability to interact with computers?
   Poor ( )  Average ( )
   Good ( )  Excellent ( )

b) Briefly explain your answer
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

3. What do you do when you experience a problem with your computer?
   Solve it myself ( )
   Ask a fellow student ( )
   Ask a lab technician ( )
   Consult online help forums ( )
4. How often do your teachers explain or demonstrate concepts using presentation software like Ms Word, Ms PowerPoint?

   Never  ( )  Rarely ( )
   Sometimes ( )  Often ( )

5. a) CAI is incorporated in every day teaching and learning process.

   True ( )  False ( )

   b) If true, does it serve to enhance your understanding of concepts in class?

   Yes ( )  No ( )

6. a) Do you find it easy to use the computer software available in the school?

   Yes ( )  No ( )

   b) Briefly explain your answer

   ...........................................................
   ...........................................................
   ...........................................................
   ...........................................................
   ...........................................................
   ...........................................................
   ...........................................................
   ...........................................................

SECTION E: PERCEPTION TOWARDS USE OF CAI

1a). How would you rate your experience with computers? (Tick as appropriate)

   I have never used a computer and I am not interested.  ( )
   I have never used a computer but would be interested to learn. ( )
   I use some computer applications like Ms Word, Ms Excel. ( )

   b) Explain your answer

   ...................................................................................
   ...................................................................................
   ...................................................................................
   ...................................................................................
   ...................................................................................

2a). How do you think the use of CAI in schools affects education?

   Positively ( )
   Negatively ( )
   Both positively and negatively ( )

   b) Briefly explain your answer

   ...................................................................................
   ...................................................................................
   ...................................................................................
   ...................................................................................
   ...................................................................................
3. a) Do you think your teachers should incorporate CAI in their lessons?
   Yes ( )   No ( )

   b) Give reasons for your answer
   ..........................................................................................................................
   ..........................................................................................................................
   ..........................................................................................................................
   ..........................................................................................................................

SECTION F: CAI SUPPORT FROM STAKEHOLDERS
1 How many computer teachers does your school have? ..............................................

2a) Are there computer technicians in your school?   Yes ( )   No ( )

   b) If yes, how many? ....................................................................................................

3a) You have been given basic training on how to use a computer by the school.
   True ( )   False ( )

   b) If true, has the training helped you improve your computer literacy skills?
   Yes ( )   No ( )

4. Give your suggestions on how CAI can be used to enhance your learning
   ..........................................................................................................................
   ..........................................................................................................................
   ..........................................................................................................................
   ..........................................................................................................................
   ..........................................................................................................................

THANK YOU
APPENDIX IV
INTERVIEW SCHEDULE FOR PRINCIPALS

This interview schedule is designed to generate information on the use of CAI in secondary schools in Kirinyaga County.

1. Name of the school.................................................................
2. For how long have you been a principal in this school? 
   ......................................................................................
3. How many teachers are in this school? ...................................................
4. How many students are in this school? ...................................................

SECTION A: AVAILABILITY OF CAI RESOURCES IN SECONDARY SCHOOLS IN KIRINYAGA COUNTY

1 a) Is there a computer laboratory in your school?   Yes ( )   No ( )
   b) If yes, how many computers are in it?............................................................
   c) If no, where do you keep the computers used in teaching and learning? ...........

2. Does the lab have internet connection?      Yes ( )   No ( )

3. What other CAI resources are available in your school? .................................
   (Probe for resources such as DVDs, VCDs, Flash discs etc)

4. What is the computer student ratio? ...........................

5a) The computers available are adequate to meet the needs of all teachers and students.
   True ( )   False ( )
   b) If false, (Probe to know how many more would be needed)...........................

6 a) How did you acquire the computers?
   i. PA funding ( )
   ii. Government initiative ( )
   iii. Donations ( )
   iv. Any other source...........................................................
7a) How would you rate the school’s ability to purchase and maintain CAI equipment?
   a) Excellent (  )
   b) Good (  )
   c) Fair (  )
   d) Poor (  )

b) Explain your answer........................................................................................................

.................................................................................................................................
.................................................................................................................................
.................................................................................................................................
.................................................................................................................................

8a) Is the cost of internet connectivity affordable for the school?

Yes (  ) No (  )

Give reasons for your answer above .................................................................

9a) Is the school able to purchase enough software for all the subjects?

Yes (  ) No (  )

b) Why? ..........................................................................................................................

.................................................................................................................................
.................................................................................................................................
.................................................................................................................................
.................................................................................................................................
.................................................................................................................................

SECTION B: ACCESSIBILITY OF COMPUTERS FOR USE BY TEACHERS AND STUDENTS.

1. To what extent are the computers in your school available for use by teachers and students any time they need them?

   Always (  ) Occasionally (  )
   Sometimes (  ) Never (  )

(Probe to find out reason for the answer given)

.................................................................................................................................
.................................................................................................................................
.................................................................................................................................
.................................................................................................................................
.................................................................................................................................

2a) Is the computer software in the school accessible to the teachers and students?

Yes (  ) No (  )
3. Do all subject areas have access to subject specific software relevant to their syllabus?
   Yes ( )  No ( )

4. To what extent is internet in the school accessible?
   Always ( )  Rarely ( )
   Sometimes ( )  Never ( )
   b) Give reasons for your answer
   ..........................................................................................................................................
   ..........................................................................................................................................
   ..........................................................................................................................................
   ..........................................................................................................................................

5. How often do you access the computer for academic purposes?
   Daily ( )  Monthly ( )
   Weekly ( )  Never ( )

SECTION C: KNOWLEDGE AND SKILLS ON THE USE THESE TECHNOLOGIES
1 a) Have you been trained on the use of these technologies? Yes ( )  No ( )
   b) If yes, where did you train (Tick all that apply)
   • Self organized ( )
   • School organized ( )
   • College/University ( )
   • Others (Specify) .............................................................................................................

2. What level of training did you receive?
   • Computer packages ( )
   • Diploma ( )
   • Degree ( )
   • Others (Specify) .............................................................................................................

3. The school has organized courses to train on the use of CAI
   True ( )  False ( )
   (If true probe to know which courses
   ..........................................................................................................................................
   .............................................................................................................................................
4. a) Are there courses that have been organized by the MOEST to train teachers on CAI use?

Yes ( ) No ( )

b) If yes, how many of your teachers have attended such courses?

5a). The private sector has organized training on CAI for teachers through the school.

True ( ) False ( )

b) If true, how many of your teachers participated?

SECTION D: PERCEPTION TOWARDS THE USE OF CAI

1. How would you rate your experience with CAI? (Tick as appropriate)

I have never used CAI and I don’t intend to even in future. ( )
I have never used CAI but would be willing to. ( )
I use CAI in applications such as Ms Word, Ms Excel etc. ( )
I use computers for administrative purposes only. ( )

(Probe to know reasons for the answer given)

2. How has the school incorporated CAI in teaching and learning? (Probe if its mandatory to use CAI or whether the school has put in place a policy on it)

3. How do you think the use of CAI in schools affects education in the country?

Positively ( )
Negatively ( )
Both positively and negatively ( )

Explain your answer briefly

..............................................................
..............................................................
..............................................................
4. The government plans to introduce e-learning in schools. Do you think the schools are ready for this? Yes ( ) No ( )
   (Probe the reasons for the answer given)

SECTION E: CAI SUPPORT FROM STAKEHOLDERS
1a) How many computer teachers do you have in your school? 

b) According to you, are they adequate to support use of CAI in the school? Yes ( ) No ( )
c) Give reasons for your answer

2a) Do you have computer technicians in your school? Yes ( ) No ( )
b) If yes, are they professionally qualified? Yes ( ) No ( )
   (Probe for the level of professional qualification)

3. To what extent has the school supported the use of CAI in teaching and learning?
   (Probe for any training the school has organized, when and where)

4. How has the MOEST come in to support the use of CAI in education? (Probe whether the Ministry has organized any training workshops for the teachers, when and where)
5. Has the private sector organized any CAI training for teachers through the school?
   (Probe for any training when, where and whether the teachers participated)

6. What suggestions would you give to enhance the use of CAI in secondary schools in Kenya?

7. Feel free to make any other comment on the use of CAI in secondary schools which we may not have touched on.

THANK YOU
APPENDIX V
OBSERVATION CHECKLIST

Name of the school.........................................................................................................................

Upon visiting the school, the researcher will seek to make the following observations:

1. Presence of a computer laboratory...........................................................................................
2. Number of computers in the lab....................................................................................................
3. Presence of computers stored in any other learning facility......................................................
4. Number of computers in the facility..............................................................................................
5. Number of computers in good working condition........................................................................
6. Availability of electricity supply or a standby generator ..............................................................
7. Connection to the internet............................................................................................................
8. Computer software available ........................................................................................................
APPENDIX VI
RESEARCH AUTHORIZATION FROM THE UNIVERSITY

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: E55/20095/12

Date: 9th January, 2015

The Principal Secretary,
Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS. KIROGO R. WANGATHU - REG. NO. E55/20095/12

I write to introduce Ms. Wangathu who is a Postgraduate Student of this University. She is registered for a M.Ed. degree programme in the Department Educational Foundations in the School of Education.


Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

JMO/ceo
APPENDIX VII

RESEARCH AUTHORIZATION FROM NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote Ref. No.

NACOSTI/P/15/6674/5411

Rosemary Wangathu Kirogo
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Use Of computer assisted instruction in teaching and learning in selected public secondary schools in Kirinyaga County, Kenya” I am pleased to inform you that you have been authorized to undertake research in Kirinyaga County for a period ending 25th September, 2015.

You are advised to report to the County Commissioner and the County Director of Education, Kirinyaga County before embarking on the research project.

On completion of the research, you are required to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

[Signature]
DR. M. K. RUGUTT, PhD, BSc.
DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kirinyaga County.

The County Director of Education
Kirinyaga County.

Date:
16th April, 2015
APPENDIX VIII
RESEARCH PERMIT

THIS IS TO CERTIFY THAT
MS. ROSEMARY WANGATHU KIROGO
of KENYATTA UNIVERSITY, 0-10300
KERUGOYA, has been permitted to
conduct research in Kirinyaga County
on the topic: USE OF COMPUTER
ASSISTED INSTRUCTION IN TEACHING
AND LEARNING IN SELECTED PUBLIC
SECONDARY SCHOOLS IN KIRINYAGA
COUNTY, KENYA,
for the period ending:
25th September, 2015

Permit No.: NACOSTI/P/15/6674/5411
Date Of Issue: 16th April, 2015
Fee Received: Ksh 1,000

Applicant's Signature

[Signature]

Director General
National Commission for Science, Technology & Innovation

[Signature]