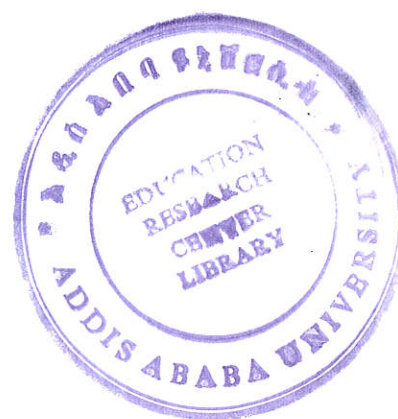


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**Utilization of Information Communication Technology
in Adama, Awassa, and Kotebe College of Teacher
Education**

By Mesfin Amare



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Abstract

Use of Information Communication Technology (ICT) in acquiring knowledge and skills become essential element in education and trainings. This study was mainly aimed at to asses the utilization of information communication technology in Adama, Awassa, and Kotebe college of teacher education. Specifically, the study explores he availability of ICT infrastructure, curricular materials in the colleges, teachers skills and qualification to utilize ICT and the major factors that influence the utilization of information communication technology in Adama, Awassa, and Kotebe college of teacher education. To conduct the study descriptive survey method was employed. Sample of the study is covered Adama, Awassa, and Kotebe college of teacher education, located in Oromia region, Southern Nations Nationalities Regions, and Addis Ababa City Administration respectively. Stratified sampling and purposive sampling was employed to teachers and deans respectively. Discretionary sampling technique was involved in selection of students to obtain first hand information. Questionnaire, interview, and observation were preferred to collect data. Relevant statistical tools such as percentage, ratio, and mean value made to analze the data. Results show that inadequate financial support, inadequate in-service training, large class size, inadequacy of time for practice, problems with Internet access and poor supply of facilities were some of the major problems that hinder utilization of information communication technology in the teacher training colleges. Hence, it appears to be wise and timely to take appropriately measures to change the much unchanged utilization of ICT in the colleges.

LIST OF ACRONYMS

- ICT:** Information Communication Technology
- CTE:** College of Teacher Education
- SITE:** Society of Information Technology and Teacher Education
- ROM:** Read Only Memory
- UNESCO:** United Nation Educational Scientific and Cultural Organization
- LAN:** Local Area Network
- WAN:** Wide Area Network
- ISDN:** Integrated Services Digital Network
- OS:** Operating System
- USAID:** United States Agency for International Development

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CHAPTER ONE

The Problem and its Approach

Introduction

1.1 Background to the study

The rapid development of information and communication technologies (ICT) during the past two decades has had impacts on education and trainings. The development of technology is placing new demands on expertise and the increased use of information communication technology (ICT) in instruction.

Schools, colleges and other educational institutions provide many sorts of facilities to facilitate the central mission of learning. Information communication technology setting learning goals in education both by institutions and individuals are often complex and difficult. Throughout history, educators have suggested on the setting of goals and devised means to help people learn that are easier and faster than previous times. Some of the means are classified as technological, that are useful in applying scientific or other organized knowledge to the attainment of practical ends (meaningful learning experience).

The new era has brought many changes and challenges to the theory and practices of educational technology. New understanding regarding the process of human learning and of the nature of knowledge itself have challenged the educators rethink basic concepts of underlying teaching methods in general and educational technology in particular. Advances in information communication technology (ICT) have altered and expanded the possibilities for facilitating

learning in the classroom. There are different arguments regarding the role of ICT in education.

Higher education without the support of ICT makes the lives of learners and teachers equally difficult. A nation's intellectual strength depends on ICT support. The use of computing and communication technology to enhance the efficacy of transaction and productivity is a driving force in this new era of social and economic transformation known as Information Society (UNESCO, 2003:43).

According to Tissue (1997:5) the common rationale to incorporate information communication technology in education are; improve learning effectiveness, greater access to information, graduates need ICT skills to be competitive in the job market, increase productivity, sharing resources of courseware, greater access to education via distance learning, and external forces competition for students, pressure from parents, students, and the public funding sources.

The integration of information communication technology in teachers training college education curriculum is a new perspective. In the case of Ethiopia, Efforts have been made to introducing information communication technology in Colleges of Teacher Education. In doing so, students need to be equipped with an initial, basic understanding of information communication technology development in addition to their major education. Eventually they could contribute to the economic development and social empowerment of the economy.

1.2 Statement of the problem

Introducing information communication technology (ICT) in college's curriculum is assumed to minimize the information gap between developed and developing countries. The inclusion of information communication technology in the College of Teacher's Education curriculum of Ethiopia is a new perspective. The implementation of this curriculum has taken place since recently. Hence it is imperative to study its utilization and make viable recommendation.

The purpose of the study is, therefore, to assess the utilization of information communication technology (ICT) in some selected College of Teacher Education focusing on the following specific objectives:

- (i) to investigate the availability of curricular materials in ICT
- (ii) to assess teachers skills of information communication technology
- (iii) to assess on how Colleges of Teacher Education are equipped with the necessary educational infrastructure in order to implement ICT
- (iv) to assess major factors that impedes the utilization of ICT in the selected Colleges of Teacher Education
- (v) to recommend appropriate strategies through which the implementation of ICT in teachers training colleges could be enhanced

Accordingly to attain the objectives stated above, the study ought to answer the following basic questions.

1. To what extent ICT is utilized in Colleges of Teacher Education?
 - 1.1 What technology resources are currently available?
 - 1.2 What are the levels of technology knowledge and skills of college staff?
2. What are the successes and challenges of ICT implementation in Colleges of Teacher Education?
3. What should be done to improve the current situation of ICT?

1.3 Significance of the Study

The appropriate utilization of ICT has crucial importance. It is true that information communication technology plays a key role in the socio-economic development of a country.

Hence, the study appears to be useful in assessing the major problems in utilizing ICT in Adama, Awassa, and Kotebe Colleges of Teacher Education. This study is significant for the following reasons;

1. It provides valuable information to ICT coordinators and implementers about the major factors that hinder the utilization of ICT in Adama, Awassa, and Kotebe Colleges of Teacher Education.

2. It helps all pertinent bodies to design a viable strategy, which in turn can promote the utilization of information communication technology in teachers training colleges.
3. A through study was not carried out so far in those colleges hence this study could be taken as a stepping stone for further studies on similar issues.

1.4 Delimitation of the Study

The study focuses on the utilization of ICT on the three Colleges of Teacher Education located in Oromia Region, Southern Nations Nationalities Region, and Addis Ababa City Administration. Relatively there are sufficient number of colleges and students from diverse society.

Even though there are many colleges in the regions, the study is delimited to three colleges, because students of these colleges are more or less similar in their background, in that almost all have completed their secondary school education at grade 10. And it is believed that these colleges are assumed to represent the rest of the colleges presently functioning in the regions.

1.5 Limitations of the study

Due to financial and time constraint the study is limited to three colleges. Reasonable and exhaustive attempt was made to reach at plausible result.

ICT (information communication technologies) defined as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. These technologies include computers, the internet, broad-casting technologies (radio and television), and telephone (Victoria, 2002:6).

Internet: Global computer network; a network that links computer networks all over the world by satellite and telephone, connecting users with service networks such as e-mail and the world wide web (available at www.msn.encarta.com).

Wireless: Voice, data, or video communications without the use of connecting wires. In wireless communications, radio signals make use of microwave towers or satellites. Cellular phones and pagers are examples of wireless communication (UNESCO, 2002:235).

World Wide Web (WWW): is a system that allows access to information sites all over the world using a standard, common interface to organize and search for information. The WWW simplifies the location and retrieval of various forms of information including text, audio and video files (UNESCO, 2002:235).

ICT as subject: It refers to learning about ICT, mostly organized in a specific course. What is being learned depends on the type of education and the level of the students'. Education prepares students for the use of ICT in education, future occupation and social life (Pelgrum and Law, 2003:23).

ICT as an assisting tool: ICT is used as a tool, for example while making assignments, collecting data and documentation, communicating and conducting research. Typically, ICT is used independently from the subject matter (Pelgrum and Law, 2003:23).

ICT as a medium for teaching and learning: This refers to ICT as a tool for teaching and learning itself, the medium through which teachers can teach and learners can learn. It appears in many different forms, such as drill and practice exercises, in simulations and educational networks (Pelgrum and Law, 2003:23).

College of Teacher Education: Teacher Education programmes offered by teacher colleges or equivalent institutions may be directed to the initial education and training of students teachers (commonly called pre-service education) or to continuing professional development of existing teachers commonly called in-service education or teacher professional development).

Chapter TWO

Review of Related Literature

2.1 ICT and Its Importance to Education

Information and Communication Technology (ICT) one of the basic building blocks of modern society has become in use within a very short time. Many countries now regard the understanding of ICT and the mastering of the basic skills including its concepts as a part of the core of education, alongside reading and, writing (UNESCO, 2002).

ICT which includes radio and television, as well as newer digital technologies such as computers and the Internet have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, ICT helps to expand its access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality, helping make teaching and learning into an engaging, active process connected to real life (Victoria 2002:11).

However, the experience of introducing different ICT in the classroom and other educational settings all over the world over the past several decades suggests that full realization of the potential educational benefits of ICT is not automatic. The effective integration of ICT into the educational system is complex, has multifaceted process that involves not only just technology. Indeed, given enough initial capital, getting the technology is the easiest part , but, also

curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing, among others are so vital (Victoria , 2002:6).

According to (Hernes, 2002: 21-22) the ICT revolution has been very much about spotting opportunities and inviting everybody to learn and make good use of it. Indeed, the ICT is perhaps above all else a revolution in learning. Individuals have seen the potential of the new tools and introduced them into their homes on a vast scale. Firms have applied them to an ever-widening range of activities: bookkeeping, production control, management, communication, marketing, and drug development etc. The experience of developed countries have situation that public authorities have incorporated them into all of their activities, from vaccination programs to tracking criminals.

ICT has transformed the way learning institutions work; it also changed the way we think about organized education. ICT has become a medium in the original sense of the word something in the middle, between the substance to be learned and the student who is to master it. First it liberates provision of education from the constraints of time and place. Many courses can be accessed from more or less anywhere at any time. Second, allowing material to be adapted or customized to individual levels and tasks to be paced according to personal progress.

The pressing problem for educational planners is how to reach, with a reasonable time and give due concern to the needs of the majority who are poor, uneducated, and live in rural areas and, how to implement and maintain the educational part of ICT networks. Many countries adopt ICT policies for their education systems that cover not only hardware and infrastructure, but also educational materials available on the Internet where, both domestic and foreign users can access them freely. In addition, many teachers and professional associations make their best work available free for any one to use.

2.1.1 Educational objectives of ICT

Planning for effective use of ICT in education necessitates understanding the potential of technology to meet different educational objectives and, consequently, deciding which of these objectives to pursue. This decision affects the choice of technologies and modalities of use. According to Gagarag, (2002:62-63) four objectives that may be enhanced by ICT are specified below;

- *Expanding access to all level of education;* In most developing countries, full time study within the time constraints of classrooms is only accessible to a few; for many who wish to study, learning will have to take place at a time and location of their choice, either synchronously or asynchronously, barriers such as time, distance, and social and cultural constraints must be overcome. ICT in their many forms have been applied in a variety of contexts;

- *Improving the quality of education;* one of the most powerful reasons for considering using ICT in an educational system is that they put learning in the hands of the user. They facilitate individualizing curriculum, permit learners to dictate the pace of learning, and widen sources of information.
- *Enhancing lifelong learning;* Life long learning is necessity in a world that changes and renews itself rapidly;
- *Facilitating non-formal education;* ICT is being used to make information and knowledge available in non-formal contexts. The demand for enrichment learning is on the rise, particularly in countries experiencing an increase in aging populations and populations with more leisure time who want to use it in intellectual pursuits. These are learners for pleasure, and for them, activities in a classroom are not ideal solutions. ICT offers a convenient solution, but only if the individual has the skills needed to use the appliances and navigate through the millions of Web pages and is able to pay for the cost of the digital connection.

2.1.2 Integrating ICT in Education

The potential of each technology varies according to how it is used. Haddad and Draxler (2002:9), identify at least five level of technology use in education: presentation, demonstration, drill and practice, interaction, and collaboration.

Each of the different ICT print, audio/video cassettes, radio and TV broadcasts, computers or the Internet may be used for presentation and demonstration, the most basic of the five levels. Except for video technology, drill and practice may likewise be performed using the whole range of technologies. On the other hand, networked computers and the Internet are ICT components that enable interactive and collaborative learning best. Their full potential as educational tools will remain unrealized if they are used merely for presentation and demonstration (Victoria, 2002:11).

Radio and television have been used widely as educational tools since the 1920s and the 1950s, respectively; there are three general approaches to the use of radio and TV broadcasting in education (Perraton and Creed, 2000:13).

- *Direct class teaching*, where broadcast programming substitutes for teachers on a temporary basis
- *School broadcasting*, where broadcast programming provides complementary teaching and learning resources not otherwise available; and
- *General educational programming* over community, national and international stations which provide general and informal educational opportunities.

IRI projects have been implemented in Latin America and Africa. In Asia, IRI was first implemented in Thailand in 1980; Indonesia, Pakistan, Bangladesh and Nepal rolled out their own IRI projects in the 1990s (Victoria , 2002:11).

What differentiates IRI from most other distance education programs is that its primary objective is to raise the quality of learning and not merely to expand educational access and it had much success in both formal and non formal settings (Bosch, 2002:45). Extensive research around the world has shown that many IRI projects have had a positive impact on learning outcomes and on educational equity and with its economies of scale, it has proven to be a cost-effective strategy relative to other interventions.

Mexico's telesecundria is another example of *direct class teaching*, using broadcast television. The program was launched in Mexico in 1968 as a cost-effective strategy for expanding lower secondary schooling in small and remote communities. Perraton describes the programme centrally produced television programs are beamed via satellite throughout the country on a scheduled basis to Telesecundria schools, covering the same secondary curriculum as that covered in ordinary schools. Students are exposed to a variety of teachers on television but have one home teacher at the school for all discipline in each grade. Assessments of Telesecundria have been encouraging: drop out rates are slightly better than those of general secondary schools and significantly better than in technical schools (Haddad and Draxler, 2002:145-148).

General educational programming consists of a broad range of programme types such as, news programmes, documentary programs, quiz shows, educational cartoons, etc. that affords non-formal educational opportunities for all types of learners (Victoria , 2002:11). Any radio or TV programming with informational and educational value can be considered under this type. Some notable examples that have global reach are the United States-based television shows Sesame Street, the all-information television channels, National geography and Discovery, and the radio programme Voice of America. The Farm Radio Forum, which began in Canada in the 1940s and which has since served as a model for radio discussion programs worldwide, is another example of non-formal educational programming (Nwaeronu and Thompson, 2002:2-3).

Teleconferencing has educational use. It refers to "interactive electronic communication among people located at two or more different places." (Rao, 2002:29). There are four types of teleconferencing based on the nature and extent of interactivity and sophistication of the technology:

- 1) audio conferencing; 2) audio-graphic conferencing; 3) video conferencing; and
- 4) Web-based conferencing.

Learning with computers and the Internet:

Learning with the technology means focusing on how the technology can be the means to learning ends across the curriculum. The central points included here are; Firstly presentation, demonstration, and manipulation of data using productivity tools; secondly use of curriculum-specific applications types such as

educational games, drill and practice, simulations, tutorials, virtual laboratories, visualizations graphical representations of abstract concepts, musical composition, and expert system and thirdly the use of information and resources on CD-ROM or online such as encyclopedia, interactive maps and atlases, electronic journals and other references (Victoria , 2002:14).

Learning about computers and the Internet focuses on developing technological literacy. The widely suggested components to learn computers and Internet are the following (Richmond, 2002: 2).

- Fundamentals: basic terms, concepts and operations
- Use of keyboard and mouse
- Use of productivity tools such as word processing, spreadsheets, data base and graphics programs
- Use of research and collaboration tools such as search engines and email
- Basic skills in using programming and authoring applications such as Logo and Hyper studio
- Developing an awareness of the social impact of technological change

Technological literacy is required for learning with technologies to be possible, implying a two-step process in which students learn about the technologies before they can actually use them to learn. However, there have been attempts to integrate the two approaches.

Distance education has evolved over time from correspondence courses, to educational radio, to educational television, one and two way teleconferencing and video conferencing to computer assisted web-based interactive learning opportunities (Simonson, 2000:1-3). According to Kaufman and Watkins (2000:59-67) yet, with the technological changes that have evolved in distance education, there have been few changes in the rationale for virtual universities. The virtual university is intended to offer useful learning opportunities to people at times and locations that are convenient to them (Kaufman and Watkins, 2000:59-67).

The African virtual university (AVU) is a single mode institution that operates without a conventional campus, but uses the facilities of conventional universities in more than 20 sub-Saharan African universities to provide learners with facilities to access technology delivery system. Started in 1997, the AVU supports learners across the continent through videotaped instruction and/or live broadcast (via satellite or fiber optic connections), with learners participating in the discussion by way of e-mail, telephone, or fax. Additional reference materials such as books, journals, and course notes are also available for learners, conferencing; self paced computerized instruction and other media (Watkins and Corry, 2002:173).

The virtual University of the technological Institute of Monterrey (ITESM), Mexico, is the primary provider of distance education in Mexico and many other area of Latin America. ITESM is a dual-mode institution that offers mainly

master's degree-level programs through its virtual campus. There are many educational technologies and institutional structures that can assist in developing successful distance education initiatives. Through dual-mode as well as single mode institutions learners a round the world have more options than ever for achieving laudable objectives through education (Watkins and Corry, 2002:173).

During the second half of the 20th century "Open Universities" have revolutionized lifelong learning in many countries. These institutions were inspired by democratization, growing demands for tertiary education, technological developments well suited to mass education, and the human resource needs of modernizing societies (Harry, 1999:165). According to (Jenkins, 1993:165) open universities differ from traditional universities in at least three ways; open to a broad segment of the population, open in the courses they offer. Usually including traditional college courses, career development courses and personal growth courses, and open different times and places of study, some times the time and place are determined entirely by the student.

Open universities have based their instruction on self-study printed materials often called "correspondence materials" because they are sent through the mail system. They include texts, study guides, and work books. These printed materials often are supplemented with small laboratory kits for science courses periodic face to face instruction in geographically dispersed study centers and some course delivery and instructor-student communication thorough telecommunication technologies radio, telephone, television and video (Daniel., 1999:165).

According to Daniel (1999), Open Universities have been a great success by several indicators, in most countries where they have been established. More than a dozen have total enrolments in excess of 100,000 students, and their costs are generally one-half to one third as compared to those of traditional universities in the same country. In addition several have evidence of high quality instruction.

According to Savukinas, Jackson, and Caiwei (2002:165) the following are examples of lifelong education programs provided by Open Universities. China TV University is the largest university in the world, with the total enrolment of 850,000 in 1994. The system includes a central unit that develops and produces course materials, 44 provincial units that also develop and produce such materials, 1550 Educational Centers at the county or company level, and 30,000 tutorial groups.

India has the second largest education system in the world. The Indira Ghandi Open University has been able to secure 90 minutes of national broadcast television each week and no radio coverage, so instruction is mostly by printed materials and requires periodic attendance in 229 study centers located primarily in urban areas. In the late 1990s, the university began establishing high capacity telecommunications links with 16 regional centers and, later some of the study centers. Satellite communication systems are also in use now (Savukinas, Jackson, and Caiwei , 2002:165-166).

The University of South Africa has been open to all races since before and throughout the apartheid era. In 1995, It had 130.000 students 47% of whom are black and 40% are white more than 80 % are employed and the average age is 31 Almost a third of the students are school teachers (Savukinas, Jackson, and Caiwei ,2002:166).

2.1.3 Challenges in Integrating ICT in Education

Although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICT integration in the education system. Significant challenges that policy makers and planners, educators, administrators, and other stakeholders need to consider include educational policy and planning, infrastructure, language and content, capacity building, and financing. Enhance and reform education through ICT require clear and specific objectives, guidelines, and time-bound targets, the mobilization of required resources, and the political commitment at all levels to see the initiatives through. Some essential elements are:

- a) A rigorous analysis of the present state of the education system. ICT-based interventions must take into account current institutional practices and arrangements. Specifically, drivers and barriers to ICT use need to be identified, including those related to curriculum and pedagogy, infrastructure, capacity building, language and content, and financing

- b) The specification of educational goals at different education and training levels as well as the modalities of use of ICT that can best employed in pursuit of the these goals.
- c) The identification of stakeholders and harmonizing of efforts across different interest groups.
- d) The piloting of the chosen ICT-based model. Even the best designed models or those that have already been proven to work in other contexts need to be tested on a small scale.
- e) The specification of existing sources of financing and the development of strategies for generating financial resources to support ICT use over the long term.

Challenges encountering ICT

A country's educational technology infrastructure sits on top of the national telecommunications and information infrastructure. Before any ICT-based programme is launched, policy makers and planners must carefully consider the availability of building/rooms and electricity and telephone.

In the first place, the availability of appropriate rooms or buildings available to house the technology is vital. In countries where there are many old school building, extensive retrofitting to ensure proper electrical wiring, heating/cooling and ventilation, and safety and security would be needed.

Another basic requirement is the availability of electricity and telephone. In developing countries large areas are still without a reliable supply of electricity and the nearest telephones are miles away. Experience in some countries in Africa point to wireless technologies (such as VSAT or Very Small Aperture Terminal) as possible levers of leapfrogging (Hawkins, 2002:40). Although this is currently an extremely costly approach, some developing countries with very poor telecommunications infrastructure should study this option.

The challenges ICT are related with capacity building; Various competencies must be developed throughout the educational system for ICT integration to be successful. : Teacher's professional development should is one of the bottlenecks. Some of the challenges in this regard are; skills with particular applications, integration with existing curricula, curricular changes in the use if IT (including change in the educational media), Changes in teacher role, and Underpinning educational theories (MacDougall and Squires, 1997:29).

The other challenges focuses on educational administrators: Leadership plays a key role in ICT integration in education. For ICT integration programs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education.

The non existence of technical support specialists is one of the challenges in implementation of ICT. Whether provided by in-school staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in a given school. While technical support requirements of an institution depend ultimately on what and how technology is deployed and used, general competencies that are required would be in the installation, operation, and maintenance of technical equipment (including software), network administration, and network security. Without on-site technical support, much time and money may be lost due to technical breakdowns.

Lack of appropriate content developers of ICT is one of the bottle neck in ICT utilization. Content development is critical area that is too often overlooked. The bulk of existing ICT-based educational material is likely to be in English or of little relevance to education in developing countries (Victoria, 2002:24). It is suggested that there is a need to develop original educational content (e.g. radio programs, interactive multimedia learning materials on CD-ROM or DVD, web-based courses, etc), adapt existing content, and convert print based content to digital media.

Language and contents of ICT have a repercussion on ICT. English is the dominant language of the Internet. A large proportion of the educational software produced in the world market is in English. It is suggested that teaching and learning materials that match national curriculum requirements and have locally meaningful content, preferably in the local languages, be developed.

2.2 ICT and Education in Ethiopia

Many studies related to ICT in education have been conducted in Ethiopia at different level (e.g. senior essay, MA Thesis and dissertations) and forms (articles, seminar paper and other) focusing mostly of television and radio, to some extent on computers.

The ICT policy document statement declares that the rapid deployment and exploitation of ICT with in education should be primarily targeted to bring about broader socio-economic impact since knowledge and socio economic development are inseparably intertwined in our globalize world (FDRE, 2002). To ensure this optimization of the role that ICT plays in education sectors, encouraging development initiative is very crucial (FDRE, 2002: 6-7).

2.3 ICT and Teacher Education

Information and communication technologies (ICT) are taken as the major factors in shaping the new global economy and producing rapid changes in society. In the past decade, the new ICT tools have fundamentally changed the way people communicate and do business (UNESCO, 2002:13). ICT has produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. It also have the potential to transform the nature of education-where and how learning takes place and the roles of students and teachers in the learning process.

In many of the developing countries, ICT are in the early stages of development in commerce, industry, and particularly, in society. Communities may have very limited resources, so it is important to undertake a careful analysis to develop strategy for the growth and development of education and teacher education that takes advantage of ICT.

The Society of Information Technology and Teacher Education (SITE, 2002) has identified basic principles for development of effective ICT teacher education as follows (UNESCO, 2002:32-33);

The first principle is that technology should be infused into the entire teacher education programme. Throughout their teacher education experience, students should learn about and with technology and how to incorporate it into their own teaching. The society indicates that restricting technology experiences to a single course or to a single area of teacher education, such as methods courses, will not prepare students to be technology-using teachers. Pre-service teacher education could provide an opportunity for students to learn a wider range of educational technologies across their professional preparation. In other words it focuses on from introductory and foundations courses to students teaching and professional development experiences.

The second principle underlines that technology should be introduced in context; it is argued that in pre-service programme basic computer literacy the traditional operating system, word processor, spreadsheet, database, and telecommunications topics are not enough. As with any profession, there is a level of literacy beyond general computer literacy. This more specific or professional literacy involves learning to use technology to foster the educational growth of students. It is believed that professional literacy is best learned in context. Pre-service students should learn the various uses of technology. Students should use it in their own learning, and they should explore creative uses of technology in their teaching.

The third principle is that students should experience innovative technology-supported learning environments in their teacher education programme. It is assumed is that "technology can be used to support traditional forms of learning as well as to transform learning". Using multimedia cases to teach topics that have previously been addressed through lectures may well be an example of a learning experience transformed by technology. Students should experience both types of uses of technology in their programme; however, the brightest promise of technology in education is as a support for new innovative and creative forms of teaching and learning (SITE, 2002).

This framework will help teacher educators and administrators consider the cultural and educational system context, technology resources, and other factors that are important in planning the integration of technology into pre-service curriculum. The framework was designed by representatives of international projects to assist policy makers, course developers, teacher educators, and other professionals who are charged with developing the use of information and communication technologies in teacher education.

2.3.1 The inclusion of ICT in Teacher Education curriculum planning and development

Many countries are engaged in a number of efforts to effect changes in the teaching/learning process to prepare students for information and technology based society. The UNESCO 1998 report notes that the new technologies challenge traditional conceptions of both teaching and learning and, by reconfiguring how teachers and learners gain access to knowledge have the potential to transform teaching and learning processes. To accomplish this goal requires both a change in the traditional view of the learning process and understanding of how the new digital technologies can create new learning environments in which students are engaged learners, able to take greater responsibility for their own knowledge.

In contrast to the traditional teaching-learning practice, a new paradigm has emerged, based on research in human learning that encompasses of the human learning process. The traditional view of the learning process is typically teacher centered, with teachers doing most of the talking and intellectual work, while students are receives of the information provided. As noted by Driscoll (1994:21), we no longer can view learner as "empty vessels waiting to be filled, but rather as active organisms seeking meaning."

Tapscott (1998:21) notes, that we are entering a new era of digital learning in which we are in the process of transitioning from "broadcast" learning to "interactive" learning. Today students no longer want be passive recipients in the information transfer model of learning. Rather they want to be active participants in the learning process.

As technology has created change in all aspects of society, it is also changing our expectations of what students must learn in order to function in the new world economy. Students will have to learn to navigate through large amounts of information, to analyze and make decisions, and to master new knowledge domains in an increasingly technological society. They will need to be lifelong learners, collaborating with others in accomplishing complex tasks, and effectively using different systems for representing and communicating knowledge to others.

The framework for technology competence can help the implementation of the six ISTE standards (Appendix D). Standard I address the technical competence. Standard II, III, and IV address preparation, implementation, and assessment supporting content learning, effective pedagogical strategies, and informative performance assessment practices. Standard V speaks to the use of ICT tools for variety of professional, communication, and collaborative activities among teachers. Standard VI addresses the social, ethical, legal, and human issues inherent when technology expands communications and learning opportunities globally. Although the standards indicate the experience of other countries, they provide an insight on the issue.

2.3.2 Essential components to support ICT in teacher development

Essential conditions must be met to successfully integrate ICT into teacher education programmes. ISTE has compiled a list of the most commonly cited conditions necessary to create learning environments conducive to powerful uses of technology. These includes shared vision, access, skilled educators, professional development, technical assistance, content standards and curriculum resources, student centered teaching, assessment, community support, support policies (see table 1).

Table 1 Essential Condition for Implementing ICT in Teacher Education

Shared Vision	There is a proactive leadership and administrative support from the entire system
Access	Educators have access to current technologies, software, and telecommunication networks.
Skilled Educators	Educators are skilled in the use of technology for learning.
Professional Development	Educators have consistent access to professional development in support of technology use in teaching and learning.
Technical Assistance	Educators have technical assistance for maintaining and using the technology.
Content Standards and Curriculum Resources	Educators are knowledgeable in their subject matter and current in the content standards and teaching methodologies in their discipline.
Student Centered Teaching	Teaching in all settings encompasses student centered approaches to learning.
Assessment	There is a continuous assessment of the effectiveness of technology for learning
Community Support	The community and school partners provide expertise, support, and resources.
Support Policies	School and university policies, financing, and rewards structures are in place to support technology in learning.

Source: ISTE (2000)

2.3.3 ICT Applications options and choices

The demand to realize educational objectives by integrating computer and Internet technologies into education forces education planners, principals, teachers, and technology specialists to make many decisions about the technical, training, financial, pedagogical, and infrastructure requirements of schools computerization programs. Some of the more challenging questions planners and educators must answer have to do with infrastructure issues.

In this part, infrastructure includes what type of computer hardware to use, where and how computers should be distributed and networked in schools, if and how school computers can and should be connected to the internet, and the software choices schools need to make. This part also touches on policies that can help to develop enabling environments to support school computerization and connectivity programs. There is no single best computer configuration or single infrastructure solution to suit all situations. Rather, there are only optimum solutions for each school.

When carrying out an educational/infrastructure assessment, the following questions may need to consider:-

- *Educational goals.* What educational goal and learning objectives will be accomplished by using computers in schools? Different computer configurations have direct relationships to how computers and the

Internet can and will be used by teachers and students to enhance education.

- *Professional development*: Will the computer system be used for teacher professional development and to supplement classroom teaching?
- *Student to computer ratio*: What target ratio of students per computer is the school or school system aiming for?
- *Schools electrical system*: What is the state of the school's electrical system? What is the availability and quality of electrical power and the type of distribution of electrical wiring in the school? Computer operates better and last longer when the electricity that powers them is continuous and of consistent voltage.
- *Other physical conditions*: What are the sizes and shapes of classrooms? What is the quality of natural or electrical lighting? Are telephone lines distributed throughout the schools? What types of desks, chairs, benches, and tables are available?
- *Physical security*: How secure are the schools and the classrooms in which computers may be installed? Is the school located where the risk of the theft is high?
- *Student per classroom*: What is the average number of students per classroom, and how large is the student population expected to grow over time?
- *Technical support and management*: What strategies will be used to provide support, management, and maintenance of computer facilities?

- *Financial resources:* How much money is available to purchase and install the equipment, buy software, train teachers, and support, maintain, and use the equipment?

These questions are not equally important in all situations, so answers should be weighted according to the specific school's situation and requirements.

There are many ways to describe different infrastructure needs and computer system configuration options and strategies Rusten and Hudson (2002) organizing them in the following ways; Physical configuration options, Networking technology options, Internet access options, and Software and operating system considerations

Physical Configuration Options

Computers can be distributed in schools in three basic ways to meet educational goals. They can be provided to individual classrooms; installed in central computer lab, libraries, and teacher planning rooms; or moved from room to room on mobile carts. Each of these options, and combinations of them, has associated benefits and costs that need to be considered carefully to select the options that best meet a school's needs (Rusten and Hudson, 2002:80).

Computers in Classrooms

One of the greatest potential benefits of distributing computers to individual classrooms is to provide teachers and students with easier access to these educational tools (Rusten and Hudson, 2002:80).

Having computers in classrooms can:

- Make it easier for teachers to integrate computer and internet use into routine educational programs, but cannot be guaranteed;
- Allow for spontaneous use of these tools during instructional activities;
- Permit teachers to organize students into a variety of learning activities, some using computers and others not; and
- Make it easier to individualize instruction and strategically integrate computer and Internet technologies into project-based learning.

Achieving the multiple benefits of classroom-based computers demands significant financial investments to:

- Purchase sufficient hardware and software so that all classes have equal access to computers;
- Refurbish all classrooms so that there is sufficient room for the computers and suitable electrical supply, security, networkability and connectivity;

- Provide each teacher with a high degree of computer technical and pedagogical skills since education technology specialists will not be available to help as they would in a computer lab; and
- Supply on going technical and educational support (Rusten and Hudson, 2002:80).

Computer rooms or laboratories

Establishing one or more computer labs is a popular way to provide equitable access to computers for the greatest number of users at the lowest possible cost. Computer labs enable schools to concentrate expensive resources in a common space that can be used for student educational activities, teacher professional development events, and community groups (Rusten and Hudson, 2002:82).

Benefit

- Establishing computers in a lab or dedicated room only requires schools to install quality electricity, network cabling and servers, internet access, effective security, climate control systems, good lighting, and specialized furniture in one or two rooms in a school rather than in different rooms.
- One or two staff members who also can provide technical and pedagogical support of teachers can maintain computer labs.
- Equipment and software can cost less for computer labs used by all classes than for classroom-based systems.
- Computer labs can optimize return on technology investments if their use is scheduled effectively.

- It can be easier and less costly to provide access to the Internet via computer labs than with classroom systems since many computers can use a common connection to the Internet.

Challenges

- Computer labs can become oversubscribed quickly, and competition for use makes it difficult for teachers to engage their students in longer-term projects and activities.
- Scheduling conflicts can frustrate teachers and inhibit their use of computer labs (Rusten and Hudson, 2002:80).

Computers in Libraries and Teachers' rooms

When funding and staff resources are scarce, schools can optimize investments in computers and Internet access by installing a few computers in public spaces, such as the library or teachers' room. Giving teachers private access to computers and the Internet can encourage them to learn to use these technologies and integrate them into daily routines (Rusten and Hudson, 2002:84).

Networking Technology Options

Connecting computers together to form a network, and connecting school, computer laboratories and classroom networks to the Internet can multiply the educational value and impact of computers in the schools. There are a variety of

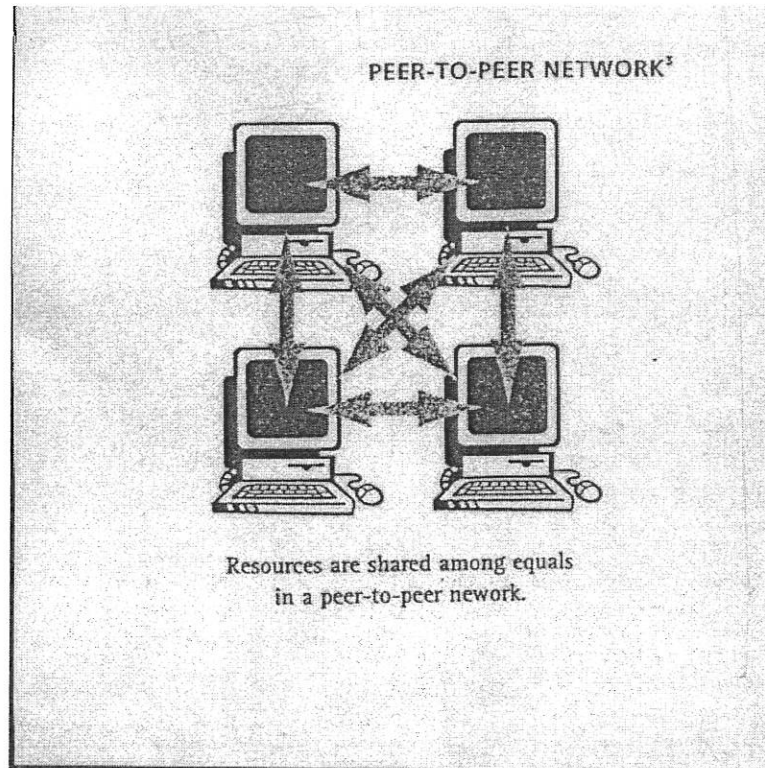
options for creating classroom, lab, and school computer LANs ((Rusten and Hudson, 2002:84).

Peer-to-Peer networking

As with all networked computers. Users can share files and resources located on computers in the network. With peer-to-peer (see Figure 1) networking, however, there is no file server or central computer to manage network activity. One or more of the computers in a peer-to-peer network can provide centralized service such as printing and access to the Internet. Most desktop operating systems come with software to enable to peer-to-peer networking once the computers are connected by some cable or wireless networking infrastructure.

Peer to peer networking is good for small networks where a centralized fileserver is not needed and network security is not a major issue. This type of networking is not expensive since the only additional expense is in the cables and networking hardware (one or two hubs). Most common computer operating systems (Windows 95/98/2000/XP) come with software to establish a peer-to-peer network, so it may not be necessary to purchase, install, and configure special network operating system software such as Windows NT, Novell Netware, or Linux (Rusten and Hudson, 2002:84).

Figure 1 Peer-To-Peer Networking



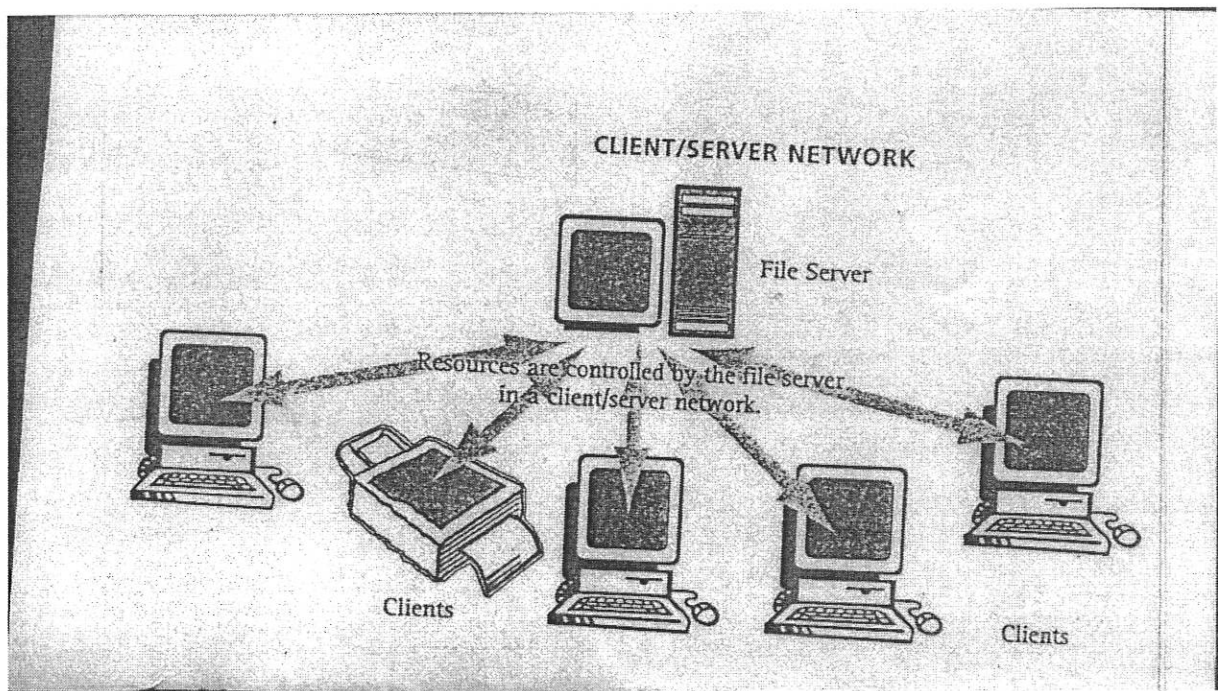
Client/Server Networking

In these networks, as seen in Figure 2, one computer centralizes such functions as storing common files, operating network e-mail delivery, and providing access to applications and peripherals such as printers.

One of the advantages of client/server networks is that they are scalable: More clients and servers can be added to the system without changing the network significantly. These centralized networks are easier to manage, administer, and secure than peer-to-peer networks. Because of the need to have a central 'dedicated' server, initial costs are higher. Also, they are more complex to set up

and maintain than stand-alone computers and peer-to-peer networks, often requiring schools to hire a technician to oversee the network. Also if the server fails, all the network functions fail.

Figure 2. Client/Server Network



Connecting computers

There are essentially three ways to connect computers to form LANs: cables, wireless, and power line systems.

Cabled LANs

Cabled networks provide reliable, high speed transmission of network traffic. Because cable systems are more common than other two options, it is usually possible to find firms and technicians with the skills needed to install quality cable LAN system.

Wireless LANs

An increasingly popular alternative to cabled LANs is wireless networks. This type of system does not require cables to connect computers to each other and to the server and shared peripherals. Instead, wireless network adaptors (receivers) are installed in all computers that will be part of the network. One or more wireless network hubs/transmitters are connected to the server, usually by a cable (several wireless network hubs can be connected to each other in a daisy chain). The hub to each computer and to and from the server then transmits network traffic. Wireless LANs have many advantages such as;

- They can be installed and configure in a very short time, since limited or no construction is needed.
- They allow for a high flexibility. Computers, especially laptops, can be moved around a room or building, within the range of the network signal, without losing their connection to the LAN.
- They can be less cost to install and use than conventional cable systems.

- They allow schools to create customized LAN systems covering single rooms or whole sections of the school. They also can be mixed with cabled systems to create greater flexibility.

Wireless LANs are not a perfect solution for all environments. The speed of network traffic depends on how many computers are using the hub's bandwidth simultaneously. Distance from the hub and thickness and character of walls between transmitter and receiver can affect the speed and quality of the network signal significantly.

Because of the benefits of wireless LANs and their growing popularity, the technology is improving rapidly, and new standards with higher transmission rates are emerging. Over the next few years, the speed and range of transmission will increase, and reliability and security will improve. Wireless LANs will become an increasingly desirable LAN solution for school computer systems.

Internet Access Options

By accessing the Internet, computers can become powerful communication devices with many educational applications. A variety of options and technologies should be considered when deciding whether and how to access the Internet (Rusten and Hudson, 2002:86).

Simulated Internet: If direct connection to the Internet is not possible, for economic or technical reasons, students and teachers can still gain simulated access to a selection of Internet resources by copying valuable websites to CD-ROMs. Then they can use the CDs to access these sites, thus simulating the Internet.

Dial-up connection: The simplest and lowest-cost connection to the Internet is through dial-up access using a single standard phone line. A dial-up connection can provide Internet access to a single computer (in a classroom, teachers room, in a lab, library) or, by using software on a server; networked computers can share this single connection.

Dedicated connection and other connectivity options: Schools can get a faster and more reliable Internet access by using permanent "dedicated" high-speed connections where they are available and affordable. A variety of dedicated high bandwidth options may be available to schools, including Integrated Services Digital Network (ISDN), digital subscriber line (DSL), terrestrial wireless, digital cable, radio modem, and satellite access.

Software and operating system considerations

Software, an essential component of computer systems, enables the hardware to do useful work for users. Software for educational computer systems categorized at least in four broad categories;

- Operating System (OS) software for client and server computers;
- Basic computer application software, including software for word processing, spreadsheets, presentations, and graphics
- Educational software applications; and
- Internet-related and delivered software, including browsers, java applications, and interactive tools on websites

2.3.4 Experience of some countries on Utilization of ICT

Like any other professions, teachers need constant and continuous renewal to be effective, motivated, and up to date in their knowledge and skills. The use of ICT is important vehicle to provide continuing professional development to teachers. Where the infrastructure exists, and connectivity costs are subsidized, the opportunity to create virtual online learning communities of teachers within nations and across regions exists. Such learning communities enable and empower trainee and practicing teachers to share experience, curriculum, learning materials, lesson notes, and collaborative projects.

The rapid development of information and communication technologies (ICT) during the past two decades has had many points of contact with education and training. The development of technology is placing new demands on expertise, and it is also leading to the increased use of information technology (IT) in instruction and learning. As early as 1970s discussions of the future of school systems started to pay attention to the opportunities provided by ICT. Finland has actively participated in this development. With the help of state and local

funding, information technology has been purchased for schools ever since the 1980s. The state has also found many ways to support teacher training in the use of IT, and it has also allocated funds for the production of IT programs. Instruction in the use of IT has also played an important role in teacher training organized by local authorities (Sinko and Lethinen, 1999: 7).

When, Finland devised a special information society strategy in the middle of the 1990s, the use of IT in instruction figured prominently as a key way to accelerate the progress of information society. Based on the information strategy on training and research prepared for educational sector under the Ministry of Education, significant additional funding was allocated to schools, universities and vocational institutions in order to purchase information technology and to network schools. Funding was also made available for teacher training (Sinko and Lethinen, 1999: 7-8).

It is worth to indicate that how Finland incorporated ICT to support its economy. According to Raivola and Vuorensyrja (1998:14) the Finish economy is changing into: First an economy based on information and knowledge, Second an economy based on information technology, intelligent logistics and project organization and, Third an economy, which serves and is served by quality-conscious and digitally, oriented people.

These economic trends place totally new kinds of challenges of lifelong learning and ethical competence, and consequently on all policies and infrastructure responsible for continuously maintaining and developing people's skills.

ICT will facilitate support for individual learning and make it easier to provide timely feedback. In addition, new technology shifts the emphasis away from lectures, where students passively take information which is then expected to parrot back, towards more active ways of acquiring information. ICT also frees people from routine administrative tasks (ERT, 1997:145).

Uganda is emerging as a leader of African education reform. One of the country's most progressive moves is its adoption and application of ICT for national development with its growing computer capability harnessed to serve education. Through the CONNECT-ED (Connectivity for Educator development) project for example Uganda is integrating ICT in to professional development programs for primary school teachers with focus on computer-assisted teacher training.

Through newly created multimedia laboratories in eight Primary Teacher-training Colleges (PTCs). Located in both rural and urban areas teachers will have access to the training curriculum through computer mediated learning environments and digital library resources. The program is enhancing the curriculum with ICT by developing, testing and distributing online multimedia training modules for teachers and tutors. These teachers in turn will train current and future

teachers. These teachers, in turn, will train current and future teachers at the participating PTCs (Fontaine, 2002:178).

Chapter THREE

Methodology and Research Design

3.1 Research Methodology

Descriptive survey method was employed to explore the problems. This approach enabled the researcher to identify the prevailing utilization constraints that need to be alleviated so as to enhance utilization of information communication technology in the selected teacher training colleges. Thus in describing the existing deterring utilization factors of information communication technology in the selected teacher training colleges, the descriptive survey research method was found to be relevant and convenient.

3.2 Data Sources

Primary sources of data were gathered from teachers and students through questionnaires. These sources helped the researcher to acquire first hand information and draw valid inferences. Moreover, data from assistant deans were collected through interview. College teachers were selected because of their direct involvement in the utilization of ICT whereas, students were chosen for the reason that they are mainly the target group of the program.

Secondary sources of data were gathered through documentary analysis. Information resources were synthesized information from primary sources of data, which were found to be appropriate for the study.

3.3 Sampling

Since the findings of this assessment were generalized to Adama, Awassa, and Kotebe College of Teacher Education, the source of data needed to be representative of the three colleges. The basis of the analysis was students, teachers, and deans. ICT classes of the programs were also source of data in which observation were conducted. Hence, the sampling technique was emphasized on data that are collected at college level. Therefore, all the three colleges in which information communication technology were given as a subject was covered by this study.

The researcher set three criteria to select information rich sample area; (1) the availability of ICT infrastructure and laboratories, (2) accessibility to collect the necessary data, and (3) familiarity of the researcher with the area. Based on this Adama College of Teacher Education from Oromia Region, Awassa College of Teacher Education from Southern Nations Nationalities People Region (SNNPR), and Kotebe College of Teacher Education from Addis Ababa City Administration were selected (see table 2).

Table 2 List of Sample College of Teacher Education with total students and teachers population

Nó.	Name of CTE	Number of Students			Number of Teachers		
		Male	Female	Total	Male	Female	Total
1	Adama CTE	611	683	1294	62	4	66
2	Awassa CTE	1331	842	2173	96	14	110
3	Kotebe CTE	1558	870	2428	94	28	122
	Total	3500	2395	5895	252	46	298

The study consisted of a total of 1026 respondents drawn from students and teachers of the three teachers training colleges. Accordingly the questionnaire that contained 12 and 20 items was distributed to 909 students and 117 teachers respectively. Of the total number of questionnaires 1026 distributed to the groups of respondents a total of 966 questionnaires were appropriately filled in and returned, while 60 questionnaires were wrongly filled in and were discarded. The return rate is 94 percent.

Regarding student respondents, 909 were taken from 5895, which accounted 15.4 percent of the total students. Only third year students were taken for this study, because they were the only students who completed ICT courses in the three selected colleges at the time of the study.

3.4 Sampling Technique

There are more than 60 colleges existing in the two Regions and one city administration. The College of Teacher Education included in these study were Adma College of Teacher Education from Oromia region, located in Adama town 100km from Addis Ababa, Awassa Ccollege Teacher Education, located in Awassa town 275km from Addis Ababa, in the Southern Nations and Nationalities Peoples Region, and Kotebe College of Teacher Education, located in Addis Ababa City Administration. Purposive sampling was employed to select the colleges.

Stratified sampling was employed for teachers, while purposive sampling was employed for assistant deans'. Regarding the student's respondents, third year students were selected, because they were the only group who took the two ICT courses in the selected colleges. Discretionary sampling was employed with the objective of getting an adequate overall picture.

3.5 Procedures of Data Collection

In collecting data for the study, three steps were adopted; Observation, Interview and Questionnaires.

3.5.1 Questionnaire

Questionnaire was used to secure data from students and teachers. The first section was prepared to acquire characteristics of respondents. The second section of questionnaire was an open ended type. This section was aimed to acquire necessary information on the availability of ICT equipments see Appendix A and B).

3.5.2 Interview

Interview is a good tool to secure an in-depth data. To obtain such an advantage the researcher employed interview guides. The respondents were three CTE assistant deans. Items which were used for guided interviews were given in (Appendix C).

3.5.3 Observations

In order to assess the actual utilization of ICT in the three colleges, laboratories level observation checklist was prepared (see appendix E). The items of the checklist were drawn from related literature to the issue and from researcher's personal experience in the field.

The items checklist were included list of ICT infrastructure present in the computer laboratories of the three colleges.

The computer laboratory observation made by the researcher himself to have a better understanding on the information to be obtained.

3.6 Method of Data Analysis

The study explores the extent of ICT utilization through multiple method of data collection. Thus, the procedures followed for analyzing the data depend on the instruments employed. Data from students and teachers questionnaires and observation were collected, tallied and fed to Microsoft Office Windows Program.

Next the descriptive analysis was conducted for each cases and reported frequency counts and percentage. Percentages were used mainly to make the figure easily understandable.

The data drawn from interviews were carefully studied, presented both as expressed by the respondents and as understood by the researcher under each variable and used to substantiate with students responses.

CHAPTER FOUR

Presentation, Analysis of Data and Interpretation

4.1 Presentation and Analysis of Data

4.1.1 Characteristics of the Respondents

In this study, different categories of respondents; teachers, students, and administrative personnel were involved. The respondents are direct stakeholders and, as a result, they were considered to be relevant and main source of dependable information for the study.

One thousand twenty six copies of questionnaires were distributed to the respondents. Out of these, 966 (94%) of copies of questionnaires were returned. Of the returned copies were 861 (94.7) from students and 105 (89.7) from teachers. As a result, the responses were found to be sufficient to draw inferences for the study.

The results from teacher's questionnaires and document analysis to the teacher's characteristics in the Adama, Awassa, and Kotebe CTE are presented below.

Table 3 Teachers by Sex, Age and Service year

		No of teachers	% (percent)
Sex	Male	100	85.5
	Female	17	14.5
Age in years	Under 30	24	20.5
	30-50	62	53
	Above 50	19	16.2
	NR*	12	10.3
	Total	117	100
Service year	1-5	29	24.8
	6-15	65	55.5
	Above 16	11	9.4
	NR*	12	10.3
	Total	117	100

Note: NR* teachers not returned the questionnaire

As cited in the introductory part of this chapter, a total of 117 teachers were involved in the study. Out of these were 22(18.8%) from Adama CTE, 40 (34.2%) from Awassa CTE, and 55 (47%) from Kotebe CTE.

As far as their sex is concerned, 100 (85.5%) of the teachers were males while the remaining 17(14.5%) of them were females (see table 3). This reveals that the participation of female teachers in education sector in the three selected colleges under study was less.

With respect to service years, 24(20.5%) and 65(55.5%) of teachers served between 1-5 and 6-15 respectively. The remaining 11(9.4%) were above 16 years of services.

The characteristic of the students explains the composition of males and females, their ages. A total of 909 students were involved in the study. Out of these, 610 (67.1%) were males and 299(32.9%) were females; the data reveal the existence of males dominance in number from the sample population (see table 4).

As far as the students' age was concerned, 630(69.3%) were found in the age category of 16-21. It was followed by the age category of 21-25 with 215(23.6%) of students. The remaining 16(17.6%) of them were categorized in the age group of 26 and above. The data showed that almost all of the respondents were found in the appropriate school age.

Table 4: Students by their sex, Age

		Adama teacher training college		Awassa teacher training college		Kotebe teacher training college		Total	
		No. of students	% of total sample	No. of students	% of total sample	No. of students	% of total sample	No. of students	% of total sample
Sex	Male	160	17.6	250	27.5	200	22	610	67.1
	Female	115	12.6	110	12.1	74	8.1	299	32.9
	Total	275	30.2	360	39.6	274	30.1	909	100
Age	16-20	183	20.1	280	30.8	167	18.3	630	69.3
	21-25	70	7.7	60	6.6	85	9.3	215	23.6
	26 and above	2	0.2	10	1.1	4	0.4	16	17.6
	WF*	20	2.2	10	1.1	18	1.9	48	5.3
	Total	275	30.25	360	39.6	274	30.1	909	100

Note: WF* - students wrongly filled the questionnaire

4.1.2 Teachers qualification and skills of ICT

The results from teacher questionnaire and document analysis of teacher's qualification and skills are presented below.

Table 5: Teachers qualification and streams they belong

		No. of teachers	% (percent)
Qualification	Diploma	7	6
	Bachelor	46	39.3
	Masters	52	44.4
	NR*	12	10.3
	Total	117	100
streams of teachers	Social Science	23	19.6
	Mathematics**	25	21.4
	English/Language	18	15.4
	Esthetics	7	6
	Natural Science	32	27.3
	NR*	12	10.3
	Total	117	100

Note: NR* - teachers not returned the questionnaire

** - 5 computer instructors belong to mathematics stream and all are computer for teaching graduates with Bachelor degree.

Regarding the qualification of teachers, 52 (44.4%) and 46 (39.3%) were Masters and Bachelor degree holders respectively. Those who had diploma were 7 (see table 5).

Regarding the streams they belong, only 5 teachers have graduated with ICT for teaching. The remaining teachers are graduates of different fields. This reveals that, the qualifications of teachers with regard to ICT at CTE are inadequate, which has a repercussion on the proper implementation of ICT in these colleges.

The results from the teacher's questionnaire analysis to the teachers' information communication technology skills are presented below.

Skills of teachers in the information communication technology are vital to enhance ICT in colleges. The findings from the survey of information communication technology skills, reveals that almost all teachers were competent in basic word-processing, Spreadsheets, PowerPoint, and Internet browsing software (see Table 6). In addition, they have the least competency in graphics, web-page design, database administration, programming and statistical tools.

Table 6: Teachers ICT skills

No.	Activities	Excellent 5		Very good 4		Good 3		Fair 2		No Capability 1	
		No	%	No	%	No	%	No	%	No	%
1	Word processing	97	82.9	5	4.3	3	2.6	-	-	-	-
2	Spreadsheets	93	79.5	-	-	6	5.1	2	1.7	-	-
3	PowerPoint	87	74.4	10	8.5	8	6.8		-	-	-
4	Internet browsing	100	85.5	5	4.3		-		-	-	-
5	Graphics	7	6	-	-	12	10.3	8	6.8	78	66.7
6	Web page design	9	7.7	-	-	4	3.4	15	12.8	77	65.8
7	Database administration	14	12	8	6.8	4	3.4	16	13.7	63	53.8
8	Programming	10	8.5	-	-		-	15	12.8	80	68.4
9	Statistical tools	28	23.9	15	4.3	10	8.5	35	29.9	17	14.5

Similarly the skills of students in ICT were rated. Accordingly the results shows that, Word-processing, spreadsheets, and PowerPoint software skills were rated high with 84.9%, 83.4%, and 49.3% respectively with excellent and very good skills (see table 7). Whereas, students' were not competent at all on basic skills of web-page design, and Internet browsing.

Table 7: Students ICT skills

No.	Activities	Excellent 5		Very good 4		Good 3		Fair 2		No Capability 1	
		No	%	No	%	No	%	No	%	No	%
1	Word processing	552	60.7	220	24.2	89	9.8	-	-	-	-
2	Spreadsheets	367	40.4	390	43	90	9.9	14	1.5	-	-
3	PowerPoint	240	26.4	208	22.9	85	9.3	28	3.1	-	-
4	Internet browsing	190	21	143	15.7	110	12.1	22	2.4	396	43.6
5	Web-page design	-		-	-	21	2.3	21	2.3	863	94.9

4.1.3 Availability of ICT Infrastructure

Regarding the availability of ICT infrastructure, as indicated in are listed below.

Table 8: Availability of ICT infrastructure

No.	Name of CTE	No. of Desk top Computers	Ratio of computer /student	No of multimedia computers	No. of Printers	No. of telephone lines	Internet	
							yes	no
1	Adama TTC	25	1:36	-	—	-		X
2	Awassa TTC	40	1:34	40	—	-		X
3	Kotebe TTC	40	1:24	-	—	12	X	
4	Total	105	1:22	40		12		

Ratio of Computer per student was 1:36, 1:24, and 1:24 to Adama , Awassa, and Kotebe CTE respectively. All other ICT equipments such as fax, laptop computers, LCD projector, VCD player, Scanner and printer were not available (see Table 8).

Out of the three CTE, Adama, and Awassa, CTE students had no access to the Internet until the time the researcher conducted the survey.

All colleges reported the existence of Microsoft Word 2000, Microsoft Excel 2000, Microsoft PowerPoint 2000, and Publisher 2000 software in their colleges, however in limited numbers.

Thus the findings indicate that the appropriate ICT infrastructures were in limited supply, access to all students and teachers were at low level. Therefore, most of the colleges are less equipped with the necessary infrastructure, which reduces the quality of ICT in the colleges.

The responses of teachers show the barriers that affect utilization of information communication technology in Adama, Awassa, and Kotebe Colleges of Teacher Education. The barrier listed is, lack of training for teachers which were rated high with the average means score 4.6. On top of this, during the interview conducted with college assistant deans, they raised that lack of training for hinders the utilization of information communication technology in the colleges.

Moreover, lack of text books and lack of ICT plan were rated high with the average mean 4.5 and 4.4 respectively. In line with this, during observation, in all of the colleges, there was no sufficient number of facilities such as computers and accessories (see table 9).

Generally, it appears that though the degree varies all of the factors tend to affect utilization of information communication technology in the selected colleges of teacher education.

Table 9: Factors affecting the utilization of ICT (the result from analysis of teacher's questionnaire)

No	Variables	S. A 5	Agree 4	Und. 3	Dis. 2	S. Dis 1	Average Mean	Rank
1	Cost of Hardware	80	13	5	7	-	4.3	4
2	Cost of technical Support	67	36	2	-	-	3.4	7
3	Poor telecommunication infrastructure	38	12	-	30	25	2.9	8
4	Lack of textbooks	89	16	-	-	-	4.5	2
5	Lack of training for teachers	95	10	-	-	-	4.6	1
6	High Internet Charge	64	23	10	8	-	4.3	5
7	Breakdown of ICT equipment	30	27	24	12	8	3.8	6
8	Absence of ICT plan	82	11	12	-	-	4.4	3
Grand mean = 4.02								

4.1.4 Factors Affecting the Utilization of ICT

A number of factors hinder the utilization of information communication technology in colleges in Ethiopia. The major factors include lack of information, shortage of textbooks and reference books, problem with Internet access, poor supply of facilities, inadequacy of periods to cover contents, large class size, inadequacy of technical support, inadequacy of time for practice, inadequate financial support for ICT, and lack of support from school personnel.

To identify the factors affecting utilization of ICT in CTE, opinion and responses were gathered from different groups of respondents.

Some of the major problems faced in utilization of information communication technology as observed by teachers were indicated as follows; computers are insufficient, insufficient trainings for teachers, lack of Internet access, lack of technical supporting staff, insufficient time to practice, large class size, and student poor background in information communication technology. Assistant deans have also indicated the following problems that faced the utilization of ICT.

- Scarce budget was allocated to implement utilization of information technology
- Shortage of ICT graduates to teach and to utilize ICT
- Shortage of computers
- Inadequate ICT infrastructure facilities

4.1.5 Recommended Solutions

On the basis problems encountered in utilizing information communication technology, the teachers and assistant deans recommended the following solutions.

- The regional government should allocate sufficient amount of budget for the proper utilization of ICT.
- ICT supporting staff and graduate teachers should be hired
- In-service training on ICT usage and maintenance should be given to teachers
- ICT should be included as a subject or integrated the curriculum of lower grades.

4.2 Analysis of Major Findings

The focus of this study was to assess the availability of information communication technology infrastructure, curricular material, teacher's qualification and competence in utilization of ICT, how teachers training colleges are equipped with the necessary educational infrastructure and the major factors that affect the utilization of information communication technology in Adama, Awassa, and Ketebe College of Teacher Education.

Research and experience show that the educational benefits to technology in schools are wide-ranging and significant (SACCS, 1997:2). The effective use of ICT in colleges can:

- Provide students with immediate access to a richer source of materials
- Encourage teachers to take a fresh look at how they teach and ways in which students can learn
- Reduce risk of failure

Bearing this in mind, the information were sought regarding other indicated the existence or absence of favorable teaching-learning environment in the colleges for utilization of information communication technology, ranging from the facilities of the colleges to the service provided by college administration. The reveals that the student text book and teachers guide are available in the colleges, but they are insufficient.

It is important that the utilization requires teachers to have knowledge and skills needed to put the roles and activities into practice. Except basic computer skills and word processing, most teachers were not skilled on Statistical tools, database administration, and graphics as reported by them. Similarly, on the side of students', most of them were not skilled except in Word-processing and spreadsheets.

From the information communication technology resources, computers are one of the main equipment. Research suggests a ratio of one computer to five students is a required effective use. And, ideally, they should also be linked to a college wide network to allow resource sharing, easy access by students and teachers (SACCS, 1997:7). But, the result of this study shows that the numbers of computers in all three colleges were found to be unsatisfactory scarce in that

the average ratio is one computer to 22 students. Furthermore, all computers found in the colleges' laboratories were not networked.

There are a number of factors that contribute to the lack of utilization of information communication technology in Adama, Awassa, and Kotebe CTE. Problems like poor supply of infrastructure, problems with Internet access, large class size,. Teachers also reported that adequate financial support, large class size, lack of ICT training have hampered the utilization of information communication technology in Colleges of Teacher Education.

Chapter Five

Summary, Conclusion, and Recommendation

5.1 Summary

The purpose of this study was to assess the utilization of information communication technology in Adama, Awassa, and Kotebe teacher training colleges.

To this end, the following questions were formulated.

4. To what extent ICT is utilized in teacher training colleges?
 - 4.1 What technology resources are currently available?
 - 4.2 What are the level of technology knowledge and skills of college staff?
5. What are the successes and challenges of ICT in teachers training colleges?
6. What should be done to improve the current situation of ICT?

Questionnaire, interview and document analysis were used to collect data from nine hundred students, one hundred seventeen teachers and three assistant deans. The collected data was analyzed through percentage, ratio, and mean values.

The findings showed that,

1. All teachers were competent on basic skills of information communication technology
2. Two colleges have no access to the Internet
3. The hardware infrastructure and software's available in the colleges were limited in number.
4. Most teachers were not skilled in graphics, database administration, and statistical tools
5. Inadequate financial support, inadequacy in-service training, large class size, and inadequacy of time for practice were some of the major factors that hinder the implementation of information communication technology in three teachers training colleges

5.2 Conclusion

On the basis of these findings, the following conclusions are made.

1. There exists an ICT infrastructure in all the three teachers training colleges. But the numbers seem to be insufficient.
2. Non professional teachers were forced to teach ICT courses in the absence of trained personnel.
3. There exist curricular materials of ICT in all the three teachers training colleges, but seem to be fewer in number.
4. Many factors impede the utilization of information communication technology. The major ones are inadequate financial support, inadequacy of in-service training, large class size, inadequacy of time to practice,

5. Problems with the Internet access and poor supply of facilities. Some of these factors are interrelated; hence it is their combined effect, which would seriously deter the utilization of ICT

5.3 Recommendation

Schools cannot move with the changes without improving the skills and abilities of the individual professional educators within them (SACCS, 1997: 13). Successful professional development programs contribute to bringing new changes in gradual incremental fashion. That is the primary goal of professional development has always been to improve the performance of the organization, the staff and, ultimately, the students.

Based on the findings of the study and conclusions drawn, the following recommendations were forwarded so as to promote the utilization of information communication technology in the colleges under study.

1. Regional education Bureau in collaboration with the Ministry of Education should strive to supply ICT infrastructure and curricular materials of information communication technology in sufficient quantity to the colleges.
2. Lack of training is cited as one of the major obstacles hindering teachers for successful utilization of ICT. Because teachers at the teachers training colleges are inappropriately and inadequately trained in the area of

implementing ICT. This could be relieved by giving in-service training for teachers to acquaint them with the knowledge and skills of teaching ICT.

3. The country's institutions of higher education have to be strengthened to fill the gap between the current supply and demand for skilled teachers by providing graduates with required skills in the area of ICT.
4. Those Colleges of Teacher Education that have no access to the Internet should have the access.
5. Finally the researcher would like to recommend that other extensive studies be made on the utilization of information communication technology.

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Appendix A:

Addis Ababa University School of Graduate Studies

College wide survey of ICT status and Use Teacher/Instructor Survey

Thank you for participating in this survey. The purposes this questionnaire is to assess the extent of utilization of ICT at your college and identify impediments of utilization. Please return the completed survey as soon as possible. If you have any questions, call (0911-64-15-24).

1. Gender: ☐ Male ☐ Female
2. Age: ☐ a. Under 30 ☐ b. 30-50 ☐ c. Above 50
3. Number of years in service:
4. Education level: ☐ a. Diploma ☐ b. BA/BSc. ☐ c. MA/Msc ☐ d. PHD ☐ e. Other
5. What is the average number of students in your class(s)? : students
6. Which stream do you teach?
☐ a. Social science ☐ c. Natural science ☐ e. Esthetics
☐ b. Mathematics/Physical science ☐ d. English/Language
7. In which subject do you use ICT as a teaching tool? (check all that apply)
☐ a. Computer science ☐ c. Science ☐ e. Social science
☐ b Mathematics ☐ d. English ☐ f. English/Language
☐ g. Other (please specify)
8. How many years you have been using computers?
☐ a. less than one year ☐ c. 3-6 year's
☐ b. 1-3 year's ☐ d. more than 6 year's
9. Did you receive any training on ICT over the past three years (YES/NO)

If yes Please indicate the following

Title of Training	Total number of hours	Level of course		
		Basic	Intermediate	Advanced

10. What are the main reasons for attending computer training?

___ a. Career enhancement ___ c. training required

___ b. Financial ___ d. Other

11. Please rate your expertise in the use of the following

	Excellent	Very Good	Good	Fair	No Capability
Word processing					
Spreadsheets					
Presentation tools (Power point)					
Internet browsing					
Graphics					
Web page design					
Database management					
Programming					
Statistical tools					

12. How often do you use ICT tools for the following purposes?

	Every day	Twice of more a week	A few time a week	Never
Teaching/Learning specific subjects				
Teaching computer skills				
Making presentations/lectures				
Preparing lessons				
Communicating with other teachers				
Communicating with students				
Preparing reports				
Other				

13. Where do you computer in college?

- ☐ a. On my office ☐ c. Administrative office ☐ e. Other
☐ b. Computer lab. ☐ d. Library

14. How many hours per week are you college computers accessible to you?

- ☐ a. less than one ☐ c. 3-6 hour's ☐ e. more than 10 hour's
☐ b. 1-3 hours ☐ d. 6-10 hour's

15. Do you use computers outside the school hours? (Yes/No)

16. If you have access to the Internet, how often do you use in the college

- ☐ a. once a month ☐ c. Several times a week ☐ e. Never
☐ b. Once a week ☐ d. Every day

17. How do you use Internet in your job as a teacher (check all that apply)

- ☐ For teaching specific lessons in various subjects
☐ For making presentation and lectures
☐ For preparing lesson
☐ For communicating with students and teachers
☐ For preparing paper and teaching material
☐ For collecting handout and reference material
☐ Other (Please specify)

18. What type of ICT training and support are available in your college? Circle "Y" or "N" to indicate whether training is available. If used rate how effective you think.

Type of training and support	How Effective was it?				
	Used Yes/No	Not Effective	Somewhat effective	Very effective	Not sure
Informal, self thought	Y N				
Formal Workshop/seminar	Y N				
Technical support	Y N				

19. To what extent do you agree to the following factors as barriers to the increased use of ICT in your college?
5=Strongly agreed; 4=agreed; 3=undecided; 2=disagree; 1=strongly disagree

- ___ a. Cost of purchase of hardware
- ___ b. Cost of technical support for training of teachers
- ___ c. Poor telecommunication infrastructure
- ___ d. Lack of textbook that integrate the use of ICT
- ___ e. Lack of training of teacher's use of ICT
- ___ f. High Internet service charge
- ___ g. breakdown of ICT equipments
- ___ h. Absence of ICT plan

20. What has been the most noticeable change in academic achievement in your college that may be related to increased use of ICT?

Appendix B:

Addis Ababa University School of Graduate Studies

College wide survey of ICT status and Use

Student Survey

Thank you for participating in this survey. The purposes this questionnaire is to assess the extent of utilization of ICT at your college and identify impediments of utilization. Please return the completed survey as soon as possible. If you have any questions, call (0911-64-15-24).

1. Gender: _____ Male _____ Female
2. Age in years: _____
3. What year are you learning currently?
_____ a. 1st year _____ b. 2nd year _____ c. 3rd year _____ d. 4th year
4. How many years have you been using computers?
_____ a. less than one year _____ c. 2-4 years _____ e. more than 6 years
_____ b. 1-2 year's _____ d. 4-6 years
5. Please indicate weather you have / have no access and using / not using the following in your college work

Items	Available Yes or No	Use for college work Yes or No
Overhead projector		
Television		
VCD		
VHS		
DVD		
Multimedia projector		
LCD projector		
Computers		
Printers		

6. In which classes or subjects do you use computers and related ICTs?

___ ICT subjects ___ Science ___ Social science
___ English ___ Esthetics ___ Local language
___ Other (please specify)

7. Please indicate your level of skill in the use of the following

Computer Application	Excellent	Very Good	Good	Fair	No capability
Word-processing					
Spreadsheets					
Presentations(PowerPoint)					
Internet browsing					
Web page design					

8. Where do you use computers in college?

___ a. in a computer lab ___ c. I do not use computers in college
___ b. in the library ___ d. Other (please specify)

9. If you are using computers and related ICT how many hours on the average per week you are to use to do your studies? ____

10. Do you have access to the Internet? (Yes/No)

11. How often do you use the Internet for surfing websites in colleges?

___ a. Never ___ c. Once a month ___ e. Once a week
___ b. Several times a week ___ d. Daily

12. Please use the space below for any additional comments you would like to share regarding the use of ICT in your college?

Appendix C Interview Guide

Interview Questions during survey of colleges

1. What facilities are available to support ICT plan?
2. Does the facility have necessary infrastructure to support a significant increase in personal computers and servers?
3. Do the buildings have necessary air conditioning and room security?
4. Who are the major stakeholders in teacher training programme?
5. What is their interest (political, personal, economic) in the programme?
6. Does the college have the vision and mission statement?
7. What kind of hardware, software, and infrastructures are necessary to support the educational goal of the teacher-training programme?
8. Will the technology be flexible, powerful, adaptable, and expandable?
9. How will the needs of students with disabilities be addressed?
10. What are the important unmet needs?
11. How will the level of technology proficiency gained by students, teachers, and staff to be assessed?

Appendix D

The National Educational Technology Standards for Teachers (ISTE)

All class teachers should be prepared to meet the following standards and performance indicators.

- I. Technology Operations and Concepts: Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:
 - A. Demonstrate introductory knowledge, skills, and understanding of concepts related to technology.
 - B. Demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.
- II. Planning and Designing Learning Environments and Experiences: Teachers plan and design effective learning environments and experiences supported by technology. Teachers:
 - A. Design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners;
 - B. Apply current research on teaching and learning with technology when planning learning environments and experiences;
 - C. Identify and locate technology resources and evaluate them for accuracy and suitability;
 - D. Plan for the management of technology resources within the context of learning environments and experiences;
 - E. Plan strategies to manage student learning in a technology-enhanced environment.

III. Teaching, Learning, and the curriculum: Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning. Teachers:

- A. Facilitate technology-enhanced experiences that address content standards and student technology standards;
- B. Use the technology to support learner-centered strategies that address the diverse needs of students;
- C. Apply technology to develop students higher order skills and creativity;
- D. Manage student-learning activities in a technology-enhanced environment.

IV. Assessment and Evaluation: Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:

- A. Apply technology in assessing student learning of subjects matter using a variety of assessment technique;
- B. Use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning;
- C. Apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.

V. Productivity and professional practice: Teachers use technology to enhance their productivity and professional practice. Teachers:

- A. Use technology resources to engage in ongoing professional development and lifelong learning;
 - B. Continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning;
 - C. Apply technology to increase productivity;
 - D. Use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.
- VI. Social, Ethical, Legal, and Human Issue: Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK -12 schools and applies that understanding in practice. Teachers:
- A. Model and teach legal and ethical practice related to technology use;
 - B. Apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.
 - C. Identify and use technology resources that affirm diversity;
 - D. Promote safe and healthy use of technology resources;
 - E. Facilitate equitable access to technology resources for all students.

Appendix E

ICT Availability of ICT Infrastructure

DIRECTION: PLEASE MARK () YOUR RESPONSES ON THE SPACE PROVIDED. AND FILL THE APPRIOPRIATE RESPONSE IF THE QUESTION REQUIRED WRITTEN RESPONSE

1. Do you have electric generators for your ICT equipment? (Yes/No)
2. Which of the following ICT equipment does your college have?

No.	ICT equipment	Yes	No	Quantity (If answer is yes)
A	Telephone			
B	Fax Machine			
C	VCD player			
D	Video Deck			
E	Desktop Computer			
F	Laptop Computer			
G	Printer			
H	Scanner			
I	Network			
J	Internet/email			
K	Internet/World Wide Web			
L	Software Available			

DECLARATION

I confirm that this thesis is my original work

Name

Me Sfin Amare

Signature



Date Submission

April 25, 2007

This thesis has been submitted for examination by my approval as a university advisor

Name _____

Signature _____

Date of Submission _____