Assessment of Educational Technology and its Application through E-Learning: The Case of Kotebe College of Teachers' Education

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A Thesis Submitted to

The Department of Educational Research and Development

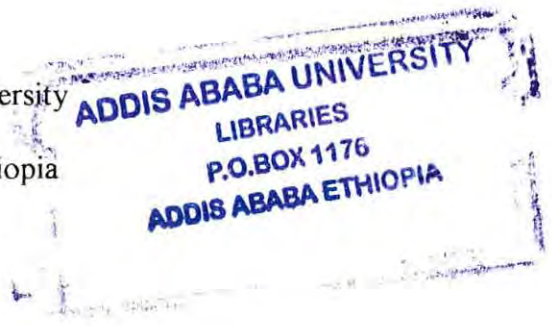
Presented in Partial Fulfillment of the Requirements for the Degree of Masters of Art

(Educational Research and Development)

Addis Ababa University

Addis Ababa, Ethiopia

June 2012



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ABSTRACT

ASSESSMENT OF EDUCATIONAL TECHNOLOGY AND ITS APPLICATION THROUGH E-LEARNING: THE CASE OF KOTEBE COLLEGE OF TEACHERS' EDUCATION

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Addis Ababa University, 2012

Educational technology comes in different forms to bring about active and interactive lessons changing the traditional way of chalk and talk teaching-learning method to some extent. Information Communication Technologies (ICTs) are parts of this technology. ICTs improve almost every aspect of our day to day life, and education is one of the beneficiaries. The general objective of this study was to examine the technological, academic, and infrastructural issues that affect the effective application of e-learning at Kotebe College of Teachers' Education (KCTE) and to look at possible constraints and solutions. Both qualitative and quantitative approaches were utilized. Questionnaire, interviews, and personal observation were used in order to get the primary data. The secondary data was obtained from books, unpublished and published studies, journals, and internet sources. The study has shown that there can be ways to bridge the gap between the current status of education at KCTE and the presently available technologies. It has also shown that the use of different kinds of educational technologies in class is beneficial in terms what both the students and the teachers gain from the interactive class. In this study, it was concluded that both the instructors and students were found to be interested in using educational technologies, especially computers in the teaching-learning process. Lack of access to computers and accessories, lack of good internet connection, lack of trainings for both the instructors and the students in using computers and lack of infrastructure in developing e-lessons hindered the process. Recommendations were forwarded on the need for upgrading variety and access of the educational technologies in KCTE, the inclusion of more interactive ICT based lessons, the continuity and strengthening of efforts which are started with MOE, and non-governmental organizations like Camara Education Ethiopia, in order to benefit from their assistance. Sustainability of safety of the devices and preventive methods, and the set up linkage of all computers with the new faster internet connection in the college were also forwarded as recommendations.

Acknowledgments

Praise the Almighty God for the continuous answering of my prayers in the process of doing this research. My advisor, Dr Firdissa Jebessa has been a great help in giving me the most professional pieces of advice. Had it not been for his support, the accomplishment of this study would have been in doubt. My beloved wife, Meron Hailu thank you for being there for me, besides the typing and editing you did. I also want to thank my brother Dawit Tekle for your moral and material support. My sister in law, Selam Hailu, I want to appreciate your patience shown in the process of collecting and tallying the data. My friend, Jovani, thank you for letting me use your high speed internet access as much as I wanted to for free. My friends, Dita, Addisu, and Kassahun, thank you for helping me edit my thesis. I also want to thank instructors and officials at Kotebe College of Teachers' Education, officials and experts at Ministry of Education, especially W/ro Kidist, and other officials at Camara Education Ethiopia, who have helped me a lot in providing and collecting primary and secondary data from different sources.

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Acronyms

AAU	Addis Ababa University
AED	Academic for Educational Development
CAI	Computer Assisted Instruction
CAL	Computer Assisted Learning
CD-ROM	Compact Disc – Read Only Memory
CEE	Camara Education Ethiopia
COE	College of Education
CPD	Continuous Professional Development
EFA	Education for All
EICTDA	Ethiopian ICT Development Agency
EMIS	Education Management Information System
ET	Educational Technology
FHI	Family Health International
GB	Giga Bite
GEQIP	General Education Quality Improvement Package
HE	Higher Education
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
ICT4E	Information and Communication Technology for Education
IT	Information Technology
KCTE	Kotebe College of Teachers' Education
MDG	Millennium Development Goals
MIL	Media Information Literacy
MILC	Media Information Literacy Curriculum
MOE	Ministry of Education
NEPAD	New Partnership for Africa's Development
OLPC	One Laptop per Child
PSEP	Post-Secondary Education Project
REB	Regional Education Bureau
TESO	Teacher Education System Overhaul

Chapter One

1. Introduction

This chapter discusses basic issues in its eight major parts, which include Background of the Study, Statement of the Problem, Objectives of the Study, Significance of the Study, Scope of the Study, Limitations of the Study, Definition of Key Terms, and Organization of the Study.

Since education plays one of the main tasks in preparing students to go into the world, there should be a link between the world and students. If education doesn't reflect the world in which it exists, it has no relevance for the students. In many instances, it has been mentioned that for learning to be successful, it has to be done with an active participation of the learner in the learning process. There are different inputs which are needed to help stakeholders in promoting active participation of students. One of the inputs is educational technology. This study intends to see the application of educational technology in a higher education institution, namely Kotebe College of Teachers' Education, with a special attention on the preparation and usage of e-learning.

1.1 Background of the Study

According to different learning styles of students, instructional materials can be tailored and put into practice. In some cases, some students may be overlooked and gaps may be created hindering the smooth teaching/learning process. According to Rahel (2010), one way to minimize this gap is to think about the learning styles of each student in the design and content of a lesson.

The most important thing here is that an educational system must be able to encompass and develop the knowledge, attitude, and skill of the students. Related to this, Amare (1996) mentioned education's role in creating access to information sources. This can be done using technologies of different kinds which are related to education. Nordkvelle (2004) stated that with the advent of electronic technology, technology's influence on education has become immense. As a result of this, governments are investing large sums in research, development, and diffusion around the new instructional technologies. Computer-assisted technologies are the major ones which give students greater contact with information and an enthusiastic drive to learn, as a result e-lessons are one of the methods or materials used lately by different practitioners in bridging the existing gap and promoting independent, active, and interactive learning. This in turn can enhance traditional methods of learning but without replacing the human touch. The capacity and quality of the teacher in handling the available technology matter more than the presence of technology. That's why this paper intends to assess the application of educational technology towards the implementation of e-learning, using Kotebe College of Teachers' Education (KCTE) as a case study.

Teachers use educational technology to deliver dynamic lessons replacing a chalk board or white board to some extent. The use of a computer or another multimedia presentation, interactive white board, power point, or other soft wares is the essential component. Teachers can use these to capture the students' attention to the maximum and to build a good background to students. As it was also indicated by Firdissa (2005) teachers should examine the possibility that different types of students might do better under different instructional conditions. Obviously, a teacher cannot be expected to have a different

lesson for every child in the classroom; however, lessons can reflect an understanding of individual differences by appropriately incorporating strategies for a variety of learning styles.

Students must communicate, collaborate, and create something as they are producers of information, rather than be simply consumers of information. They need to participate in creative and collaborative projects. With this in mind, AED (Academic for Educational Development) has been providing support to help the implementation of educational technology into colleges of teachers' education (CTEs) curriculum. At the moment AED is performing its activity under the name and/or control of Family Health International (FHI). Trainings were given at Hawassa CTE mainly and also in some other CTEs for all government CTEs on how to use relevant materials and even develop new ones using different soft wares, like Mcromedia Authoware and Adobe Captivate. These trainings were intended to help instructors in all colleges of teachers' education in Ethiopia prepare and use e-lessons in class. The trainings took place between 2006 and 2010. Camara Education Ethiopia (CEE) is also another non-governmental organization working together with Ministry of Education (MOE) on upgrading the ICT usage in Ethiopian education system. Under the same purpose, CEE has lately been working together with KCTE as a content and technology provider of the college.

1.2 Statement of the Problem

To have a successful teaching learning process, students must be in touch with, work together, and create something they customized as they are producers of information. As

it was stated by Rahel (2010), incorporating the learning styles of students in the teaching learning process makes learning easier for students to boost their interest and understanding. The implementation of educational technology and the preparation and utilization of e-lessons is an important component here. It was briefly mentioned earlier that computer-assisted technologies provide students with some eagerness to learn, where by e-lessons are one of the methods or materials used to bridge the existing gap and promote independent, active, and interactive learning.

However, there is a doubt that the courses given at colleges of teachers' education in general and specifically on the employment of the technology or the outcome out of it have not been up to where it should be. According to a study made by Mirressa (2007) on the usage of information communication technology in a higher education institute, there is a common situation where most of the staff members have the awareness and access towards it. However, he continued to set that his findings come with some doubt whereby the awareness of the staff members doesn't guarantee the integration of ICT into the teaching-learning system. More reservation also exists in the follow up of the outcome of the trainings given to some of the instructors themselves.

Though the government is trying its best to apply educational technology at all levels, the lack in awareness and usage of e-lessons seems to have created a gap in modernized handling of the teaching-learning process. This assessment of the implementation of educational technology at Kotebe College of Teachers' Education towards the implementation of e-learning was done through the selected variables which are

educational technology, specifically e-lessons, the ICT infrastructure of the college and the courses/trainings given to students at KCTE, and the training which was given to instructors.

While examining the condition of the implementation of educational technology in colleges of teachers' education in preparing and using e-lessons, inconsistency in the usage of educational technology in general and the usage of ICT in particular were traced out because they are the basic pillars in seeing whether the available infrastructure and trainings given are up to how they are supposed to be. Access to and the status of the available ICT related technologies were also examined.

In view of all of the above, the following research questions were devised with the aim of examining the problems critically and look for potential solutions and suggest them on the way:

1. What is the level of the current usage of educational technology in Kotebe College of Teachers' Education (KCTE)?

2. To what extent are the trainings and courses given at KCTE effective in helping the instructors use e-lessons in the subject matters they are teaching?

3. How does KCTE's educational technology infrastructure serve as a factor in integrating e-learning?

4. How can stakeholders including students, instructors, educational institutions, content and technology providers use the technology for better implementation of e-learning?

1.3 Objectives of the Study

The main objective of this study is to assess implementation of educational technology into KCTE's curriculum through the use of e-lessons. The outcome of the assessment is expected to examine implementation and find out gaps occurred in the process.

This research is particularly designed to

1. evaluate the status of the current usage of educational technology in KCTE
2. detect gaps that may exist in the application and relevance of the usage of the technology as a result of the availability and status of infrastructures.
3. assess the inclusion of e-learning in the teaching-learning process in helping the students and instructors use e-lessons in their own field and
4. recognize the potentials and opportunities which exist in the usage of educational technology so that stakeholders would be able to use the technology better towards the preparation and usage of e-lessons.

1.4 Significance of the Study

The research is believed to have the following significances where, at the end, it will help readers to

1. create a common understanding on the status of educational technology at KCTE
2. identify the major challenges existing in the implementation of the technology towards the preparation of e-lessons
3. see the extent of the success of the implementation in preparing the e-lessons, and

4. initiate other researchers who wish to conduct a further study on the situation on broader scope

1.5 Scope of the Study

In defining the boundaries of the inquiry, based on the choice of objectives and questions and variables of interest, the research is delimited to Physics, Chemistry, Mathematics, and Information Communication Technology (ICT) subjects. Departments of the above mentioned subjects found in the Kotebe College of Teachers' Education are used. The college was chosen purposefully as a result of its physical proximity and access so that the researcher can, to some extent, tackle time and resource restrictions. The four departments were selected because it was from these departments that instructors were given the trainings in Hawassa College of Teachers' Education on how to prepare and use e-lessons using different soft wares at different moments between 2006 and 2010.

1.6 Limitations of the Study

There were financial and time limitations which have affected this study. Hadn't it been for the lack of the above two, the researcher would have been able to see other colleges or universities, to have a more in-depth contact and discussion with participants, and to retest instruments after modifications were made from the results of the pilot study. The participants' unavailability during appointments and at office hours has affected the on time collection of necessary data.

1.7 Definition of Key Terms

E-learning: is an electronically supported learning and teaching, which can be networked learning or not, and serve as specific media to implement the learning process.

Simulation: acting out an actual or probable real life condition or situation.

Animation: is a simulation of movement created by displaying a sequence of pictures. Animation on computers can be used as multimedia presentations. **Educational Technology**: is the usage of software, hardware, or Internet applications, and related tools and activities which are helpful in the teaching-learning process.

Synchronous: real-time or direct presentation or transmission of an internet supported lesson or program.

Asynchronous: flex-time or programmed instruction and tutorials that allow users to work through the screens at their own pace and at their own time.

1.8 Organization of the Study

This research paper constituted five chapters. The first chapter had introduction, the background of the study, statement of the problem, purpose of the study, basic research questions, limitation and delimitations of the study, significance of the study, organization of the study, and definition of key terms. Chapter two consisted of synthesis of related literature. Chapter three explains the research design and methodology, instruments, and the methods of analysis. Chapter four is about the analysis of the data gathered, interpreted, and related discussions. Chapter five consists of summary, conclusion, and recommendation.

Chapter Two

Review of Related Literature

This chapter includes views of different writers and philosophers on the different aspects of educational technology, e-learning and e-lessons. E-Learning stakeholders and the interaction between and among them were also synthesized. An attempt was also made to see other countries experience and Ethiopian context was also examined through ESDPs and the GEQIP.

2.1 Introduction

Educational technology, as the name itself indicates is a blend of two main words: education and technology, which are both dynamic and ever changing. The personal and professional aspects of our life are directly or indirectly affected by one or the other. The development of education in different periods of human history and civilization, as it was described by Mangal and Mangal (2010), passed through different levels which include the method of verbal presentation and memorization at its early stage, where writing was unknown to writing on leaves, tree trunks, engraving on stones and metallic materials gave education a step ahead. The invention of paper and ink made a breakthrough making the basis for further developments of printing materials and textbooks (Reyden, 1996). Later on much further developments were observed which include multimedia presentations too.

2.2 Educational Technology

Educational Technology, as it is defined by Bishop (as cited in Damtew 2005), is the result of engineering techniques, information science, natural science, and human

technology as they are used to promote education. The contribution of all of these features is supposed to facilitate the teaching learning process. The main use of the educational technology for teaching is in an instructional situation where the learner is given control so that he/she may review the material at his or her own pace. In doing so ones own individual interests, needs, and cognitive processes need to be put into consideration. Hence, educational technology can be taken as a resourceful organization of any learning system, adapting methods, processes, and products to give out identified educational goals.

The basic objective here is not so much to replace the teacher as to change the teacher's role entirely. As such, a technology must be well designed to combine the various elements of the cognitive processes and the best quality of the technology (Rajakumar, Kumar, Uppa, and Banerjee, 2006). The challenge here is to design appropriate systems that will provide for and enable appropriate teaching-learning systems that could realize the identified goals. Once a lesson has been designed and built in with the appropriate responses, it should be flexible and permit change and alteration. This would engage developing a range of support systems and training, creating the enabling systemic conditions/materials, reaching these to the school system, and training teachers and students to use them.

As it was mentioned before, Educational Technology is concerned with the systematic application of science and technology in order to provide efficiency to the task of teaching and learning. Mangal and Mangal (2010) illustrate this further by underlining its

importance that it is a wise application and utilization of available human and material resources for providing appropriate solution to the educational problems and to improve the process and the products of education by getting maximum as well as effective output with the minimum input.

2.3 Aspects of Educational Technology

Before the Greeks found the Socratic method of carefully structuring questions and answers to be effective people have depended on word of mouth, demonstration, and limited written records where these were the primary media for early training. As it was described by Knirk and Gustafson (1986) eventually, a system of providing instruction to individuals through an apprenticeship system developed, which led to grouped instruction processes.

Garrison and Anderson (2003) characterize educational technology based on the 1994 definition by the Association for Educational Communications and Technology (AECF), as a theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning. In order to put this in into practice, besides the usual blackboard or chalkboard, educators use different kinds of ETs including projector, radio, tape recorder, television, video tapes, charts, diagrams, graphs, maps, globes, photographs, posters, models, slides, transparencies, computers, and so on. (Fisseler and Bühler, 2007), (Tinio, 2002) and (Mangalvand Mangal, 2010). These technologies are part of a scientific process whereby human and material resources are used to enhance efficiency in teaching, and learning.

The development of computer technology and access to the broadband Internet and increasingly common ownership of the computers in households, make it possible to become more and more common as the means of communication in education (Dobrzañski and Brom, 2008). At its best availability, it gives or creates the maximum level of communication between the teacher and the students. Using whatever exists is still good concerning the current situation of a country or an institution.

Information and communication technologies (ICT's)—which include radio and television, as well as newer digital technologies such as computers and the Internet—have been labeled as potentially powerful enabling tools for educational change and reform (Tinio, 2002). When used appropriately, different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly dig-ital workplace, and raise educational quality by, among others, helping make teaching and learning into an engaging, active process connected to real life. Towndrow (2005) said that the use of ICT works best in teaching and learning when it is conceived of and used as an integral part a lesson or a task.

2.4 Information Communication Technology in Education

The term Information Communication Technology (ICT) is a very wide one which touches the diverse set of technological tools and resources used to communicate, and to produce, distribute, store, and administer information. According to Tinio (2002), these technologies include computers, the Internet, and broad-casting technologies which include radio and television.

It is true that computers alone won't boost academic performance. however according to Williams. Sawyer. and Hutchinson (1999) they can have a positive effect on student achievement in all major subject areas, preschool through college. The issue here is how computers and the Internet can be used to improve the efficiency and effectiveness of education. though both are still under utilized in developing countries as a result of infrastructural and management problems. In doing so teachers are advised to make decisions about the use of technologies based on a set of one or more of the following principles which were summarized from nine of which Towndrow (2005) has listed:

1. making possible activities which could not be done as easily as possible in the print based approach
2. allowing teachers and students greater flexibility in terms of when and where learning occurs. and
3. saving time over time

Flexibility is needed in the attempt to reach the diversity of learners utilizing the system. saving time over time is related with making the lesson easy to be understood by the learners and easy to explain by the teacher. saving time and energy to be wasted in traditional print based approach. Simulations. sounds. and animations are included in e-learning to promote the principles.

2.5 Learning about and with Computers

The interest level and skill of using computers among each and every one of us differs a lot. Some people excelled in the applications of computers and related functions where as some others refrain from using computers for fear of failure. and still others don't make

effort because of lack of basic skills. Many students are found in between and among these situations.

The invention and development of computers has made great strides in the previous decades. As it was mentioned twenty five years ago by Knirk and Gustafson (1986) between 1960 and 1980s, the performance of computers has increased ten thousand times, while the price of each unit has declined 100,000 times. It won't be hard to imagine the current development or invasion of computers of different type in our lives with their own merits, and of course demerits. The Microsoft revolution created by Bill gates, and the effects of companies like IBM, Apple, and Macintosh have made a great impacts in every aspect of our activities (Microsoft, 2012).

Computer literacy is needed to have an understanding of what a computer is and how it can be used as a resource. Literacy, which refers to having knowledge and understanding, needs to be distinguished from competency, which refers to having a skill. Computer competency is applying your skill with computers to meet your information needs and improve your productivity (Hutchinson and Sawyer, 2000). It also means being able to transfer basic skills to new systems and new software.

The need for having computer literacy for teachers is to acquire the specialist knowledge and skills to control the equipment and get the best possible performance out of it, but they do not expect to have to fix it when it malfunctions, or devise new applications for it. According to Romiszowski (1988), they just acquire the equipment that is designed for

the task they wish to perform, learn to use it efficiently and if it breaks down, or their requirements expand beyond the equipment's present capabilities, they call in a specialist. Computers as an aid to the instructional process are the latest arrival in the field of education surpassing all audio-visual aid materials and equipments (Mangal and Mangal, 2010). Though they are the last, they are also found to be the best as a result of their capacity to incorporate most of the features which the previous educational technologies possess: text, sound, and motion. The usage of computers in the classroom can be named as an electronic classroom, according to Little and Williams (2003). According to them eclassrooms can benefit from computer-aided learning (CAL) which uses software to generate on screen learning materials and computer-aided assessment. Besides the computer itself, different facilities are needed. These, as mentioned by Anderson and Weert (2002), include basic infrastructure such as electrical wiring, Internet access, lighting, air-conditioning, and space.

Computers are connected to the internet to be used as a source of information. This benefit allows students to access any information or to exchange data and ideas with students from other schools. E-classrooms can benefit from this besides an interactive display board where all computers in a class can be connected to an interactive display board at the front of the classroom, so that everyone can watch a presentation by one pupil, as it was portrayed by Little and Williams (2003). The board also converts the teacher's board notes into a computer file which can be saved and used again.

The general aspect here is first to learn about computers by having the literacy, and

competency if possible, and later on use that literacy and the technology to teach other subjects. That is how learning about and with computers can go one after the other and hand in hand one upgrading the other.

2.5.1 Computer Assisted Learning

In prior decades, books and instructions in the education system were the only way available outside the family and immediate community to convey information from generation to generation. However, over the past four decades, this noticeably changed since nearly everyone in advanced industrialized societies got access to television, to radio, and at a growing rate to computers (Thomas and Kobayashi, 1987)

It is apparent that economic factors are often the basic ones which affect the use of computers in education. Having a prosperous economy able to commit sufficient resources for supporting computers in education is an advantage which developed countries enjoy. In order to show the expensive nature of using computers in education, Thomas and Kobayashi (1987) mentioned that besides the computers themselves, there are costs associated with proper place and furniture, printers, soft wares, maintenance, curriculum development, and teacher training. The availability of all these is still important despite the change in the way computers are produced and used.

Computer-assisted learning, like other self-instructional media, can be selected as the basis of a complete, automated instructional system. (Romiszowski, 1988) Alternatively, teachers may select specific CAL exercises as components in their overall course or

lesson designs, just as they select a set of slides or film. In the first case, the CAL system becomes the principal medium of instruction, replacing classroom teaching entirely or at least in a large part.

The terms Computer Assisted Learning (CAL) and Computer Assisted Instruction (CAI) are used interchangeably by different without a big difference in the meaning and usage. A summary of what Mangal and Mangal (2010), have stated about CAL/CAI is presented here

1. In CAI there is an interaction between an individual student and the computer just as it happens between the teacher and an individual student.
2. The computer is able to display the instructional material to the individual student.
3. The individual student takes benefit of the displayed material and responds to it. These responses are attended by the computer for deciding the future course of instruction displayed to the learner.
4. The interaction between the individual learner and the computer device helps in the realization of the set instruction objectives.

The above definition and characteristics of CAI is a method of instruction in which there is a purposeful interaction between a learner and the computer device (having useful instructional material as software) for helping the individual learner achieve the desired instructional objectives with his own pace and abilities at his command, letting fast learners go to next levels and slow learners revise or rewind the same lesson or level.

2.5.2 E-Learning and E-Lessons

In general, e-learning is the expression broadly used to describe instructional content or learning experience delivered or enabled by electronic technologies (Ong, Lai and Wang, 2004). In this modern and technologically advanced time, electronic technologies come in different, advanced, and interesting manners. Some of the technologies which have already been in use in our country are education through radio, television, and plasma transmissions. The usage of computers and internet comes next in line as it is a new development replacing or encompassing one or more of the above.

It is difficult to strictly draw a line when defining e-learning but some definitions of it are more restrictive than this one, for example limiting e-learning to content delivery via the Internet (Jones, 2003). The broader definition, which will be used for the purposes of this research, can include the use of the Internet, intranets/extranets, audio- and videotape, satellite broadcast, interactive TV, and CD-ROM, not only for content delivery, but also for interaction among participants, as it was stated by Wagner, Hassanein, and Head (2008).

The description of e-learning as it was made by Tinio (2002) is related more with web-based learning where e-learning is most commonly associated with higher education and corporate training encompassing learning at all levels, both formal and non-formal, that uses an information network—the Internet, an intranet or extranet - whether wholly or in part, for course delivery, interaction and/or facilitation. This stand refers to learning using an Internet browser.

E-learning is multifaceted, embracing all forms of electronic devices that are employed in teaching and learning situation to make learning easy. Elijah (2010) picks out one as the most popularly used e-learning device is the computer which can be used in teaching and learning in Computer Assisted Learning (CAL) or Computer Assisted Instruction (CAI). E-learning is advantageous to the extent of enabling learners to grow to be more skilful in choosing their own goals, constructing their own strategies, assessing their own knowledge and monitoring their own progress (Rahel, 2010).

As O'Neill, Singh, and O'Donoghue (2004) assert it, for instructors and students, the implications of e-learning are wide-ranging and universities must provide quality and flexibility to meet the diverse needs of students which will inevitably involve tailoring courses to suit differing educational needs and aspirations. Organization for Economic Cooperation and Development (OECD) further adds the importance of e-learning (2005) as it is increasingly prominent in tertiary education. Here, it is important to note that HE institutions need to consider the implications for everyone involved before implementing any new e-learning strategies.

The advantages and disadvantages of e-Learning are presented by different scholars, including Fisseler and Bühler (2007), Garrison and Anderson (2003), and Mangal and Mangal (2010), and a summary of what they have proposed comes as follows:

1. Access to information and educational contents can be made possible any time, any place
2. Making instruction and learning opportunities provided to the learners adaptable to

their needs

3. Promoting collaboration among students from different scenarios

4. Access to variety of delivery media CD, DVD, laptops, and mobile phones

5. Make the students more interested and motivated towards learning as a result of access to multimedia and Internet and related opportunities of having an on-line, offline and live interaction between the students and teachers.

6. Audio-visual recording technologies unique advantage of providing learning experiences that can be paused and reversed for observing, learning and imitating at the will and convenience of the learners, at the same time promoting self-pacing, and

7. Provisions of richer experiences through simulated and gaming techniques

Though these are not the only advantages, there are also some drawbacks on the implementation of e-learning, which are

1. Requirements of adequate knowledge and skills for the use of technologies
2. Affordability of computers, laptops, multimedia facilities, or Internet connections.
3. Lack provision of equipping the teachers in their pre-service or in-service training programs for getting acquainted with the knowledge and skills required.

2.5.3 Dimensions of E-Learning

The extent of e-learning technology use in course delivery varies widely. According to Wagner et al. (2008), these attributes can be classified into the dimensions of synchronicity, location, independence, and mode. E-learning can be synchronous (real-time) or asynchronous (flex-time). Synchronous e-learning requires students to be present

at the time of content delivery, but asynchronous applications includes programmed instruction and tutorials that allow students to work through the screens at their own pace and at their own time. Some of these can be downloaded for further use and can be combined with other lessons to apply computer enhanced learning.

Most of the courses available on the Internet are based on this asynchronous model (Greenagel, 2002). Students can be involved in e-learning from distributed locations, as in distance learning, or from the same place, such as using a group support system in a classroom to work on an assignment.

E-learning applications also differ in the levels of collaboration that they involve. Some courses are entirely independent and individual, while others incorporate some elements of group learning such as discussion forums or chat rooms. The mode of course delivery can be entirely electronic (with or without an instructor) or take a more blended approach integrating electronic and classroom delivery to varying extents. As Jack and Curt (2001) indicated it, many current e-learning offerings follow the latter mode, taking advantage of the benefits of various types of delivery. The variety of delivery lets different classroom situations benefit from it, though being affected by lack of all the infrastructure needed, specially the Internet.

2.5.4 E-Lessons

E-lessons just like any other lesson should be presented in a structured manner so that the prosperity of possible e-learning systems can be cherished. These days there are a lot of

choices to pick from in order to prepare an e-lesson. For example, to present visual content, a teacher can choose between a slide show and / or a videotape. One choice gave the option of showing motion, but had very low levels of resolution. The other had high resolution but was static. If a teacher needs both at different points of a lesson, according to Romiszowski (2004), he or she needs to be equipped with every available type of audio, visual, and audiovisual presentation device, which seems to be very expensive in Ethiopian context. If all possible presentation alternatives are on the same CD-ROM, or online, accessible through just one presentation device, it will be the best option.

Most of the time, the greater part of students' time in education is consumed by interactions with educational content where in traditional, classroom-based and teacher centered education, this has meant study using texts and library resources. However, in e-learning contexts, as it was mentioned by Garrison and Anderson (2003) content can be expressed in text for reading on screen or on paper, but it is often supplemented with a rich variety of computer assisted instruction, simulations, micro worlds, and presentation creation tools. In particular, work with the development, cataloguing, and distribution of such content, broadly referred to as 'learning objects', promises to provide teachers, developers, and students with a vastly expanded set of content.

According to Tsegaye and Baylie (2007), and though this may not be the case all the time, their study showed that students who used computer simulations in learning have scored better on than those who have performed traditional equipment-based experiment in a physics class. There is also another study made by Miressa (2007), which confirmed

that students who have learnt with computer scored higher on achievement tests, learnt more in less time, liked their classes more, and have a more positive attitude towards their work. These benefits are important in enhancing the quality of instructional process in class, upgrading the level of understanding of the students, and maximizing knowledge transfer.

2.6 E-Learning Stakeholders

A stakeholder is a constituency of an organization or a party which is affected by it or a process related with it. As Wagner et al. (2008) summarized it, the most important stakeholders affected by e-learning are Students, Instructors, Educational Institutions, Content Providers, and Technology Providers.

2.6.1 Students

In order to maximize learning and performance in a student centered situation, as Amera (2008) said it, effective utilization of instructional materials is highly required. The main targets of e-learning are students. According to (Rahel, 2010) e-learning technologies offer greater diversity of learning goals than the traditional classroom, students' interest and motivation increase substantially. Students are motivated to use e-learning to gain access to higher education. For some, it may be a component of a traditional course; while for others entire courses may be entirely online. Particularly for this second group, e-learning may create access to higher education that they would not have otherwise because of geographic or time constraints.

Since e-learning gives students an entirely new learning environment, it requires a different skill set to be successful. To achieve this, critical thinking, research, and evaluation skills are growing in importance as students have increasing volumes of information from a variety of sources to sort through (New Media Consortium, 2007). Also, particularly in courses that are electronic, students are much more independent than in the traditional setting. This requires and at the same time provides high motivation and commitment to learning. As said by Garrison and Anderson (2003) to support this, the design of appropriate amounts of interaction is critical and depends on a variety of factors, many of which are rooted in the expectations and capacity for interaction expressed by the students. Besides, e-learning by its very nature requires a certain level of technical sophistication, though this becomes a less serious issue over time as computer literacy increases.

2.6.2 Instructors

Based on the manner of e-learning delivery, instructors may or may not have face-to-face interaction with their students. Here, teachers can select pedagogical strategies appropriate to both learning styles and individual needs of students (Rahel, 2010). This matters more than anything as there can be ways in which students do things independently once there are options provided according to their learning styles and individual needs.

E-learning technologies bring as much change to instructors as they do to students, again requiring a new set of skills for success (Jones, 2003). In the e-learning environment,

instructors shift from being the primary source of students' knowledge to being the manager of the students' knowledge resources.

The instructor delivers the content to the class and responds to their questions in most in traditional classroom situations, but in a technology only asynchronous e-learning environment, the instructor is more of a coordinator of the content, which students then peruse at their own pace (Teo and Gay, 2006). Thus, the skills that are most important for an instructor to possess may depend on the e-learning attributes of their course.

The development and application of content objects is an important component of the teacher's role in education. Garrison and Anderson (2003) further describe this as the network created by internet or other options provides opportunities for teachers to find, utilize, and, in some cases, create learning objects that are automatically updated by other content agents, by emerging data, and by other research results or environmental sensors E-learning requires technical sophistication, including learning new software applications, from instructors as well as students (Jones, 2003). If instructors are also the content creators, use of new technology may be wide-ranging. Studies made and presented by Arabasz and Baker (2003) have shown that the main challenges of technical support for e-learning initiatives include lack of knowledge. If there is lack of knowledge in using, if not in preparing, e-lessons the need for uplifting or upgrading of skill and knowledge of both the instructors and the students must be worked out before inculcating any e-learning in the curriculum.

Educational softwares are one of the basic tools here as they can be used with or without internet access. For instance, there are CD-ROMs with encyclopedias, phone books, mailing lists, maps, and reproductions of famous art. (Williams et al, 1999). Having the knowledge is of how to alter instructional design to be effective for courses with technology. To increase usefulness and enjoyment, instructors should vary the types of content, generate fun, give feedback as soon as possible, and support interaction to boost acceptance. The amount of time that it takes instructors to create and manage e-learning courses is another important consideration to be kept in mind.

2.6.3 Educational Institutions

The context of educational institutions in this research paper is higher education which includes colleges and universities. Educational institutions mix technology of and at different levels into classrooms to facilitate lecture delivery and create new technology mediated learning opportunities for students.

There are many of them all over the world which provide distance learning, including e-learning, to create access to a larger pool of students and to do away with geographic boundaries between institutions and students. It can also be used to make up real life situations and use simulations in their place. The types of e-learning offered by universities range right across the e-learning spectrum, but in most campus-based institutions the growth of e-learning has not altered the fact that face-to-face classroom teaching remains central. (OECD, 2005)

One of the factors, which Wagner et al. (2008) have forwarded as a reason to influence the application of e-learning is budgetary restriction. In some cases the implementation of e-learning courses can involve very costly technology upgrades cases as a result of the technological infrastructure in place at an institution. E-learning systems require several components including sufficient bandwidth, course management systems, technology equipped classrooms, and adequate computer facilities for student use. However, it can also be used to replace the laboratory experiments using computer simulations. This is because, as Tsegaye and Bayile (2007) put it, the cost of scientific instruments is increasing significantly, and using computers makes many things possible.

2.6.4 Content Providers

The content provider can be either the instructor or an external source. However, this doesn't matter as long as their motivation is to provide content modules that will result in effective learning. Teo and Gay (2006) stress the importance of technology standards because content should be created in a format that will allow its utilization across various e-learning technology platforms. Greenagel (2002) adds to this that it is equally important to make certain that the content provided is consistent with the learning methodologies in use at various institutions and thus being more likely to result in successful learning. The targeted success will be arrived at through the proper matching the content included in the lesson and the manner it can be displayed using the available technology. Garrison and Anderson (2003) added on this that content agents can also be built to supervise and to report on research activities of researching teachers, thus creating new content automatically that both informs and involves students in the process.

The possible immaturity of e-learning, according to a document presented by OECD (2005) is demonstrated by low adoption of content management systems. Learning is affected by the type of content, the learning environment, and even the characteristics of each learner so e-learning content providers, just like other type of content providers, need to take this and the curriculum of the country concerned into consideration when developing content.

2.6.5 Technology Providers

Technology providers develop the technology that enables e-learning delivery. For this research, Macromedia Authoware and specially Adobe Captive are under concern being the technology/software providers. E-lessons have the power to attract, stimulate, and retain learners with different kinds of applications. Different versions of Adobe® Captivate® softwares are one of the e-learning authoring softwares used for rapidly creating and maintaining interactive eLearning content (Adobe, 2010). Using the software, one can import the existing Microsoft PowerPoint content and make it more engaging with rich media, application simulations, and quizzes. There are also other softwares which come with user friendly features.

One of the latest technology which posses both the software and parts of the hardware is the eBeam Interactive Whiteboard technology which works on infrared and ultrasound to turn any standard whiteboard into a digital workspace. The eBeam receivers are attached to any traditional whiteboard and connect to a PC or Macintosh computer. By inserting standard dry erase markers into electronic sleeves, pen strokes are recognized and data is

transferred to the computer. Notes and drawings can be saved, printed, emailed, edited or shared in real-time over the Internet with anyone, anywhere. (Luidia, 2012). It Works with standard whiteboard markers, electronic eraser for minor edits and changes, replaces flip-charts by allowing for unlimited page capturing, and opens new page or prints page with a tap of the pen – directly from the board.

The whole point should be thinking of ways on how to make the teachers be capable of using the existing technology towards the preparation and use of e-lessons. Technology providers also intend to provide learning environments that will result in effective learning for students.

Many industry experts attribute the shortcomings of e-learning to technological issues (Woodill, 2004). He reasons out this that many products are not developed on proven educational principles and thus do not take the different ways that people learn into consideration. Contrary to him, there are still many like the ones mentioned above consider individual differences. Similar to content providers, technology providers should provide provisions for personalizing the learning experience based on the context of learning and the characteristics of the student.

2.7 Interaction Between and Among the Stakeholders

Interaction is the defining component of the educational process and occurs when students transform the inert information passed to them from another and construct it into knowledge with personal application and value (Garrison and Anderson, 2003).

Interactions involve partnerships are which are a key characteristic of e-learning that could help not only students and their instructors, but also institutions to share knowledge, and good practices, and achieve benefits such as advanced technology and educational quality. Some institutions, in developed countries, are already involved in partnerships covering activities such as e-learning infrastructure; learning management systems and applications; creating e-learning materials; developing joint programs; collaborating for research; sharing best practices (OECD, 2005).

ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, as it was discussed by Tinio (2002), ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners' teaming and communicative skills as well as their global awareness. It models learning done throughout the learner's lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

Interaction in many formats has been a defining feature of formal education. According to Teshome (2007), the deployment and exploitation of education and the technologies to be used require full integration of technologies into the system of not only teaching and learning, but also in research, management, and other systems too.

Higher education must go far beyond access to information or content and include engagement with others in the gradual development of personal understanding which is

developed through interaction between and among teachers and students, and forms the basis of their conversational approach to teaching and learning. Garrison and Shale (as cited in Garrison and Anderson, 2003) define all forms of education as interactions among teachers, students, and content, and add that key to the learning process are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions. Thus, both human and non-human interactions are integral and reciprocal components of a quality e-learning experience.

Benefits of interaction in e-learning are described by different personalities like (Romiszowski, 1988) and Tinio (2002), which can include pacing, elaboration, conformation, navigation, and inquiry. Garrison and Anderson(2003) also went to the extent of saying that teacher-teacher interaction is the cornerstone of community within which teachers function. All of these show the importance of integration between and among those who are concerned.

Describing the above interactivity Garrison and Anderson (2003), added that pacing of the educational experience operates from both a social perspective and serves to keep an educational group synchronized or acting together, and in an individual perspective, serving to define a speed for progressing through the lesson such that the educational objectives are completed in a reasonable and pedagogically effective span of time. Hence, students should feel that they are being included in a lesson in ways that shape its outcomes, rather than being observers asked to participate interactively only occasionally.

This allows individual student control of pacing and facilitates group pacing such that collaborative learning activities are possible. Tinio (2002) compares aspects of the traditional pedagogy and the emerging pedagogy for the information society and stated that in the first case pace is determined by the program or the curriculum while in the second case pace is determined by learners. We have repeatedly mentioned the benefits of listening to or observing individual differences of students while dealing with pedagogical issues. The interactive capability for students to follow individual interests and paths makes inquiry both a motivating and personalizing function of interaction.

Interaction serves to develop connections between new content and existing mental diagram allowing learners to build more connections between existing and new information and skills. E-learning Stakeholders' Responsibility Matrix (See Appendix 9) shows how the stakeholders support and affect each other (Wagner et al. 2008). Feedback from the environment through experience and interaction is also an input here. This interaction can be shown through programmed computer response in interactive tutorials and simulations and games. Before simulations are put into practice, as proposed by Romiszowski (1988), the following questions should be asked in order to get the best out of the lesson accompanying the simulation. Asking must then be followed by deciding and then acting.

Here is the summary of what was proposed:

1. Is there any advantage in using the simulation over the real system or equipment?
2. Is the simulation sufficiently realistic for students to see the relationship to reality?

3. Are all the system/equipment characteristics, which relate to the learning objectives, reproduced with sufficient fidelity?

4. Does the simulation react to student inputs in a way equivalent to the real system/equipment?

5. Is the simulation so constructed that the students are likely to discover the general principles that govern the relationships observed?

6. Is the simulation package accompanied by teachers' notes, explaining the objectives, content, underlying model and principles and suggestions on how to make the link from simulation to reality?

The answer to the above questions accredits the quality and application of the technology to be used: being realistic, having fidelity, reacting to student inputs, having an underlying model and content to be supported by the teacher. Since simulation minimizes the cost of training considerably, as Cayirci and Marincic (2009) indicated it, it should be encouraged. Besides this, it also minimizes the dangers that may be caused by interaction with chemicals.

In general, a simulation inculcating e-learning-scenario, according to Fisseler and Bühler (2007), can be described as an arrangement consisting of Content: material ranging from simple text to complex multimedia and learning-objects; Communication: everything from face-to-face to chat and discussion-boards; and Construction: learners work with different materials, taking notes, writing essays, doing presentations or work together on a project. In order to interact for different parties, they should be in platform where they

would exchange content, have smooth communication, and agree on the construction of materials as outputs.

2.8 Other Countries Experience

The experience and exposure of other countries towards the use of ICT in education can be a spotlight on the main issues to appreciate and learn from. Though ICT does not automatically, without any human intervention add quality, there are a lot of evidences that ICT application to education speeds up the teaching-learning process. Being an already developed country on one side and a developing one on the other side gives countries the power to implement any. With this in mind, it is good to see experiences from other countries which are developed and also African countries' experience.

Some researches indicated that there is a wide gap between where we are and where some other countries are. A study made by Damtew (2005) Teaching using satellite communication was experimented in India back in 1975-76, and computer was introduced in the educational system of the countries like Japan in 1987, and New Zealand in 1989 and Canada in 1989.

According to a report released by European Union (2010) a lot of countries advocate several innovative pedagogical approaches whereby students learn in ways relevant to their own background, experiences and interests where the methods are effectively enhanced through the use of ICT with the aim to increase students' engagement and improve their results. The report further states that all European countries, except

Denmark and Iceland, report that the development of teachers' ICT skills is included in centrally promoted programmes for Continuous Professional Development (CPD). The internet access of schools in USA and England is studied and compared by Twining (2002) showed that almost all schools were connected to the internet in these two countries. Though it is or at least looks difficult to arrive at where the above mentioned countries are, it is one thing to set them as a reference and set the goals accordingly because countries like Ethiopia have a lot to learn from developed ones.

Ebeam is one of the educational technologies which was mentioned earlier. The usage of this technology is now a normal phenomenon in French education system at different levels. This technology can be observed to some extent in Ethiopia, at Alliance Ethio-Francaise.

2.9 Practices in Africa

As it was said earlier, the usage of ICT in education is affected by the economic power of a country or an institution. In most African countries the economy is firstly geared towards maintaining the existence of its citizens, rather than upgrading the quality of the education system. That's why Damtew (2008) mentioned that quality has emerged as a growing concern for students, parents, employers, and governments. In order to solve this, some attempts were made.

As it was mentioned on the Addis Ababa University (AAU), College of Education (COE) Quarterly News Letter (2004) the UNESCO Director General, Mr. Koichiro Matsuura

launched the Master of Education in Information Communication Technology. The project aimed at building teaching capacity in the four African countries, including Ethiopia. Countries in Sub-Sahara Africa are overwhelmed with major tasks related to access, finance, and quality, internal and external efficiency and therefore are unable to meet the demand for education. Though this was the fact by then, the rate of growth of ICT in the African region was increasing at a very high rate, according to the report, where by countries are building National ICT Network, School NET, Research and Academic Network, etc. Computer Science was being made part of the Secondary School Curriculum and there is a strong urge to integrate ICT into the general curriculum. Some of the African Governments have formulated a strategy of universal access to roll out ICTs to every government district and every school.

However, as the report stated it, (AAU, 2004) evidence shows that many of the current attempts at implementing computers in African schools are slowed down by insufficient teacher training in the effective use of computers in the classroom, both from a pedagogical and a technological point of view. Many teachers needed trainings they did not know how to set up and maintain their computers; neither did they know how to integrate them effectively into classroom teaching.

On a summary report of ICT and education status of 53 African countries, Glen and Isaacs (2007) mentioned that there is actually a widespread belief that ICTs can be important potential levers to introduce and sustain education reform efforts in Africa. The report also states that there are evidences of increasingly widespread demand for and use

of ICTs in education initiatives in African countries and demonstrated interest from African policymakers in using ICTs to help meet Education For All (EFA) objectives. The same report comments on the scattered and often uncoordinated initiatives utilizing ICTs to benefit education throughout the continent. This World Bank funded study comment is related to the above mentioned results of the report that there is no or few consolidated documentation of what is actually happening in Africa in this area, or comprehensive baseline data on the state of ICT use in education in Africa against which future developments can be compared.

Takeuchi (2008) quotes the former secretary general of the UN, Kofi Annan where he mentions that one of the Millennium Development Goals (MDG) is achievement of universal primary education by 2015 and that we must make sure that information and communication technologies are used to help unlock the door to education. Based on Kofi Annan's speech, he further explains that to achieve improvement of the educational situation, several kinds of ICT4E projects such as NEPAD's (New Partnership for Africa's Development) e-school initiative and One Laptop Per Child (OLPC) have been implemented Wims and Lawler (as cited in Takeuchi, 2008).

A study made about the status of ICT in Education in Kenya, one of our neighboring country, can be used as a reference point to show where our country is. According to the study and its report made by Farrell (2007), Kenya has made remarkable progress putting in place an ICT policy framework and implementation strategy, complete with measurable outcomes and time frames. The report continues mentioning that the process

has had the benefit of sound advice from officials and stakeholders and, perhaps more importantly, strong leadership from the office of the Permanent Secretary of the Ministry of Education. However, universal implementation is challenging given the lack of resources, national ICT infrastructure, and even electrical supply.

The Ministry of Education of Kenya developed the country's Education Sector Support Program in 2005 that featured ICT as one of the priority areas with the aim of mainstreaming ICTs into the teaching and learning process. The National ICT Policy embedded this intent as a national priority and provided the impetus for the ministry to develop its sector policy on ICT in Education.

The ministry moved quickly and, in June 2006, introduced the National ICT Strategy for Education and Training. This document, referred to as the ICT policy for the education sector, consists of the following components, each with its own statement of strategic objectives and expected outcomes: ICT in education policy; Digital equipment; Connectivity and network infrastructure; Access and equity; Technical support and maintenance; Harnessing emerging technologies; Digital content; Integration of ICT in education; Training (capacity-building and professional development); and Research and development.

As strength of the country's higher education institutions, we can mention that each university in Kenya has developed its own ICT policy. There is also collaboration among

14 universities to produce educational software while at the same time building software design, development, and support capacity in the higher education sector.

2.10 Ethiopian National ICT Policy (NICTP)

Ministry of communications and Information Technology (MCIT) of Ethiopia is responsible for the National ICT policy. MCIT (2010) indicated that Ethiopia's Information and Communication Technology (ICT) policy is an integral part of the country's larger development goals and objectives setting the goal is to rapidly transform the country's subsistence agricultural-based economy and society into a predominantly knowledge- and information-based economy and society. The focal point of the policy being on the country's ICT development process, the Government of Ethiopia has developed multiple policies, most notable of which are the National ICT Strategic Plan and the ICT4D Action Plan for the year 2006-2010.

The broad ICT sector policy of the Ethiopian government that derives from Plan for Accelerated and Sustained Development to End Poverty (PASDEP), as developed in 2006 by the Ethiopian ICT Development Agency (EICTDA).

The policy aims to:

1. develop ICT as a globally competitive industry, and as an engine of national growth;
2. create the necessary conditions for the rapid development of ICT within the economy and society to accelerate Ethiopia's socio-economic development process;
3. promote and facilitate an extensive use of ICT in support of key sectors of the economy including agriculture, industry and the services sectors;

4. transform Ethiopia into a knowledge and information-based society and economy; and

5. promote the use of ICT for modernizing the civil and public service to enhance its efficiency and effectiveness for service delivery, to promote good governance and reduce wastage of scarce resources.

2.11 Education Sector Development Programs (ESDPs)

The Federal Democratic Republic of Ethiopia has proposed different plans for education through MOE under its Education Sector Development Programs (I, II, III, and IV). In an Action Plan of ESDP I (MOE,1998), which was launched in September1998, it was indicated that the expansion of higher education during ESDP will be limited to meeting the immediate needs of the country for educators, engineers, health workers, and public administrators. Universities will be required to become fully efficient before they expand their facilities. However, nothing was mentioned about ICT in any part of the document.

In ESDP II (MOE,2002), the plan about the introduction of Information Communication Technology (ICT) in the secondary schools was intended to be a major undertaking in between 2002/3 and 2004/5. A financial management system for improving the efficiency of the higher education institutions was also intended to be developed and implemented, though there was little said about the development of ICT infrastructure in higher education. Under sub-section 4.8, it was planned that necessary additional infrastructure like classrooms, laboratories, computer centers, workshops etc. would be constructed.

ESDP-III program action plan was intended to be covered between 2005/2006 – 2010/2011. According to this document (MOE, 2005), to enhance the quality of education at secondary level, ICT infrastructures were planned to be provided to schools to receive satellite education transmission. Moreover, with the objective of improving the quality of education and supporting teachers, the process has started to make use of School Net service for the 161 preparatory schools (grade 11-12). The objective of the School Net program was to support the country's education system with ICT which involved providing personal computers to schools to set-up internet laboratories, organizing training for teachers, digitization of existing video-based educational contents for web access and eventually facilitating community access to ICT. Fiber cable institutional networking was being provided in higher education institutions and secondary schools are provided with necessary ICT infrastructure to receive satellite education transmissions in six subjects.

Moreover, the facilitation of Internet laboratories in high schools was also underway which was believed to bring about improvements in the quality of education, as it would enable students to utilize on-line and electronic libraries and information. It would also assist the professional development of teachers.

As to teachers' ICT literacy, Information Communication Technology had been put as an independent course in the newly designed Teacher Education System Overhaul (TESO) courses where teachers would be introduced to ICT through pre-service and in-service training programs (MOE, 2005).

The two priorities under ESDP IV (MOE, 2010) were to improve the quality of general education and to increase access and equity where the quality improvement program integrated core priorities such as "teacher and leader development" and "Information and Communication Technologies " (ICT). There were many challenges which were stated and one of them was the low level of confidence amongst a number of teachers on the benefits of ICT. In order to improve the quality of teaching and learning, it was necessary to go beyond the provision of more ICT infrastructure.

Through these the development of an e-learning culture among students and teachers was envisioned. The technical capacity in maintenance of ICT equipment at regional level was also planned to be expanded (MOE, 2010). The development and implementation of a technology responsive ICT national curriculum for primary, secondary and higher education as well as for other educational institutions as also under way with the where the curriculum was developed as a start.

2.12 General Education Quality Improvement Package (GEQIP)

The Ministry of Education of Ethiopia, MOE (2008) in different scenarios has stressed the importance of strengthening human resource capacity and achievement of the MDGs, of which education is a key element, is a cornerstone of the Government development strategy. The package which was launched by MOE, namely General Education Quality Improvement Package (GEQIP), in November 2008, is part of the whole process which has strengthened the basement of the strategy.

The MOE (2008) planned to strengthen the existing education system, under the first phase of the GEQIP, through a combination of capacity development for policy analysis and planning; renewal, renovation, repair and ongoing maintenance of IT infrastructure at the federal, regional and woreda levels; and several enhancement initiatives that will make education information more accessible and relevant. This subcomponent would support MOE and Regional Education Bureaus (REBs) to strengthen the existing education management information systems; and build the capacity for policy analysis and planning of the MOE in order to improve education provision.

The package touches teachers' education institutes by equipping them with practicum offices to better organize school placements and supervision/M&E and with student teacher ICT resource centers (MOE, 2008). MOE tried to pin point the possible constraints and drawbacks in the process which affect Education Management Information System (EMIS) operations and data analysis and application as they were undermined by inadequate IT equipment at all levels and by poor communication lines between REBs and the center.

Related with infrastructure, the federal IT infrastructure was in the process of being upgraded with $500.000 under a separate project Post-Secondary Education Project (PSEP); this subcomponent was planned to support additional upgrading, including a data center and an ICT training center.

2.13 ICT in Ethiopian Higher Education Context

In order to have a glimpse at the status of higher education in Ethiopia, it would be advisable to mention the changes it has gone through. Higher education in Ethiopia, according to a document by MOE (2010), has a relatively short history of some 60 years only. As Mammo (2010) stated it the transition of higher education has gone through three major phases: under the traditional monarchy, under the military rule, and currently found under a federal arrangement. Each phase respectively is described as an elite education system where quality over numbers was the guiding norm under the traditional monarchy: a shallow ideological control penetrated the educational system, and a 'dramatic expansion of higher education' with all the problems that this has to go through.

According to Damtew (2005), Ethiopia has been trying to facilitate government administration and service delivery, different sector program development, where Education is one of them, with Information and Communication Technology (ICT) by developing its own ICT policy.

The development of higher education in Ethiopia has undergone both major quantitative and qualitative change with a succession of new policies was designed and implemented (MOE, 2010). Ethiopia has started a higher education expansion and reform program of remarkable extent. The expansions, according to Saint (2004), would result in the establishment of new universities, launch system support agencies, mount new courses, and increase enrolments. Recounting the background, Saint (2004) stated that secular

higher education was initiated in 1950 with the founding of the University College of Addis Ababa. During the following two decades, half a dozen specialized technical colleges were established.

Mammo's review (2010) stated that both public and private higher education colleges have grown since 1991. Public universities were expected to be 33 in the year, 2010. Enrolment into higher education sector has also expanded with a policy of 70:30 with 70% catering for science and technology students and 30% for humanities and social sciences.

Minister of Capacity Building of Ethiopia, His Excellency Ato Tefera Walua (2006), has delivered a speech at the 1st International Conference on ICT for Development, Education, and Training in Africa held in May, 2006, in Addis Ababa, Ethiopia. In his speech, he has mentioned that Ethiopia has been actively engaged in using ICT as an enabler for democratic governance, development, and to integrate technology into the education system where the government considers ICT as a tool in its efforts to transform the society.

According to the Higher Education Proclamation, No. 650/2009, (FDRE, 2009), the objectives of higher education are to prepare knowledgeable, skilled, and attitudinally mature graduates in numbers with demand-based proportional balance of fields and disciplines so that the country shall become internationally competitive. Besides this, it

has also an objective of promoting and enhancing research focusing on knowledge and technology transfer consistent with the country's priority needs.

One of the directions of the proclamation (FDRE, 2009) is stated as the focus of research in any institution shall be on promoting the relevance and quality of education and on the country's development issues focusing on transfer of technology. It is also asserted that every institution shall allocate sufficient fund particularly for research focusing on technology transfer and innovation. This is related to what was said earlier (Garrison and Anderson, 2003), that content agents can also be built to supervise and to report on research activities of researching teachers, thus creating new content automatically that both informs and involves students in the research process.

The Ministry of education was expected, according to the proclamation (FDRE, 2009), to encourage government organs, professional associations, business organizations, and other appropriate persons to work jointly on matters concerning education, training, research, practicum or apprenticeship and research and technology transfer.

His Excellency Tefera (2006) further mentioned that information and communication technologies have drastically changed the way individuals, organizations, and enterprises think and do business. The development of e-medicine and e-education in the higher education system is the other important point where he attached due considerations as the development of e-medicine and e-learning infrastructures will make great contribution in order to have skilled manpower.

A year before this conference, Prime Minister Meles Zenawi of Ethiopia noted the importance of ICT while speaking to an ICT conference in Addis Ababa in 2005 by saying:

> *"We were convinced that we should invest every penny we have on securing the next meal for our people. We did not believe serious investment in ICT had anything to do with facing the challenges of poverty that kills. Now I think we know better. We recognize that it is a vital and essential tool for fighting poverty – for beating poverty that kills – and ensuring our survival."* Meles (as cited in Farrell and Isaacs, 2007: 4).

Besides the documents prepared by the government and practical efforts being practiced, the above statements also show how much is the government convinced and dedicated in using the technology in general in the poverty eradication and development process and in education specifically.

Education can be regarded as one of the most important sectors among many sectors in which ICT is used. As it was mentioned by Takeuchi (2008) about ICTs for Development in Ethiopia, ICT's application is significant in the build up of e-government initiatives which include e-Administration, e-Society, e-Services, and e-Citizens. This is further described in the case of Ethiopia, the e-government projects such as the SchoolNet (distance education), HealthNet (telemedicine), AgriNet (agricultural information sharing) are classified as e-Services, which aim to provide better public services, while the WoredaNet (TV conference between the central and local public offices) is

categorized into e-Administration which aims to improve work processes in the public offices.

Both the Millennium Development Goals (MDGs) and Education for All (EFA) underline the importance of education is focal point of development considering it as the (UN 2004) and (UNESCO 2007). As it was somehow mentioned earlier, ICT4D projects in Ethiopia include SchoolNet, WoredaNet, AgriNet, HealthNet, EtherNet, and RevenueNet. Of these, SchoolNet and EtherNet concentrate on education. SchoolNet plans to connect more than 550 high schools in the country with VSAT based broadband for delivery of video-based distance and standardized education. EtherNet is connecting all public higher learning institutions at campus, local institutional, regional and national levels.

According to a study made for University of Manchester by Takeuchi (2008), though the ICT use in Ethiopia is lower level than other countries, it seems that the situation has been improving recently which is somehow depicted by the number of the Internet users that has increased more than twenty times in the last decade. A study made ten years earlier than that by Mulat and Tadesse (2002) showed that Institutions with Internet connection mainly used the technology for e-mail and there was no widespread practice of downloading/uploading information. The use of Internet for education purpose or procurement of material was not reported by the majority of the institutions that have the connection.

2.14 Media and Information Literacy (MIL)

Under the plan named an ICT Curriculum for Schools and Program of Teacher Development, UNESCO (2002), four major areas were touched: ICT Literacy (where ICT skills are taught and learned as a separate subject); application of ICT in Subject Areas (where ICT skills are developed within separate subjects); infusing ICT across the Curriculum (where ICT is integrated or embedded across all subjects of the curriculum); and ICT Specialization (where ICT is taught and learned as an applied subject or to prepare for a profession). ICT literacy is the major concern here and its fundamental specific units include basic concepts of ICT, using computers and managing files, word processing, spreadsheets, databases, creating presentations, finding information and communicating with computers, and doing other basic things (UNESCO, 2002).

Later on UNESCO (2011) has released a model Media and Information Literacy (MIL) Curriculum for Teachers which is an important resource for member countries in their continuing work towards achieving the objectives of UNESCO which are all related to MIL. According to Janis Karklins, Assistant Director-General for Communication and Information at UNESCO (2011), the MIL Curriculum for Teachers is pioneering for the following reasons:

1. It is forward looking, drawing on present trends toward the convergence of radio, television, Internet, newspapers, books, digital archives and libraries into one platform – thereby, for the first time, presenting MIL in a holistic manner, and

2. It is specifically designed with teachers in mind and for integration into the formal teacher education system thus ensuring a catalytic effect.

UNESCO (2011) believes MIL will enable its goal to increase drastically the number of media and information literate teachers worldwide who will in turn train students, thus leading to media and information literate societies. UNESCO's global action to promote media and information literate societies has at its basis the development of knowledge societies and free independent and pluralistic media, and information providers.

To summarize what have been mentioned from the different studies and reviews of literature discussed so far, there are different writers and philosophers who wrote a lot on the different aspects of educational technology, e-learning and e-lessons. Here, educational technology was presented as something concerned with the systematic application of science and technology in order to provide efficiency to the task of teaching and learning. Related with it, e-learning came as an instructional content or learning experience which is delivered or enabled by electronic technologies, whether connected to the internet or not. The content comes in the form of e-lessons.

To properly inculcate them in educations students and teachers must be able to learn about computers and also through computers. E-Learning stakeholders and the interaction between and among them enable the implementation a reality. The Ethiopian context of the application of the above is backed by different packages, programs and proclamation.

Chapter Three

Research Design and Methodology

The main purpose of this study is to assess the implementation of educational technology in Kotebe College of Teachers' Education towards the application of e-learning. Both quantitative and qualitative research methods were used in order to attain the research objectives. which intended to

1. evaluate the status of the current usage of educational technology in KCTE

2. discover the effectiveness of the trainings given to KCTE's instructors in helping them use e-lessons

3. detect gaps that may exist in the application and relevance of the usage of the technology as a result of the availability and status of infrastructures.

4. assess the inclusion of e-learning in the teaching-learning process in helping the students and instructors use e-lessons in their own field and

5. recognize the potentials and opportunities which exist in the usage of educational technology so that stakeholders would be able to use the technology better towards the preparation of e-lessons.

The mixed method research design was used in which the researcher converged qualitative and quantitative data in order to provide a comprehensive analysis of the research problem. The integration of both qualitative and quantitative approach was intended to explicate my investigation with the intention that one does not blemish or lessen the strength of another. but rather complement each other to make stronger interpretation and argument.

Qualitative research approach was used because it has the ability to provide descriptions of how people experience a given research issue providing information about experiences, beliefs, opinions, emotions, and relationships of individuals. With this in mind I have attempted to get an in-depth opinion from participants by doing in-depth interviewing of individuals and further discussions, systematic observation of selected sites and activities, and analysis of documentary data. Quantitative research approach was also used because it is rooted in numbers and statistics with the ability to effectively translate data into easily quantifiable manners.

In general, a case study methodology has emerged as the appropriate tool for the research. Here in this study, a descriptive case study methodology was used to conduct this research. Armfield (2007) noted that a descriptive case study strives to enrich the thinking and discourse of educators either by the development of educational theory or by the refinement of prudence through the systematic and reflective documentation of experience. This descriptive case study is essential as a base for in-depth studies. Henceforth, there will be in-depth interviewing of individuals and small groups, systematic observation of selected sites and activities, and analysis of documentary data.

As this research is a case study type, it is holistic, thick, a more or less comprehensive examination of a phenomenon. A case study, according to, Gerring (2006) utilizes a particular type of evidence employs triangulation. Later in this chapter further description is given on how the findings were triangulated. A case study research, as it was described by Barkley (2006) copes with the technically distinctive situation in which there will be

many more variables of interest than data points. It relies on multiple sources of evidence, with data needing to converge in a triangulating fashion; to guide data collection and analysis. Based on the above principles, I have tried to include the sources mentioned and explored each accordingly.

3.1 Data Sources

This research used both primary and secondary data. Rather than selecting a large number of respondents, the researcher identified a small number that would provide in-depth information about the issue under concern because the researcher believed that the larger the number of people, the less the amount of detail emerging from any one individual. Detailed views of individuals and the specific contexts in which they hold these views can be provided. Sources of data, besides the documents to be analyzed, were five instructors in four departments at KCTE: two from department of Information Communication Technology (ICT), one each from departments of Chemistry, Physics, and Mathematics.

Academic and research vice dean of the college, an educational technology specialist/trainer from AED/FHI, an expert in the MOE responsible for Media and Information Literacy Curriculum, country director of Camara Education Ethiopia (CEE) and also Chief Advisor of CEE and an official at the Ministry of Communication and Information Technology of Ethiopia (MCIT). Altogether ten important and concerned people were interviewed and discussed with.

To triangulate the findings from the above sources, a sum of 150 students and 45 instructors from three of the above departments, Mathematics, Physics, and Chemistry, except department of ICT, participated in filling out the two questionnaires. The number of graduating students in each department is Chemistry: 262, Physics: 188, and Mathematics: 232. Fifty students from two sections of each department, where each section had a number of twenty five students on average, were given a copy of the questionnaire each through their own instructors. The involvement of the instructors was under control to minimize the bias and influence they may exert on the students. These sources enabled the researcher to have primary data through the instruments listed below.

3.2 Instruments of Data Collection

1. Interview: This provided a framework in which respondents can express their own thoughts in their own words. It was done with knowledgeable people on the matter including trained instructors in the colleges, a specialist from AED/FHI, and an expert in the MOE, officials at CEE and another official MCIT.

2. Observation checklist: the availability of appropriate materials and their usage was observed in the college during different occasions, at class time and without the presence of students. The places observed include offices of instructors, classrooms, and computer labs. Attempts were made to observe the availability and the usage of e-lessons.

3. Questionnaires: they were used to gather data which could have been missed out during the use of other instruments. Before the questionnaires were distributed to students and instructors in the college, they were pilot tested and evaluated by different

personalities including using five instructors and twenty students of the college using the interview guidelines and the questionnaires.

3.3 Procedures of Data Collection

The procedures used here to collect data for the study was based on the type of information to be obtained from primary as well as secondary data sources. Interviews were used because they generate data by asking concerned bodies. Purposeful sampling was employed where the researcher purposefully selected participants who had good knowledge and experience of the central phenomenon which was being explored.

A pilot study had been conducted using five instructors and twenty students of the college using the interview guidelines and the questionnaires. During the discussions and after analyzing the questionnaires some modifications were made on the first questionnaires so that the participants would feel at ease while responding to the inquiries.

As it was mentioned earlier, ICT, Chemistry, Physics, and Mathematics departments were chosen because it was from these departments that MOE, with the help of AED/FHI, gave trainings to selected instructors on how to prepare e-lessons. These selected participants were not given the questionnaire which was prepared for other instructors. An official of the college, a specialist/trainer, an expert, officials of CEE and MCIT were also used for the interview.

The data which couldn't have been gathered through the above was collected through the observation of materials and activities in process where field notes were used to keep accounts of what was being observed. Two separate but related questionnaires were distributed to have the quantitative aspect of data and to fulfill information gaps which the research needed to be complete. Out of the totally distributed 45 instructors' questionnaire 34 instructors' copies were collected and analyzed. All of the students' 150 questionnaires were collected by me and/through the help of classroom teachers. 30 of the questionnaires were rejected while 120 of them were organized in a tabular form and analyzed.

3.4 Methods of Data Analysis

The data gathered from the interviews and the observations were analyzed qualitatively. Utmost effort was put into the analysis so that triangulated information can be gained. To have integrity and enhancing the findings interview data were compared with information obtained from other sources. Maximum attempt was exerted to differentiate, synthesize and report the consistency and/or disparity of the interview data with what the researcher observes from other sources related to the persons interviewed. The data collected from the questionnaire were analyzed quantitatively applying appropriate and relevant descriptive statistics for the data at hand.

Chapter Four

Data Presentation, Analysis, and Interpretation

This chapter deals with data presentation, analysis and interpretation. Four different tools were used in order to come up with the data presented afterwards: questionnaires, interviews, and observation checklist. The questionnaires were prepared for 45 instructors and 150 students enrolled across three departments in Kotebe College of Teachers' Education: Physics, Chemistry, and Mathematics. The three departments were chosen purposefully because it was from these three departments and one instructor from the ICT department that trainings were given to selected instructors on how to prepare and use e-lessons. The training was organized by AED/FHI and MOE. Henceforth, those who were interviewed from these departments representing were selected purposefully based on the trainings they have taken on how to use Authoware and Captivate programs. The interviewed instructors were not given the questionnaires to be filled because of their background which differs from the other instructor participants of the study. These instructors were chosen to be interviewed as a result of the better experience or exposure they have had on the preparation and use of e-lessons.

As it was mentioned in chapter three, 34 instructors' and 120 students' questionnaires were collected and analyzed. Besides these, five instructors from the college, vice dean of Academy and Research of the college, one specialist from AED/FHI, one expert from MOE, one expert from MCIT, and one expert from CEE were also interviewed. The expert from MOE was selected because he was an expert on the area of the new Media Information Literacy Curriculum. The expert from MCIT was included because he was

thought to have a lot of information on the country's ICT policy. The officials from CEE were also interviewed because the organization, CEE, works with MOE on the usage of ICT in education. The data gathered from these interviews were also analyzed relating each with the responses of the questionnaires.

Observations were made in the instructors' offices and ICT labs at class time and during other occasions too. The information gathered through the observation checklist (see Appendix 7) at the different moments was also explored and analyzed. The documents to be examined here include the syllabuses that the ICT department uses to implement the ICT courses in the college vis-à-vis the national ICT policy.

4.1 Characteristics of the Respondents

Table 1.A: Instructor participants

	Item	Instructors		Remark
		No.	%	
1	Sex			
	Male	34	100%	
	Female	0	0	one female participant left on maternity leave
2	Age			
	20-29	3	8.8%	
	30-39	15	44.1%	
	40-49	14	41.2%	
	50+	2	5.9%	
3	Qualification			
	Diploma	1	2.9%	
	Bachelors degree	4	11.8%	
	Master's degree	29	85.3%	
4	Professional Rank			
	Technical Assistant	1	2.9%	Assist the instructors in labs
	Lecturer	29	85.3%	
	Graduate Assistant	4	11.8%	Are also lecturers

No. = Number of Participants

In the Table 1A the male female ratio of the participant instructors is highly unbalanced, which is the general feature of the college teaching staff composition and male to female ratio (125:32). Of the expected 45 respondents, only three of them were women and from whom one of them was already on a maternity leave. This on the other hand shows that a lot has to be done to maximize the number of female instructors in the college, especially in the Mathematics, Physics, and Chemistry fields.

In the same table, we can see that the age distribution of the instructors tends to be dominated by younger generation of less than 40 years of age constituting 94% of lecturer or teaching staff participants.

Moreover, table 1A shows that the respondents are mainly holders of Masters of Science constituting 85% of the participants. 97% of the respondents are instructors of whom 12% of them are also serving as graduate assistants.

Table 1.B. Student participants

1	Sex	Department					
		Physics		Chemistry		Mathematics	
		No.	%	No.	%	No.	%
	Male	17	14.2%	20	16.7%	19	15.8%
	Female	20	16.7%	24	20.0%	20	16.7%
	Total	**37**	**30.9%**	**44**	**36.7%**	**39**	**32.5%**
2	**Age**	**No.**		**%**			
	-20	23		19.2%			
	21	40		33.3%			
	22	45		37.5%			
	23+	12		10%			
	Total	**120**		**100%**			

No. = Number of Participants

Unlike the instructor participants, the female to male ratio of the respondents is better with 64:56 ratios. Table 1B shows this difference clearly. This is an encouraging fact to

the participation of more females in the science fields. This percentage of female regular undergraduate students in the college is 59.2% while the male students constitute only 40.8 (see Appendix 10).

4.2 Usage of Educational Technology

Table 2: Usage of educational technology in class

	Educational technology		Always		Usually		Once in while		Rarely		Never		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	projectors	I*	2	5.8	2	5.8	4	11.7	16	47	10	29.4	34	100
		S*	4	3.3	7	5.8	9	7.5	43	35.8	57	47.5	120	100
2	audio materials	I*	-	-	-	-	-	-	1	2.9	33	100	34	100
		S*			2	1.7	3	2.5	52	43.3	63	52.5	120	100
3	video materials	I*	-	-	-	-	1	2.9	-	-	33	97.1	34	100
		S*	1	0.8	3	2.5	3	2.5	46	38.3	67	55.8	120	100
4	television	I*	-	-	-	-	-	-	-	-	34	100	34	100
		S*	1	0.8	1	0.8	1	0.8	4	3.3	113	94.2	120	100
5	computer	I*			3	8.8	4	11.7	12	35.3	15	44.1	34	100
		S*	2	1.7	18	15	20	16.7	38	31.7	42	35	120	100

I* = instructors response S* = Students response No. = Number of Participants

Table 2 is concerned with the level of use of educational technologies by both the instructors and students. Here a list of five technologies was provided and a space was also provided under the Table if there is a need for mentioning another educational technology used by the participant instructors. When it comes to projectors, the majority (76.4%) of them responded that they rarely or never use projectors in class. Most of the responses of the students seemed to go in line with what the instructors have replied which confirmed the results found about the use of educational technologies in the class. The majority of the students (83.3%) said that their teachers rarely or never use projectors

in class. According to both the instructors and students the usage of audio-video materials also remains minimal. Audio-video out put can be interlinked with projectors to give multiple options for teachers.

However, in the interview I had with representatives of each department, there was at least one projector for two instructors provided by the college. There seemed to be the underutilization of what is already available on hand. This resulted in the minimal usage of audio and video materials which can go with or be replaced here by the usage of a computer connected with a projector, assuming the computer has speakers connected to it.

When it comes to the usage of computers in the class, 79.4% of the participant instructors rarely or never use computers in classroom for teaching purpose. This data is substantiated by the response of the students that 66.7% of them believe the usage of computers in class was minimal.

Table 3: Computer usage place outside classroom

	Educational technology		Always		Usually		Once in while		Rarely		Never		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	I*	Home	9	26.5	11	32.4	12	35.3	2	5.8	-		34	100
	S*		8	7.2	18	16.2	14	12.61	33	29.73	38	34.23	111	100
2	I*	Office	11	32.4	10	29.4			9	26.5	4	11.8	34	100
	S*	(not applicable)												
3	I*	Computer lab	-		-		4	11.7	16	47.1	14	41.2	34	100
	S*	of KCTE	10	9	13	11.7	61	54.9	22	19.8	5	4.5	111	100
4	I*	Internet	2	5.9	3	8.8	2	5.9	12	35.3	15	44.1	34	100
	S*	Center/cafe	5	4.5	13	11.7	40	36	39	35.1	14	12.6	111	100

I* = instructors response S* = Students response No. = Number of Participants

Table 3 shows where the instructors and students use computers outside the classroom situation. All the teachers and 92.5% of the students responded to this question while 7.5% of the students responded that they don't use computers at all. The instructor respondents who use computers most of the time at home sums up to 58.9% whereas still a large amount, 61.8%, of the instructors use computers in their offices too.

There can obviously be a number of instructors who, most of the time, use computers every time they are at home or in the office. However, during my observations in the offices of the instructors, there is a differing fact that most of the instructors' tables are empty, without any computers. Of the 8 instructors' offices which I have observed, 4 of them didn't have any computers. In the interview I had with the department representatives, the ratio of computers to teachers is 1:3.

In a college like KCTE, the need of having personal computers is highly urgent and this is confirmed in the interview I had with the college's vice dean of academy and research. He admitted the currently existing shortage of computers, and mentioned his hopes of receiving computers through a donation from CEE. The college has written a letter to the Minister of Education, Ato Demeke requesting for more computers in the college from CEE. The reason was that CEE is in Ethiopia to support primary and secondary schools, not higher institutions.

However, as a result of a supporting letter from the Minister of Education, the college is now promised to get at least 100 computers from CEE. This information was confirmed

during the discussions I had with the interim director of CEE and also the senior advisor of the organization. The two officials of the organization also informed me that the computers have e-lessons on different subjects, where all would be connected to one server with 100 GB database. Besides, each computer will run using Ubuntu software, which wouldn't be attacked by any virus. This is hoped, according to the vice dean, to alleviate problems which come along with the shortage of computers and up-to-date antivirus.

The largest percentage of students amounting 54.9% of them go to the college's lab once in a while, while they rarely or never use computers at home or in internet cafes. This reason can be related with economic reasons which would restrict them or their families to pay for personal computers or for the internet cafes. Besides these the students come from different parts of the country where the existence of computers is also insignificant. The college has a schedule for the students to use computers in the college labs if the labs are free. However, the problem with this is that it is only one hour per week which is allowed for one student. During my observation in the three ICT labs of the college I have counted 20 – 25 computers which were working. There were also 20 computers in the two libraries. All together there are around 105 computers available for the students in the college. The total number of regular and evening students in the college is 2916 and the ratio of the 2916 students to computers is 28:1

4.3 Reasons for using/not using computers

Different factors can be mentioned as a reason for using computers more or less. The balance between the hindering factors versus encouraging ones shows where the college

community is when it comes to the usage of computers. The following tables show this to some extent.

Table 4: Students' reasons for not using computers

	Reasons for not using computers	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I	I don't know how to operate computers	1	*11.1*	-	-	-	-	6	*66.7*	2	*22.2*	9	*100*
Ii	I don't have access to computers	4	*44.4*	4	*44.4*	1	*11.1*	-	-	-	-	9	*100*
iii	I don't have enough time to use computers	5	*55.6*	3	*33.3*	1	*11.1*	-	-	-	-	9	*100*
iv	I don't see the significance of using computers	-	-	-	-	-	-	6	*66.7*	3	*33.3*	9	*100*

As shown in Table 4, the percentages of students which amount to 88.8% and 88.9% respectively said that they don't use computers for reasons related with lack of access to computers and lack of time. However, as it can be seen on table 4, most of them still believe that they have enough knowledge on how to use computers and believe in the significance of using computers.

During my observation in the three computer labs and the library, I have noticed that there were many computers which were not being used by anyone. One of the computer labs was empty every time I went there. Proper time scheduling would have alleviated the problem. This is related with lack of access and proper management of infrastructure. The students must be able to adjust their free time and use the computers in any of the labs or libraries.

Table 5: Purpose of using computers

	Instructors' Purpose	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Organizing my teaching material	11	*32.4*	10	*29.4*	3	*8.8*	4	*11.8*	6	*17.6*	34	*100*
2	Teaching in the classroom	3	*8.8*	1	*2.9*	1	*2.9*	16	*47.1*	13	*38.3*	34	*100*
3	Internet	14	*41.2*	16	*47.1*	4	*11.8*	-	-	-	-	34	*100*
4	Grading of results	5	*14.7*	3	*8.8*	1	*2.9*	12	*35.3*	13	*38.2*	34	*100*
5	Research	4	*11.8*	6	*17.7*	3	*8.8*	9	*26.5*	12	*35.3*	34	*100*
6	Office work	13	38.2	9	*26.5*	1	*2.9*	5	*14.7*	6	*17.7*	34	*100*
	Students' purposes												
1	Doing assignments	-	-	10	*9*	11	*10*	51	*45.9*	39	*35.1*	111	*100*
2	Internet	35	31.6	23	20.7	24	21.6	19	17.1	10	9	111	*100*

No. = Number of Participants

Computers can be used for different purposes by different people. As it is indicated in Table 5, students and instructors of the college use computers for at least one purpose or more. Of the instructor participants, 61.8% of them prepare their teaching materials using computers while only 9% of the students said they do assignments using computers. This figure might have been affected by the use of internet as it can be used to prepare or organize teaching materials and to do assignments for both the instructors (88.3%) and the students (54.3%) respectively. The frequency and purpose of using the internet is described in the next table.

More purposes were mentioned by the instructors in table 5, where the usages of computers to teach in the classroom and to do research are very low, 11.7% and 29.5% respectively; as compared to other purposes like using computers for office work which amounts to 64.7%. If this many teachers can use computers for office work, it can be assumed that the usage of computers for research and classroom teaching was low as a result of not having ample time to spend with personal computers for research purpose, not having one computer for one instructor in the offices, and not having computers in each classroom or laptops, which can be moved around from one class to another class, for teaching purposes.

4.4 Frequency and purpose of using the internet

Depending on the access and speed available, students and instructors use computers and the internet for different purposes and frequencies. Table 6 shows the instructors' and students' frequency and purposes of using the internet is described.

Of all the purposes mentioned by the instructors, using the internet for e-mailing and social network leads by 85.3% followed by using it for research purpose and to communicate with colleagues 67.7%, and 64.7% respectively. The purpose of using the internet for the purpose of researching was low among the students where the percentage goes down to 10.2% as a result of access to computers and good internet connection.

Table 6: Frequency and purpose of using the internet

	Purpose		Always		Usually		Once in while		Rarely		Never		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	E-mailing, social networks (eg. Facebook)	I*	13	50	11	35.3	8	8.8	2	5.9	-	-	34	100
		S*	35	35.7	12	12.2	12	12.2	7	7.1	32	32.7	98	100
2	Research Purpose (downloading e-books and e-journals)	I*	14	41.2	9	26.5	6	17.6	4	11.8	1	2.9	34	100
		S*	3	3.1	7	7.1	23	23.5	36	36.7	29	29.6	98	100
3	Communicate with my students	I*	-	-	4	11.8	5	14.7	4	11.8	21	61.8	34	100
4	Communicate with my teachers	S*	-	-	3	3.3	7	7.6	24	26.1	58	63.0	92	100
5	Communicate with my colleagues	I*	12	35.3	10	29.4	8	23.5	4	11.8	-	-	34	100
6	Communicate with my classmates	S*	12	12.2	7	7.1	12	12.2	32	32.7	35	35.7	98	100

I* = instructors response S* = Students response No. = Number of Participants

When the instructors and students are using the internet for the research purposes, the access and connection level matters a lot. During the interviews I had with the colleges vice dean of academy and research and the colleges ICT department head, I was informed that the management is in the process of upgrading the connectivity level of the college, and as a result some of the computers in the offices are getting the latest services form the new installation. Since the new service is not well networked with all the computers and not officially inaugurated, all the PC's in the college couldn't benefit from it. Some of the teachers are benefiting from the new service, which can easily help them download e-books or e-journals for the research purposes.

In the interview I had with the instructor from the chemistry department, I was informed that he has downloaded e-lessons which were about the different laboratory activities which were supposed but could not be done in KCTE as a result of lack of chemicals or

lab instruments. He has also told me that he had shown the lessons to different groups of students he had, and even shared it among his colleagues. He added that using sources on the internet, he has tried to prepare e-lessons on few chemistry lessons, for example on the electrolysis of water, but found it very tiresome, time taking and discouraging. He said that had he been provided with the e-lessons, rather than him preparing each, he would have saved more time and energy.

4.5 Access and status of computers, accessories, and related infrastructure

The access and status of computers, accessories, and related infrastructure highly affects the implementation of e-learning in an institution. With this in mind, the following data can help us see where KCTE is.

Table 7: Instructors and Students' rating of the access and status of computers, accessories, and related infrastructure

	Description		Excellent		Very Good		Don't know		Fair		Poor		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Speed of computers	I*	-	-	8	23.5	2	5.9	13	38.2	11	32.4	34	100
		S*	4	3.3	9	7.5	32	26.7	39	32.5	36	30	120	100
2	Memory capacity	I*	-	-	9	26.5	1	2.9	14	41.1	10	29.4	34	100
		S*	5	4.2	10	8.3	32	26.7	38	31.7	35	29.2	120	100
3	Compatibility in accepting recent soft wares	I*	-	-	9	26.5	1	2.9	14	41.1	10	29.4	34	100
		S*	-	-	4	3.5	62	54.9	27	23.9	20	17.7	113	100
4	Comfort of chairs and tables	I*	14	41.2	11	32.4	5	14.7	4	11.8	-	-	34	100
		S*	8	6.7	16	13.3	48	40	28	23.3	20	16.7	120	100
5	Internet connection	I*	9	26.5	3	8.8	2	5.9	13	38.2	7	20.6	34	100
		S*	18	15	16	13.3	26	21.7	40	33.3	20	16.7	120	100
6	Electric power supply	I*	3	8.8	5	14.7	3	8.8	9	26.5	14	41.2	34	100
		S*	17	14.2	16	13.3	19	15.8	48	40	20	16.7	12	100
7	Access to printers	I*	-	-	1	2.9	4	11.8	15	44.1	14	41.2	34	100
		S*	1	0.8	3	2.5	8	6.7	27	22.5	71	67.5	120	100
8	Access to scanners	I*	1	2.9	2	5.9	8	23.5	11	32.5	12	35.3	34	100
		S*	-	-	-	-	3	2.5	19	15.8	98	81.7	100	100

I* = instructors response S* = Students response No. = Number of Participants

The comfort of the chairs and the tables was also one of the issues that the students and instructors were asked to rate where 73.6% of the instructors found the chairs and tables comfortable whereas the same comment is given by only 20% of the students. During my observation, I have noticed that the chairs and tables in the labs were not as such bad, but the problem of discomfort is caused when the students are using the computers; as they are using one computer for two, in most cases. The comfort of chairs and tables from the offices of the instructors, as I have observed it, is much better than what the students are using. The attention that was given by the school administration to the students' needs must be the same as the attention that the students get on every aspect of upgrading the status of the ICT infrastructure.

The status of electric power supply is seasonal in most parts of Ethiopia, getting better and worse as a result of different factors. The situation in the college under study is no different from other parts of the country which was shown by 67.7% of the instructors and 56.7% of the students who rated the electric power supply fair or less than that. The unsustainable power supply has a lot of negative sides, especially on the use of computers. The accidental power interruption causes computer users to lose any unsaved data, disruption of CD being burnt, stoppage of downloading or installation activities, and it even goes to the extent of damaging of the computer itself. This highly affects the usage of ICT for learning and research purposes, among other factors.

As it can be seen in the last two rows of Table 7, the access to printers and scanners is very poor for both the instructors and students. Access to printers was rated as it is almost inaccessible by 85.3% of the instructors and 90% of the students. This case gets worse

when it comes to the scanners, 67.8% of the instructors 97.5% of the students found it inaccessible. During my personal observation in the teachers' offices and ICT labs, I have seen only one scanner in the ICT department head's office. During an interview with the department head, he mentioned that some colleagues, even from other departments come to his office to get their documents scanned.

Some of the input and output devices are scanners and printers. Scanners can be used to scan and save, magnify, or modify images, charts, tables, and so on. These scanned objects can be saved on PC's in the labs or can be displayed using projectors showing easily whatever is there on the object as part of the class discussion. Scanned objects can also be converted to editable versions including MS Word allowing the users to make modifications on whatever they have scanned. Printers are also one of the major accessories which go together with the usage of computers. Teachers may have the economic capacity to buy and/or share printers if the college doesn't provide enough, but this can't be the case when it comes to the students. Though free access to printers can give way to a misuse of the technology, there can be ways where users can have an easier or better access to printers and scanners.

4.6 Provisions of trainings

In our earlier discussions, we have seen that all of the instructors were computer literate, with different levels and purposes of using computers. Responding to the questions about the trainings that they might have had in using basic applications and programs, 100% and 76.5% of them replied that they received trainings on how to use MS Office Applications: MS Word and PowerPoint respectively. These two programs are beneficial

in preparing notes and in making presentations. 79.4% of the instructors did not get any SPSS training, a program which is very helpful in doing research by analyzing quantitative data. Having the training is really beneficial as the instructors are in place where they are supposed to do research for different purposes and also set an example to their students too.

Table 8: Trainings given to the instructors and students

	Programs		Yes		No		Total	
			Yes	%	No.	%	No.	%
1	MS Office Word	I*	34	100	-	-	34	100
		S*	103	85.8	17	14.2	120	100
2	MS Office PowerPoint	I*	26	76.5	8	23.5	34	100
		S*	25	24.3	78	75.7	103	100
3	Internet browsing and E-mail	I*	34	100	-		34	100
		S*	102	85	18	15	120	100
4	SPSS	I*	7	20.6	27	79.4	34	100
		S*	-	-	-	-	-	-
5	Authoware (used to prepare E-lessons)	I*	2	5.9	32	94.1	34	100
		S*	-	-	-	-	-	-
6	Adobe captivate (used to prepare E-lessons)	I*	1	2.9	33	97.1	34	100
		S*	-	-	-	-	-	-

I* = instructors response S* = Students response No. = Number of Participants

The students take many common courses and one of them is introduction to Information and Communication Technology. In this course's syllabus (see appendix 8), it is mentioned that the students would learn about basics of a computer system, programming languages, networking and the internet in theory. Practical lessons would also be given on MS Windows applications. However, according to the responses of the students, though 85.8% of them have taken MS Word, it is the first sub topic of the practical part of the common course entitled Introduction to ICT. If a proper time allocation and usage

of enough time for the course is given, basic parts of the lesson would be covered. This was also mentioned by one of the ICT instructors during the interview that there is some inconsistency of coverage of course among different groups as a result of shortage of time.

Authoware and Captivate are also other softwares used to make e-lessons incorporating text, high resolution graphics, audio, video, and animations. The four instructors who were interviewed representing the mathematics, physics, chemistry, and ICT departments were selected purposefully based on the trainings they have taken on how to use Authoware and Captivate programs. One of the interviewee form the ICT department is an ICT professional but did not take the e-learning trainings which were organized by AED/FHI and MOE but had a good knowledge about it. These did not fill in any questionnaire because of their good background which differs from the other instructors. As it was properly explained in the earlier chapters, these instructors were chosen to be interviewed as a result of the better experience they had on the preparation and use of e-lessons.

From the information gathered from these interviews, it was understood that at the beginning of the trainings, most of the trainees didn't have access to computers at their offices on which they needed to practice on what they had been trained about. Later on they were provided with PC's which were not fast and compatible enough to make the practice and to produce the e-lessons they were asked to. One of the instructors, despite all these problems produced and submitted a chemistry e-lesson which was later on copied and distributed to other CTE's. Another instructor also had the same experience

and added that when the training was given at that time, each trainee was supposed to come up with or prepare an e-lesson of his/her own, for which they would get paid 2,000 birr per lesson prepared. He shared the previously mentioned problems and added that the time it took to prepare one lesson was very long and tiresome which couldn't be compared with the remuneration stated earlier. Here it can be seen that as training is the initial and important part of a new activity or endeavor, applying what's being learnt is also an issue to put in mind.

Table 9: Places where trainings were given to the instructors and students

	Programs		At KCTE		In another college/ university		At a private computer training centre		Through MOE		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%
1	MS Office Word	I*	-	-	28	82.4	6	17.6	-	-	34	100
		S*	103	100	-	-	-	-	-	-	103	100
2	MS Office PowerPoint	I*	-	-	10	38.5	12	46.1	4	15.4	26	100
		S*	25	100	-	-	-	-	-	-	25	100
3	Internet browsing	I*	-	-	19	55.9	15	44.1	-	-	34	100
		S*	98	96.1	-	-	4	3.9	-	-	102	100
4	SPSS	I*	-	-	5	71.4	2	28.6	-	-	7	100
		S*	-	-	-	-	-	-	-	-	-	-
5	Authoware	I*	2	100	-	-	-	-	-	-	2	100
		S*	-	-	-	-	-	-	-	-	-	-
6	Adobe captivate	I*	-	-	1	100	-	-	-	-	1	100
		S*	-	-	-	-	-	-	-	-	-	-

I* = instructors response S* = Students response No. = Number of Participants

In Table 9, it is possible to see where the participants have taken trainings on different programs. It is also possible to create a link between Table 8 and table 9. Except two of the instructors, the rest have never taken any training at the college. It is encouraging that almost all of the instructors have had trainings on both MS Office Word and MS Office PowerPoint programs, but not at the college. To the contrary, it is only 20% of the instructors who have had training on SPSS somewhere else. The college needs not only instructors but also researchers who are able to use SPSS to deal with quantitative data.

competency level of the students in the different classes or departments. Some students, for example might have covered the Ms Office programs mentioned on the syllabus including PowerPoint application, going even to the extent of making presentations using the program. One group of students made it this far. Some others might have lagged way back not even covering half of the syllabus.

This in turn has made the responses to differ a bit. The programming courses which are given to mathematics and physics students were intentionally left out of the questionnaire because chemistry majoring students don't take it and it would give the data a misleading result. Besides these programming courses are given by ICT instructors, not by physics or mathematics instructors as the courses are not teaching the subject matters through the use of computers, which is the main intention of this research.

4.7 Benefits of the usage of computers

Computers have made a lot of change in human beings life since their invention and throughout their development. A lot of advantage can be gained through the use of them in education. Most of the advantages were mentioned in earlier chapters. Here the perception of the instructors and students about the advantages is presented.

As it can be seen from in Table 10, 76.5% of the instructors strongly agreed that the usage of e-learning would raise the students' interest to learn and 73.5% of them strongly believed that it would give them another option to teach the subject matter. From the instructors 67.7% of them agreed on the idea that computer simulations can help them explain some lessons better whereas 74.2% accepted the idea that they can save and use more time in class if they use e-lessons.

Table 10: Benefits of the usage of computer programs in learning other subjects

	Benefits		Strongly Agree		Agree		Don't know		Disagree		Strongly Disagree		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	The usage of e-learning would raise the students interest to learn	Instructors	26	76.5	6	17.6	2	5.9	-	-	-	-	34	100
2	It would give me another option to teach the subject matter	Instructors	25	73.5	5	14.7	4	11.8	-	-	-	-	34	100
3	Computer simulations can help me explain some lessons better	Instructors	16	47.1	7	20.6	9	26.5	2	5.9	-	-	34	100
4	I can save and use more time in class if I use e-lessons	Instructors	18	58.1	5	16.1	8	25.8	-	-	-	-	31	100
5	It would make the subjects more interesting	Students	16	16.7	43	44.8	20	20.8	17	17.7	-	-	96	100
6	It would make the subjects easy to understand	Students	36	34	34	32.1	22	20.8	14	13.2	-	-	106	100
7	It would give me another option to learn about the subject matter	Students	32	33.7	31	32.6	20	21.1	10	10.5	2	2.1	95	100
8	It would help me understand complicated topics easily through simulations	Students	39	44.8	30	34.5	11	12.6	3	3.4	4	4.6	87	100

No. = Number of Participants

One of the chemistry teachers who was interviewed on this topic had a training on the preparation of e-lessons and practical experience of applying e-learning in class. According to him, the benefits of using simulations, downloaded practical experiments

and their explanations, and the usage of them in class have a lot of benefits. Instead of just explaining, for example, about magnetic fields or electrolysis of water for the whole period or more using still images, a ten minutes animation aided explanation would give the benefits mentioned earlier. This can also alleviate the problems related with the lack of laboratory materials. The information I got from him was also confirmed during my other interviews with the physics and ICT instructors.

Though the belief that the students have on the benefits is not as strong as the instructors, on the average 68.3% of them believe in the benefits of using ICT in class to learn other subjects. Had they had more exposure from the instructors on the usage of computers or related materials to teach some of the lessons, they would have understood the benefits of it.

During my discussion with an expert in the MOE, I was informed that in the new post graduate diploma to be given at the end of pre-service training of the teachers' training graduates, there would be one course named Media Information Literacy (MIL), which would replace the old Instructional Media course. As a result student participants of the study would at least be thought how to use ICT, not in learning, but in teaching their field of study.

4.8 Problems on the usage of ICT as an Educational Technology

Though the benefit of ICT usage as an educational technology is agreed by all, there are some hindrances that come on the way of the application. Some of them were observed in KCTE and presented here.

Table 11: Problems on the usage of ICT as an Educational Technology and the need for urgency of having the solutions to each problem

	Problems Description		Highly urgent		Urgent		I don't know		Not urgent		Total	
			No.	%	No.	%	No.	%	No.	%	No.	%
1	College's lack of attention towards ICT	I*	7	20.6	14	41.2	12	35.3	1	2.9	32	100
		S*	21	20.8	13	12.9	54	53.5	13	12.9	101	100
2	Inconsistent technology usage (e.g. breakdown of computers)	I*	24	70.6	7	20.6	-	-	3	8.8	34	100
		S*	36	32.4	49	44.1	20	18	6	5.4	111	100
3	Computer virus	I*	23	67.6	8	23.5	-	-	3	8.8	34	100
		S*	53	47.7	18	16.2	35	31.5	5	4.5	120	100
4	Poor internet connection	I*	19	55.9	6	17.6	3	8.8	6	17.6	34	100
		S*	65	62.5	20	19.2	15	14.4	4	3.8	96	100
5	Poor electric power supply	I*	21	61.8	9	26.5	-	-	4	11.8	34	100
		S*	38	36.9	41	39.8	15	14.6	9	8.7	103	100
6	Lack of access to printers	I*	21	61.8	11	32.4	-	-	2	5.9	34	100
		S*	57	56.4	32	31.7	12	11.9	-	-	120	100
7	Lack of access to scanners	I*	23	67.6	8	23.5	-	-	3	8.8	34	100
		S*	65	59.1	34	30.9	6	5.5	5	4.5	110	100

I* = instructors response S* = Students response No. = Number of Participants

Table 11 consists of a list of problems which were listed down for the instructors and students to rate them according to their urgency. According to the instructors the most highly urgent problem selected by more than 70.6% of them is the bad status or inconsistency of technology like the breakdown of computers. whereas 62.5% of the students selected poor internet connection as a problem which needs a highly urgent solution. The internet connection is better in few offices of the college. according to my observation, whereas the other offices and the labs are still struggling with the usual poor internet connection. As it was mentioned earlier, the college is trying its best to upgrade

the connectivity level of the college; however, putting what has been started into practice seems to have taken a longer time than expected.

As it can be seen in the table lack of accessories like printers and scanners are also highly urgent problem selected by 61.8% and 67.6% respectively. The same feeling is shared among the students who rated the lack of the two accessories with a percentage of 56.4 and 59.1. It must be known that these accessories are not luxury items, but they are part and parts of the whole attempt of using ICT infrastructure in the college.

During my discussion with the head of the ICT department, I was informed that there were some e-lessons which were installed on some of the computers in the computer labs, but due to computer viruses which attacked the PCs, all the computers had to be formatted, and this shows how much safety first rules are supposed to be respected before taking any curative, not preventive, measures as a second or last option. The proper availability and adjustment of protective systems and accessories is inevitable as they are some of the ICT components which have a big role in what the computers take in as input and take out as output.

Chapter Five

Summary, Conclusion, and Recommendation

This research has tried to assess the implementation of educational technology in Kotebe College of Teachers' Education towards the application of e-learning, through the following themes: the current usage of educational technology in the college under study, KCTE; effectiveness of the courses given at KCTE's in helping the instructors use e-lessons in the subject matters they are teaching; the extent of KCTE's educational technology infrastructure being a factor to integrating e-learning; the extent of the teaching-learning process inculcating e-learning in helping the students and instructors use e-lessons in their field; and what the stakeholders including students, instructors, educational institutions, content and technology providers can do for the better usage of the technology in the implementation of e-learning

In trying to do so different concerned bodies and officials were contacted and dealt with through interviews and questionnaires, which touched issues including the usage of educational technology in class, the status of the usage of computers, the condition of places where computers were used in the college, instructors' and students' reasons for not using computers, instructors' and students' purpose of using computers, frequency and reason of using the internet, instructors' and students' rating of the access and status of computers, accessories, and related infrastructure, trainings given to the instructors and students, places where trainings were given to the instructors and students, benefits of the usage of computer programs in learning other subjects, problems on the usage of ICT as an Educational Technology and the need for urgency of having the solutions to each

problem, and at last observed constrains and possible solutions. The following parts of this chapter which include summary, conclusion, and recommendation are derived from the analysis of data.

5.1 Summary of the Findings

- In KCTE the utilization of Educational Technology is minimal and limited to the irregular use of projectors in some ICT lessons. The other subjects/lessons under study, physics, chemistry, and mathematics, seem to inculcate almost none of the educational technologies, though there are some projectors in each department. Creating a variety of support systems, trainings, materials, and reaching these to the users, primarily instructors and students, is found to be given less attention by the college.
- The under utilization of computers and the Internet was reflected in the college under study, KCTE, as a result of lack of access to computers and accessories. Internet access is available in the campus with irregular distribution where some PC's are connected to a good connection and some others don't have any access at all.
- Though computers alone by themselves can't boost academic performance, they can have a positive effect on student achievement in all major subject areas, by creating interest and making concepts easy to understand. Both the instructors and the students at KCTE believe that the benefits mentioned here can be gained if there is a proper and enough access provided to them.

- At KCTE ICT literacy somehow exists among both the instructors and students at different levels. The literacy level depended on the kinds of trainings and courses given by the college, where each was found to be minimal. Few instructors even went far to extent of being trained on how to prepare or use e-lessons of their own.
- As a result of special trainings on preparation and use of e-lessons, few instructors have attempted to prepare and use e-lessons in the college, despite the fact that most of the PC's are slow, incompatible with modern soft wares, and inaccessible.
- The trainings were limited to few encounters and few people instead of addressing more staff members and students in repeated occasions. The capacity of these few trained people to train their colleagues or share their knowledge to others was hindered due to shortage of time, lack of access to computers, accessories, and internet. Assessments were not made on the outcomes of the trainings given before to find out why the trainings were not fruitful.
- In order to fill the gap that exists in having enough computer literacy and applying it in the teaching learning, MOE together with UNESCO is devising a course or training on the Media Information Literacy Curriculum to be provided as part of the post graduate diploma to be given to graduates of colleges of teachers' education, including KCTE's graduates, replacing the old Instructional Technology course. This, though it is a bit late, is planned to upgrade the competency level of not only ICT but all graduating teachers from colleges of teachers' education.

- Besides literacy, economic factors are often the basic ones or even more serious than other factors which affect the use of computers in education. At KCTE, Computer Assisted Learning was found to be one of the biggest problems which hindered the implementation of e-learning in the teaching-learning process. Purchasing enough computers and accessories to satisfy the needs of instructors and students was impossible because the college doesn't have any budget assigned to fill this gap.
- There were some attempts made by the college to attract and interact with technology/content providers like CEE. This contact earned the college the promise of getting up to 200 computers, where some of them are being donated while this research is on the process.
- Related with interactive tutorials and simulations, some attempts were made in having the instructors trained and also getting computers with e-lessons on them. This attempt was at its early stage, not yet having a clear vision of what had been achieved and what was planned to be achieved. Due to virus and formatting problems, some e-lessons were lost for good.

5.2 Conclusion

Though the Ethiopian government at a country level in every aspect and specifically related with education has emphasized the importance of ICT in eradicating poverty for some years now, there seems to be a lot to be done in applying what was being said and written. The case of higher institutions is also affected by the general situation in the country. One of the characteristics of this situation is

From my findings of this research, it can be concluded that:

- Both the instructors and students want to use educational technologies more but don't do it as much as they want to. So it can be concluded that there is a mismatch between interest level of instructors and students to apply the technology on one side and the provision provided by officials and responsible bodies at different levels on the other side. It is so discouraging that, though there is enough to be used by instructors, the proper usage of this infrastructure is not given a lot of concern or the infrastructure is underutilized.
- Using computers in the teaching-learning process of subjects, different from ICT period itself, seem to be minimal. The awareness of the instructors to inculcate the technology in teaching the subject matters seen under this study, like physics, chemistry, and mathematics, is found to be low.
- Though there are three computer labs in the college, the amount of time given to each student to practice his/her personal skills and to make innovations is gloomy. This situation is hindering the practice of e-learning.
- Even during the limited time allotted, the students can't use the computers to the maximum as a result of the poor status and speed of the computers and internet connection. This was also found to be a hampering factor for both the instructors and the students to apply e-learning.
- Lack of access to input and output devices like scanners and printers had created its own negative impact in discouraging the use and productivity of the instructors and the students using the limited access they have on the computers.

- The other conclusion which can be made here is that the inconsistent supply of electric power has had another negative effect on the utilization of the available educational technologies. In general, the availability and status of most of the infrastructure did not exist in a uniform manner, where few have a better situation than the majority of the college community.
- The safety of the available computers is very low because it is affected by the power interruption and lack of maintenance. There is an encouraging activity that the lack of constant protection to some of the computers, has improved lately as most became well protected lately. The infection of even one of the computers affects the safety of the others negatively creating another discouraging situation in the teaching learning process.
- The role of MOE was found to be encouraging in supporting this kind of interaction platforms to solve problems. However, there seems to be a big gap still existing between and among higher institutions themselves in sharing knowledge and good practices.

5.2 Recommendation

The use of educational technologies in general and e-learning or ICT in education in particular have been extremely valuable as an aid to or part of an instructional process. The new methods of ICTs are supposed to go together with and change, though not replace, the traditional chalk and talk teacher dominated ways of education. The interaction between all stakeholders benefits each; especially the students and inurn the

institution they are in and also the country they live in. With this in mind and based on the findings and the conclusions made, it can be recommended that

- The variety and access of the educational technologies in KCTE should be upgraded. This must include upgrading the quality of the devices through proper and continuous scrutiny. The number and quality of the computers found in the computer labs of the college should be increased. The communications and efforts which are started with non-governmental organizations like CEE should be kept strong to benefit from their assistance.
- The safety of the devices must go hand in hand with the uniform availability of electric power. Automatic generators or power supply devices can minimize the problems which can be caused by the disruption of power which may exist at any time of the day.
- Preventive messages posted on the walls of the computer labs are a good start but preventive measures should put into mind the usage of updated antivirus which is also related with the usage of computers. Using 'shadow mode' in all the networked computers is an option to minimize the attack by computer viruses, where every time a computer is started or restarted, it automatically cleans itself from any computer virus. The usage of Ubuntu versions should be emphasized here as it prevents any virus or counterfeited software from attacking the computers.
- Good internet connection should be linked to all the computers as soon as possible. There are some computers which are networked with the new faster internet connection in the college. Though this is already something that takes a

lot of effort, making the other computers networked should not be a problem once there is a good connection in the college.

- Using educational technology and applying e-learning are not aimed at replacing the instructors, because the instructors are the modulators of the interaction between and among the technology, the content, and the students. If this is the case, upgrading the ICT literacy level of the instructors is mandatory. Trainings which were given before should be assessed and lessons must be taken from them. Further trainings should be sought for further endeavors of the college community.
- Despite the challenging fact of having PC's which are slow and incompatible with modern soft wares, and inaccessibility of good internet connection, the effort of the few instructors to prepare and use e-lessons in the college, must be encouraged and must continue. They should also be given more time freedom and/or less class load to enable them have more time to prepare the e-lessons which are customized to their students' and colleagues' needs. Available technologies should be made familiar with the instructors to minimize the knowledge and awareness gap which may be created between them and their students.
- The Media Information Literacy Curriculum should be put into practice as soon as possible for those who are participating in the pre-service training which is given to college graduates before becoming teachers. Since the curriculum is an initiative of MOE and supported by UNESCO, the bodies must work together further to insure its inclusion in the training program of the teachers.

- In creating and strengthening interaction, the college must find ways of attracting more stakeholders and other colleges, who have something to give and something to take. Experiences, trained personalities, and plans and programs can be shared, utilized, commented on and improved in the process.
- There is a lot to learn from and the experience of other countries on the use of ICT in education. Though it is difficult to send every instructor, student, or officials to other developed countries for trainings, it is possible to see what is being and can be applied in even Ethiopia and see if there is something to learn from each. This can be a mere hope at the moment for many educational institutions of Ethiopia but it is a reality that can be achieved anytime soon if there is no limitation to be imposed on the inevitable: the ICT dominated world.

Reference

Arabasz, P. and Baker, B. (2003). Who is Responsible For E-learning Success in Higher Education. Rretrieved on February 10, 2012 http://www.ifets/journals/11_3/3pdf

Addis Ababa University (2004). College of Education Newsletter, Addis Ababa, AAU

Adobe Systems Incorporated (2007). Retrieved on January 1, 2012 from http://www.adobesystemsincorporated.com

Amare Asgedom (1996). *Rethinking Education in Ethiopia*. The Ethiopian Journal of Education, vol XIV, number 2

Amera Seifu (2008). *Teachers' Difference on the Utilization of Instructional Materials as the Function of their Years of Teaching Experiences*. The Ethiopian Journal of Education, vol XXVIII, number 2

Anderson, J. and Weert T. (2002). Information and Communication Technology in Education Division of Higher Education, Paris, UNESCO

Armfield, S.W.J, (2007). A Descriptive Case Study Of Teaching And Learning In An Innovative Middle School Program, Northern Arizona University. Flagstaf. Retrieved on January 11, 2012 from *http://*www.ci-doc.coe.nau.edu

Blaikie, N. (2003). Analyzing Quantitative Data: From Description to Explanation, London, SAGE Publications Ltd

Barkley, D. L. (2006). The Value of Case Study on Rural Entrepreneurship. Retrieved on January 23, 2012 from *http://*cherokee.agecon.clemson.edu/re_e-pub.htm

Brewer, J.D. and Miller R.L. (2003). The A-Z of Social Research, New Delhi, SAGE Publications,

Cayirci, E. and Marincic, D. (2009). Computer Assisted Exercise and Training. New Jersey

Damtew Wolde (2005). *An Overview of the Information and Communication Technology for Education in Ethiopia,* IER Flambeau, Vol. 13. No. 1

Damtew Tefera. (2008). African Higher Education. Projecting the Future. Boston

Dobrzañski, L.A. and Brom F. (2008). Journal of Achievements in Materials and Manufacturing Engineering, Volume 30, Issue 2, October 2008 Gliwice, Silesian: University of Technology

EICTDA (2006). The broad ICT sector policy of the Ethiopian government that derives from PASDEP, as developed in 2006 by the Ethiopian ICT Development Agency (EICTDA).

Elijah, U. E. (2010). Proceedings of the 1st International Technology, ASSR. Retrieved on December 11, 2011 from http://derekstockley.com.au/e-learning-definition.

European Union (2011). Key Data on Learning and Innovation through ICT at School in Europe. Retrieved on December 1, 2011 from http://*ec.europa.eu/education/pdf/doc254_en.pdf*

Farrell, G. and Isaacs, S. (2007). *Survey of ICT and Education in Africa: A Summary Report, Based on 53 Country Surveys*. Washington, DC: *info*Dev / World Bank.

FDRE (2009). Higher Education Proclamation, Federal Negarit Gazeta, Addis Ababa, Birhanina Selam Printing Press

Fisseler B. and, Bühler C. (2007). Accessible E-Learning and Educational Technology, Villach, University of Dortmund

Firdissa Jebessa (2005). *Active Learning versus the Traditional Methods of Teaching at Higher Education Institutions.* The Ethiopian Journal of Education, vol XXV, no. 1

Garrison, D.R. and Anderson, T. (2003). E-Learning in the 21st Century, New York: RoutlidgeFalmer

Gerring, J. (2006). Case Study Research: Principles and Practices, Cambridge, Cambridge University Press

Glen, F. and Isaacs, S. (2007). Survey of ICT in Education in Africa. Retrieved on November 21, 2011 from http://www.infodev.org/en/Document.354.pdf

Greenagel, F.L. (2002). *The illusion of e-learning: why we're missing out on the promise of technology*. Retrieved on August 11, 2011 from http://www.guidedlearning.com/illusions.pdf.

Hutchinson, S.E. and Sawyer, S.C. (2000). Computers, Communications, and Information, Boston: Irwin McGraw-Hill

Jack, Z., & Curt, U. (2001). Why blended will win. *Training and Development.* Retrieved on November 11, 2011 from http://www.findarticles.com/p/articles/mi

Jones, A.J. (2003). ICT and Future Teachers: Are we preparing for e-Learning? *Paper presented at the IFIP Working Groups 3.1 and 3.3 Conference: ICT and the Teacher of the Future*, January 27-31, 2003, Melbourne, Australia. Retrieved on August 18, 2011 from http://www.ictteachers.com/illusions.pdf.

Knirk, F.G. and Gustafson, K.L. (1986). Instructional Technology: A Systematic Approach to Education, New York: CBS College Publishing

Little, S. and Williams, C. (2003). ICT Complete Revision and Practice, London: Coordination Group Publications

Luidia Incorporated, (2012). eBeam systems, Luidia Inc. Retrieved on April 21, 2012 from http://www.e-beam.com

Mammo Muchie (2010). Ethiopian e-Journal for Research and Innovation Foresight (Vol. 2, No 2) Quality of Higher Education in Public Institutions Book Review, 2009, Addis Ababa: Forum for Social Studies

Mangal, S. K. and Mangal, U. (2010). Essentilas of Educational Technology, New Delhi: PHI Learning Plc

MCIT (2010). E-Government Strategy and Implementation Plan, 2010, PricewaterhouseCoopers

Miressa Neme (2007). Administrative and Staff Readiness for Potential Use of ICT in Education, the Case of College of Education, AAU, School of Graduate Studies, Unpublished

MOE (1998). Education Sector Development Program I (ESDPI), MOE, Addis Ababa

MOE (2002). Education Sector Development Program II (ESDPII), MOE, Addis Ababa

MOE (2005). Education Sector Development Program III (ESDPIII), MOE, Addis Ababa

MOE (2010). Education Sector Development Program IV (ESDPIV), MOE, Addis Ababa

Mulat Demeke and Tadesse Biru (2002). ICT Penetration and Usage in Ethiopia: Baseline Study by Department of Economics, Faculty Of Business And Economics, Addis Ababa University

New Media Consortium (2007). *2007 Horizon Report. R*etrieved on July 1, 2011 from http://www.nmc.org/pdf/2007_Horizon_Report.pdf.

Nordkvelle, Y. (2004). Technology and Didactics, Journal of Curriculum Studies, New York: Tylor Francis Group

OECD (2005). E-learning in Tertiary Education, Berlin. Retrieved on December 8, 2011 from *www.oecd.org/publications/Policybriefs*

O'Neill, K., Singh G., and O'Donoghue J. (2004). Implementing e-learning Programs for Higher Education, Journal of Information Technology Education Volume 3 Wolverhampton

Ong, C.S., Lai, J.Y., & Wang, Y.S. (2004). Who is Responsible For E-learning Success in Higher Education? Retrieved on February 10, 2012 from http://www.ifets/journals/11_3/3pdf

Rahel Bekele (2010). Learning Styles of Information Systems Students: Input for Content Development in Adaptive e-Learning Systems. The Ethiopian Journal of Education, vol XXX, number 1

Rajakumar, P., Kumar, S., Uppa S. and Banerjee, B. (2006). National Focus Group on Educational Technology, National Council of Educational Research and Training, Delhi. Retrieved on November 11, 2011 from http://www.ncert.nic.in/special/ed/final

Richard, W., Frank S. Holleman III, Linda G. Roberts, (2000). e-Learning, U.S. Department of Education, Washington, DC. Retrieved on August 11, 2011 from http://www.puw.pl//3/e_learning

Reyden, V. D. (1996). Identifying the Real Thing. New York City. School for Scanning. Retrieved on October 2011 from *www.si.edu/mci/.../identifying_the_real_thing.pdf*

Romiszowski, A.J. (1988). The Selection and Use of Instructional Media, New York: Nicolas Publishing

Romiszowski, A. J. (2004). How's the E-learning Baby? Factors Leading to Success or Failure of an Educational Technology Innovation *Educational Technology*, January-Volume 44, Number 1

Saint,W. (2004). Higher Education in Ethiopia: The Vision and Its Challenges. Boston College & Council for the Development of Social Science Research in Africa

Takeuchi, T. (2008). ICTs for Development in Ethiopia, A Case of the SchoolNet Project, A dissertation submitted to the University of Manchester for the degree of MSc in the Faculty of Humanities. Retrieved on August 21, 2011 from http://*www.edu-ict4d.com/ICTs_for_Development*

Teo, C.B., & Gay, R.K.L. (2006). A Knowledge-Driven Model to Personalize e-Learning. *ACM Journal of Educational Resources in Computing, 6* (1), 1-15. Retrieved on August 18, 2011 from http://www.acmjournal.com/pdf.

Tefera Walua (2006). 1st International Conference on ICT for Development, Ethiopian Ministry for Capacity Building

Teshome Yizengaw. (2007). The Ethiopian Higher Education: Creating a Space for Reform, St. Mary UC Printing Press

Thomas, R. M., & Kobayashi, V. (1987). *Educational Technology* (Vol.4). Oxford, UK: Pergamon.

Thomas, E. Ogden, and Israel, A. (2002). A Guide to Success. Academic Press, London. Retrieved on August 11, 2011 from http://www.ebook3000.com

Tinio, V. L. (2002). ICT in Education. United Nations Development Program New York, NY 10017. Retrieved on August 11, 2011 from http://www.eprimers.org

Towndrow, P. A. (2005). Teachers as Digital Task Designers, Journal of Curriculum Studies, Vol. 37, No. 5, Taylor and Francis, Philadelphia

Tsegaye Kassa and Baylie Damtie (2007). *The Impact of Computer Simulated Direct Current Circuit Physics Lessons on Achievement, Group Interaction and Attitude of Students:* The Ethiopian Journal of Higher Education Vol. 4 No. 1

Twining, P (2002). ICT in Schools Estimating the level of investment, MED8. Retrieved on November 11, 2011 from www.med8.info/docs/meD8_02-01.pdf

UNESCO. (2002). Information and Communication Technology in Education, A curriculum for schools and Program of teacher development division of higher education, Communication and Information Sector, Paris. Retrieved on October 23, 2011, from http://unesdoc.unesco.org/images/0012/001295/pdf

UNESCO. (2011). Media and Information Literacy Curriculum for Teachers, Communication and Information Sector. Paris: UNESCO

Wagner, G., Sampson, D. G., Lytras, M. D., & Diaz, P. (2004). Ontology and the Semantic Web for E-learning. *Educational Technology & Society*, 7 (4), 26-28.

Wagner, N., Hassanein, K., & Head, M. (2008). Who is responsible for E-Learning Success in Higher Education? A Stakeholders' Analysis. *Educational Technology & Society*. Retrieved on January 10, 2012 from http://www.educationaltechnology.com

Weller, M. (2004). Models of Large Scale e-Learning. *Journal of Asynchronous Learning Networks*, The Institute of Educational Technology, United Kingdom. Retrieved on January 11, 2012 from http://www.iet.open.ac.uk/people/m.j.weller

Williams, B.K., Sawyer, S.C., and Hutchinson, S.E. (1999). Using Information Technology, Boston: Irwin McGraw-Hill

Appendix 1

Addis Ababa University

Institute of Educational Research

Questionnaire to be answered by Instructors at KCTE

General Information

The purpose of this questionnaire is to gather information regarding the usage, skill and attitudes toward educational technology mainly the preparation and use of e-lessons particularly in some departments at the Kotebe College of Teachers' Education.

Responses to the questionnaire will be kept in confidence. The information sought for this study will be used for an MA Thesis.

Note. 1. Please don't write your name.

2. Please respond by putting "✓ " mark or by writing your responses on the space provided.

SECTION ONE: Background Information

1. Age: 20-29 ☐ 30-39 ☐ 40-49 ☐ 50+ ☐

2. Education Level:

Diploma ☐ Bachelors degree ☐ Master's degree ☐ Doctorate ☐

3. Gender: Male ☐ Female ☐

4. Department: _____

5. Professional rank: _____

6. Experience (in years)of :

6.1. Teaching _____

6.2. Others (please specify your position) _____

SECTION TWO: Educational technology and E-learning Application

I. Usage of Educational Technology (Please tick "✓") all that apply)

7. How often do you use any of the following educational technologies in your class?

	Educational technology	**Always**	**Usually**	**Once in while**	**Rarely**	**Never**
i	projectors					
ii	audio materials					
iii	video materials					
iv	television					
v	computer					

Others (please specify) _____

8. If you don't use any of the educational technologies, specify your reason here please.

_____

9. Do you use computers? Yes ☐ No ☐

10. If your response to no. 9 is 'yes', where do use computer more often?

	Place	**Always**	**Usually**	**Once in while**	**Rarely**	**Never**
i	Home					
ii	Office					
iii	Classroom					
iv	Computer lab of KCTE					
v	Internet Center/cafe					

Others (specify) _____

11. If your response to no. 9 is 'no', what is your reason?

	Reasons for not using computers	**Strongly Agree**	**Agree**	**Undecided**	**Disagree**	**Strongly Disagree**
i	I don't know how to operate computers					
ii	I don't have access to computers					
iii	I don't have enough time to use computers					
iv	I don't see the significance of using i computers					

Please specify any other reason

_____

12. If you use a computer, what do you use it for? (Please check all that apply)

	Place	Always	Usually	Once in while	Rarely	Never
i	Organizing my teaching material					
ii	Teaching in the classroom					
iii	Internet					
iv	Grading of results					
v	Research					
vi	Office work					

Others (Please specify)

_____

13. How often do you use internet?

Never ☐ Rarely ☐ Occasionally ☐ Often ☐ Nearly Always ☐

14. For what purpose do you use the internet?

	Purposes	Always	Usually	Once in while	Rarely	Never
i	E-mailing					
ii	Social networks (eg. Facebook)					
iii	Research Purpose					
iv	Communicate with my students					

Others (specify)

_____

II. Trainings given on Preparation and Use of e-lessons

15. Have you ever received any training on the following programs? (Check all that apply)

	Programs	Yes	No
i	Word processing		
ii	PowerPoint Presentations		
iii	SPSS		
iv	Internet Browsing and E-mailing		
v	Authoware (used to prepare E-lessons)		
vi	Adobe captivate (used to prepare E-lessons)		

Others (please specify) _____

16. If you have marked any of the above 'yes' where have you taken the training?

	Programs	Trained myself	At KCTE	In another college	At a computer training centre	Through MOE
i	Word processing					
ii	PowerPoint Presentations					
iii	Internet Browsing and E-mailing					
iv	Authoware					
v	Adobe captivate					

Others (please specify if there are other training places or programs which you have taken)

_____

_____

17. How do you approve the following statements?

	In the case of my subject area...	Strongly approve	Approve	Undecided	Disapprove	Strongly disapprove
i	The usage of e-learning is important					
ii	The usage of e-learning would raise the students interest to learn					
iii	Computer simulations can help me explain some lessons better					
iv	I can save and use more time in class if I use E-lessons					

III. KCTE's Educational Technology Infrastructure

18. How do you rate your access to computers and related devices and applications?

	Computers, devices, and applications	Excellent	Very Good	Good	Fair	Poor
i	Computer					
ii	Internet					
iii	Printer					
iv	Scanner					

19. If you have computer in your office/department, how do you rate its status/specification?

	Status/ specification of computers	**Excellent**	**Very Good**	**Good**	**Fair**	**Poor**	**I don't know**
i	Speed						
ii	Memory capacity						
iii	Compatibility in accepting recent soft wares						

IV. Better Usage of ICT as an Educational Technology

20. Which one of the following ICT related problems need urgent solution?

	Problems	**Highly urgent**	**Moderately urgent**	**Not urgent**	**I don't know**
i	College's lack of attention towards ICT				
ii	Instructors lack of confidence to use the available technology				
iii	Inconsistent technology usage (computer virus, poor internet connection)				

21. Please list down the constraints that you have encountered in general when it comes to the usage of computers and internet in your field of study and the possible solutions for each.

	Constraints observed/faced	Suggested solutions
i		
ii		
iii		

Appendix 2

Addis Ababa University

Institute of Educational Research

Questionnaire to be answered by graduating (3rd year) students at KCTE

General Information

The purpose of this questionnaire is to gather information regarding the knowledge of, skill in and attitudes toward educational technology mainly the preparation and use of e-lessons particularly in some departments at the Kotebe College of Teachers' Education. Responses to the questionnaire will be kept in confidence. The information sought for this study will be used for an MA Thesis.

Note. 1. Please don't write your name.

2. Please respond by putting "✓" mark or by writing your responses on the space provided.

SECTION ONE: Background Information

1. Age:_____

2. Gender: Male ☐ Female ☐

3. Department: _____

SECTION TWO: Educational technology and E-learning Application

4. How often do your instructors use any of the following educational technologies in your class?

(Please tick"✓" all that apply)

	Educational technology	**Always**	**Usually**	**Once in while**	**Rarely**	**Never**
i	projectors					
ii	audio materials					
iii	video materials					
iv	television					
v	computer					

Others (please specify) _____

5. Do you use computers? Yes ☐ No ☐

6. If your response to no. 5 is 'yes', where do you use computer more often?

	Place	**Always**	**Usually**	**Once in while**	**Rarely**	**Never**
i	Home					
ii	Computer lab of KCTE					
iii	Internet Center/café					

Others (specify) _____

7. If your response to no. 5 is 'no', why?

	Reasons for not using computers	**Strongly Agree**	**Agree**	**Neither**	**Disagree**	**Strongly Disagree**
i	I don't know how to operate computers					
ii	I don't have access to computers					
iii	I don't have time to use computers					
iv	I don't need to use computers					

Please specify if there is any other reason

_____

8. If you are using computers in the classroom or computer lab of the college, please rate the following descriptions.

	Description	**Excellent**	**Very Good**	**Good**	**Fair**	**Poor**
i	Speed of computers					
ii	Comfort of chairs and tables					
iii	Internet connection					
iv	Electric power supply					
v	Access to printers					
vi	Access to scanners					

9. If you use a computer, what do you use it for? (Please check all that apply)

	Place	**Always**	**Usually**	**Once in while**	**Rarely**	**Never**
i	Doing assignments					
ii	Communicate with my teachers					
iii	Internet					

Others (Please specify) _____

10. Have you ever received training on how to use the following programs? (Check all that apply)

	Programs	**Yes**	**No**
i	Word processing		
ii	PowerPoint Presentations		
iii	Internet browsing and E-mail		

Others _____

11. If your answer is yes, please mention where you have taken the training.

		Word processing	**PowerPoint Presentations**	**Internet browsing and E-mail**	**Other courses (specify please)**
i	At KCTE				
ii	At a private training centre				
iii	Trained myself				

12. Rate your degree of agreement about the benefits of the usage of computer programs in your field of study?

	Benefits	**Strongly Agree**	**Agree**	**Neither**	**Disagree**	**Strongly Disagree**
i	It would make the subjects more interesting					
ii	It would make the subjects easy to understand					
iii	It would give me another option to learn about the subject matter					
v	It would help me internalize complicated topics through computerized simulations					

13. Please list down the constraints that you have encountered in general when it comes to the usage of computers and internet in your field of study and the possible solutions for each.

	Constraints observed/faced	Suggested solutions
i		
ii		
iii		

Appendix 3

Interview guidelines for the vice dean of the KCTE

1. Is there any budget allocated to enhance the ITC standard of the college?
2. Is there any gap or problem encountered in the process?
3. How far have you succeeded?
4. What are the short or long term plans the college has related with inculcating ICT in its education system?

Appendix 4

Interview questions to department representatives and/or instructors

1. How do you think e-learning will help in the teaching-learning process of the Kotebe College of Teachers' Education?

2. Do you have any support for the use of educational technology in the Kotebe College of Teachers' Education?

3. Have you ever had any training on the use of ICT to prepare or use e-lessons for the teaching-learning process? (describe the strengths and weakness of the training please)

4. What infrastructures are available for enhancing ICT use in the department/college?

5. How do instructors in the department get the access?

6. How many of the computers are connected to the internet?

7. Do you believe the current available infrastructure is enough to make the whole university computer based?

8. Do you use e-lessons to describe instructional content or learning experience delivered by electronic technologies (CD's or internet)?

9. What infrastructural problems is your office encountering with regards to the use of e-lessons?

10. Do you have enough support funds from the college administration or any other NGO or the government or other governments?

Appendix 5

Interview guideline for the head of the ICT department/representative

1. How do you describe the status of the computers in your department?
2. Is there any budget given to your department to enhance the ITC standard of the department?
3. How much is it significant in helping you upgrade the status of ICT in the department specifically and in the college in general?
4. How is its consistency?
5. Is there any gap or problem encountered in the process?
6. How is the status of the usage of antivirus and availability of maintenance (are they preventive or curative)?
7. How is the ICT usage level of other departments' instructors and students?
8. Is there any accessible scanner or printer to be used by the instructors or students?
9. What suggestions do you have towards the improvement of the current situation?

Appendix 6

Interview guidelines for the MOE official responsible for MILC

1. Is there any effort made to enhance the MILC?
2. Is there any gap or problem encountered in the process?
3. How far have you succeeded?
4. Do you have any plans (short or long term)?

Appendix 7

Observation checklist

Date and time _____

Rate availability and status using the following scale

1. Excellent
2. Very good
3. Average
4. Poor
5. Not available

	Item/place	Computer	Internet access	Projector	Scanner	Printer	Remarks
1	Classroom						
2	Computer lab						
3	Teachers office						
4	Department head office						
5	Staff room						
6	Library						
7	Science lab						
8	Other observations of items/places/activities						

Personal comment: _____

_____

_____

Appendix 8

Kotebe College of Teacher Education
Department of Computer Science and Technology

Course Title: **Introduction to Information and Communication Technology**
Course Number: **ICT 201** Credit Hours: **3** Contact Hours: 3
Prerequisites: **None** Academic Year: **2004** Semester: 2
Students' Faculty: **Science** Program: **Undergraduate** Enrollment: **Regular**

At the end of the course students will be able to:

- ✓ Understand basic concepts of ICT
- ✓ Understand the computer system and its components
- ✓ Understand how a computer is working
- ✓ Have knowledge of computer hardware and software
- ✓ Explain the development of programming languages
- ✓ Understand data representation techniques and computer arithmetic
- ✓ Develop basic idea of computer networking
- ✓ Use basic MS office applications and the Internet

Course Content:

Part I (Theoretical)

Chapter 1: Introduction

- Data and Information
- Basics of ICT
- Information System
- History, Types and Characteristics of Computers

Chapter 2: Computer System

- Computer hardware
  - Input device
  - Output device
  - Processor
  - Memory
  - Storage device
- Computer Software
  - System software
  - Application software

Chapter 3: Introduction to programming languages

- Types of programming languages
- Historical development of programming languages

Chapter 4: Data Representation in a computer system

- Number system
- Character representation

Chapter 5: Basics of computer Networking and the Internet

- What is computer Network?
- Importance of Computer Networking
- Types of Networks
- Network topologies
- The Internet and its services

Part II (Practical)

1. Introduction to MS Windows
   - 1.1. The windows components (Desktop, Icons, Taskbar, Start button)
   - 1.2. Mouse operations (Point, Click, Double Click, Right Click, Drag)
   - 1.3. Exploring your computer (Windows explorer)
   - 1.4. Managing files and folders (creating, Renaming, Deleting and Restoring files and folders)
   - 1.5. Searching files and folders
   - 1.6. Using Windows accessories
   - 1.7. Changing desktop settings
2. Introduction to MS Word
   - 2.1. Starting MS Word
   - 2.2. Exploring the word window
   - 2.3. Creating a new document
   - 2.4. Saving a new document
   - 2.5. Opening existing document
   - 2.6. Editing an existing document
     - 2.6.1. Inserting and deleting text
     - 2.6.2. Undo and Redo
     - 2.6.3. Copy, Cut and Paste
   - 2.7. Using Thesaurus and Spelling Checker
   - 2.8. Formatting
   - 2.9. Inserting pictures, word art and drawings
   - 2.10. Working with tables
3. Introduction to MS Excel
   - 3.1. Starting MS Excel
   - 3.2. The MS Excel environment
   - 3.3. Using formulas and functions (relative addressing and absolute addressing)
4. Internet Basics

Reference:

- Dida Midekso (1994), Introduction to computer science, AAU Printing press
- D. Mergia (2003), Addis Ababa. Complete Guide to Information Technology.

NB. You can refer to any other relevant material and also use search engines to browse Web sites

Assessments:

- Mid Exam
- Final Exam

Appendix 9

E-Learning Stakeholders' Responsibility Matrix

	Student	Instructor	Institution	Content Provider	Technology Provider	Accreditation Body	Employer
Student	• participate in collaborative exercises to enhance learning • share experiences and encourage use	• participate proactively in exercises • provide feedback regarding overall effectiveness	• use e-learning technologies according to institutional policies	• provide feedback regarding the appropriateness of content for e-learning	• provide feedback regarding the effectiveness of technologies	• Demand accreditation for e-learning programs • Provide feedback	• promote the validity of e-learning during interviews
Instructor	• provide effectively designed courses incorporating e-learning content • provide technical and motivational support to encourage use	• share experiences and encourage use • promote standardization	• use e-learning technologies according to institutional policies and standards	• ensure protection of copyrights • provide feedback regarding the level of effectiveness experienced by students collectively	• provide feedback regarding the effectiveness of technologies	• adhere to accreditation standards	• educate on the validity of e-learning
Institution	• standardize the e-learning experience across courses • provide technical support • protect sensitive student information	• provide training in instructional design and technology • provide technical support • provide incentives • enforce standardization	• recognize e-learning credits • share e-learning experiences and courses • encourage standardization	• ensure protection of copyrights • provide funding for content development	• provide feedback to improve future versions • supply appropriate infrastructure to support technology	• adhere to accreditation standards • provide evidence for quality assurance	• seek course accreditation to provide evidence for quality assurance • educate on the validity of e-learning
Content Provider	• select appropriate content and media for e-learning • comply with [illegible] standards	• provide content that meets course & program needs • comply with learning & usability standards	• provide content that meets institutional needs • Comply with learning standards	• comply with standards for interoperability	• comply with standards for interoperability	• adhere to accreditation standards	• provide content relevant to work environment
Technology Provider	• consider learning principles when designing • allow adjustments for individual learning styles • comply with usability standards	• consider usability and teaching principles when designing • comply with learning & usability standards	• comply with standards for interoperability • provide technical support and training	• comply with standards for interoperability • Provide technical support	• comply with existing standards, and collaborate to develop new standards when necessary	• adhere to accreditation standards	• provide an effective learning environment to [illegible]ize learning of [illegible] employees
Accreditation Body	• enforce standards to ensure quality of accredited courses	• provide clear guidelines for requirements	• provide clear guidelines and timely services	• provide clear guidelines for requirements	• provide clear guidelines for requirements	• collaborate to ensure consistency	• enforce effective standards to ensure quality of graduates
Employer	• recognize the validity of e-learning	• provide feedback regarding success of graduates	• provide feedback regarding success of graduates	• provide feedback regarding relevance in workplace	• provide feedback regarding success of graduates	• ensure that standards provide appropriate measures	• share experiences and encourage acceptance of e-learning

Appendix 10

Kotebe College of Teachers Education
Office of The Registrar
First Semester 2004 E.C
Statistics for Undergraduate Students

Students Enrolled in Undergraduate Programme by College, Department, Year of Study and Sex

College/Modality/Department (Stream)	Regular									Evening										Summer										Total		
	1st 2004 Entry		2nd 2003Entry		3rd 2002 Entry		Total			1st 2004 Entry		2nd 2003 Entry		3rd 2002 Entry		4th 2001 Entry		Total			1st 2003 Entry		2nd 2002 Entry		3rd 2001 Entry		4th 2000 Entry		Total					
	M	F	M	F	M	F	M	F	T	M	F	M	F	M	F	M	F	M	F	T	M	F	M	F	M	F	M	F	M	F	T	M	F	T
Amharic	3	36	2	30			5	66	71	30	80			8	17			38	97	135			11	44	14	24			25	68	93	68	231	299
English	11	32	6	28			17	60	77	88	98	21	13	13	6	23	5	145	122	267	21	19	31	13	16	26			68	58	126	230	240	470
History	20	23	12	33			32	56	88	28	18							28	18	46	41	5							41	5	46	101	79	180
Geography	24	19	16	30			40	49	89	65	44			17	6	30	4	112	54	166	50	10	11	8					61	18	79	213	121	334
Civics	31	12	30	18			61	30	91	76	62			23	9	35	8	134	79	213	36	32	41	47					77	79	156	272	188	460
Chemistry	24	69	41	45	32	51	97	165	262	43	17							43	17	60	28	13	28	11	27	4			83	28	111	223	210	433
Biology	61	32	44	46	27	40	132	118	250	52	25	26	4	12	3	15	9	105	41	146	30	9	18	18	19	9			67	36	103	304	195	499
Physics	18	73	11	26	33	27	62	126	188	47	5							47	5	52	67	18	88	12	39	6			194	36	230	303	167	470
Mathematics	21	70	27	48	38	28	86	146	232	71	29			25	5	16	1	96	35	131	98	20	70	12	19	9			187	41	228	369	222	591
Health & Physical Education	43	47	44	52	27	21	114	120	234	93	25							93	25	118	76	30	22	17	38	12			136	59	195	343	204	547
EDPM																							49	10	26	9	44	3	75	19	94	75	19	94

	M	F	T
Total No. of Undergraduate Students =	2501	1876	4377
Total No. of Regular Undergraduate Students =	646	936	1582
Total No. of Extension Undergraduate Students =	841	493	1334
Total No. of Summer Undergraduate Students =	1014	447	1461

Compiled by Haileleleule Getnet

Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for degrees in other university, and sources of materials used for the thesis have been duly acknowledged.

Name: Nebiyou Tekle

Signature: