ADMINISTRATIVE AND STAFF READINESS FOR POTENTIAL USE OF ICT IN EDUCATION: THE CASE OF COLLEGE OF EDUCATION, AAU

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Administrative and Staff Readiness for Potential Use of ICT in Education: The Case of College of Education, AAU

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Table of Contents

List of Figures

Page

List of Tables

List of Abbreviations

AAU - Addis Ababa University

ICT - Information and Communication Technology

ICTDO - Information and Communication Technology Development Office

VSAT - Very Small Aperture Satellite Terminal

SDDPC - System Design and Data Processing Center

Abstract

This work presents an investigation of ICT policy of AAU and preparedness of College of Education to integrate ICT into the teaching-learning process. The ICT policy of the University and the readiness of the administrative bodies of the College of Education to integrate ICT were investigated using interview and document analysis. Preparedness of the teaching staff of the College of Education in terms of ICT use, awareness of emerging ICTs, attitude towards ICT and competency(skill) in the use of emerging ICTs were studied using questionnaire. The data obtained through interview and document analysis were analyzed qualitatively while the one obtained through the questionnaire was analyzed using frequency tables and graphs. It was found that ICT policy is currently non-existent at AAU. It was, however, found that the University was on the way of developing ICT policy. The findings also showed that the majority of the teaching staff were using ICTs particularly computers (96.9%) and internet (95.7%). Most of the teaching staffs (93.4%) were found to be using computers daily. As of the competence of the teaching staff on some of the basic ICT applications the study exhibited that the perception of the majority was promising especially on word processing, emailing and internet browsing. The teaching staff and the management team were also found to have positive attitude towards ICT in education. An investigation of the College's infrastructure readiness revealed that there was a serious problem of access to ICTs by the students i.e. the current ICTs were only serving the teaching staff and the administrative offices. The ICT integration level at AAU, College of Education was seen in light of a proposed ICT integration model. It was found that the characteristics of the College of Education resemble a typical institution at the first phase, Emerging Phase, of the proposed ICT integration model. It was, so, recommended that the College of Education needs to work hard to meaningfully integrate ICT into the education system so that movement to the next phases, applying, integrating and transforming could be possible.

CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

Information and Communication Technology (ICT) has changed and is changing almost the entire "how-of-lives". It has changed how people communicate (i.e. phone technology, fax, e-mail, chat, weblog, SMS, etc), how they market (i.e. the E-business –online marketing, network marketing etc), how they teach and learn (i.e. E-learning, Web-based learning, Online learning, Virtual classrooms, Open learning through Distance Education, the schoolnet, CD-ROMS, Computer assisted learning, etc), how they govern (i.e. E-governance), how they treat patients (E-healthcare), and much more untraceable areas of their daily life. In line with this, Hailu (2001) holds that it is becoming very clear that the future will be the edge where there will be no single activity that is going to exist without utilizing the Information and Communication Technology.

The current Ethiopian government has showed great interest and recognition to promote, develop and use ICT in recent times. In this respect, the Ethiopian Telecommunication Corporation has stated that it has a vision to see the entire country connected with state-of-the-art ICT infrastructure that provides highly qualitative, reliable and secure communication services at affordable prices (http://www.telecom.net.et).

There are some visible initiatives by the Ministry of Capacity Building of Ethiopia to develop ICT in the education sector. The three initiatives namely, Ethiopian National SchoolNet Initiative, The National ICTs in Higher Education Initiatives; and The National ICT Education, Training and Awareness Initiative represent commitment from the govement to deploy and develop ICT in the education sector. The initiatives have varying and sector specific aims. The aim of the 'Ethiopian National SchoolNet Initiative' is to facilitate the deployment and the exploitation of ICTs, to facilitate teaching and learning process within the Ethiopian school system,

including the primary, secondary, technical and vocational schools. The aim of 'The National ICTs in Higher Education Initiatives' is to assist the deployment of ICTs within the nation's universities, colleges and research institutions to facilitate teaching, learning and research activities where as the aim of the 'National ICT Education, Training and Awareness initiative' is to promote ICT awareness and literacy initiatives; life-long and adult education initiatives as well as distance and virtual education and learning initiatives through the deployment and exploitation of ICTs (http://www.wikieducator.org/ICT4Africa/Country_Report_Ethiopia)

Similarly, the ICT Development Office (ICTDO) of Addis Ababa University has stated that the vision of the ICTDO sector of the University is: "to become a center of excellence in utilizing the potential of ICT in learning, research, innovation, and educational environment for national development" (http://www.aau.edu.et/ict/). Having this vision, what comes to the mind of the researcher is, "To what extent is Addis Ababa University, College of Education ready to realize this vision?"

Accordingly, the purpose of this research is to investigate the readiness/preparedness of Addis Ababa University, College of Education to integrate ICT into the education system.

1.2. Statement of the problem

ICT has been successfully incorporated in the educational systems of the developed countries years before and there have been studies that showed the positive contribution of technology in facilitating learning. For instance, Jay-Sivin-Kachala as cited in Schacter (1999), after reviewing 219 research studies from 1990 to 1997 to access the effect of technology on learning and achievement across all learning domains and all ages of learners, found that students who learnt with computers scored higher on achievement tests, learn more in less time, liked their classes more and have more positive attitudes towards their work. In another study, Becta as cited in Robertson et al. (2004) observed that from national testing results of 2110 schools in the UK, schools with very good Information and Communication

Technology (ICT) resources had higher proportions of students performing at the higher levels of achievement in English, mathematics and science, independent of school socio-economic status and privilege.

Similarly, in Jamaican Ministry of Education, Youth and Culture ICT policy document (2003) it is accentuated that ICT is profoundly affecting every aspect of human activity. In the same document, as summarized from different studies, it is disclosed that ICT can provide stakeholders and administrators with new tools for increased communication for management efficiencies, and teachers and learners with improved learning opportunities by:

- Empowering citizens, managers and other stakeholders by enabling online teamwork for increased participation, collaboration and information sharing through the use of email, the Web and other remote collaboration tools
- Enabling the rapid creation and inexpensive distribution of educational information and knowledge, and, facilitating fast and easy access to information and expertise around the world
- Encouraging professional development, in-service-training, remote support and mentoring for lifelong learning, and increasing motivation through the use of multimedia (sound, video, graphics, animation and text.)
- Allowing each student to learn at his/her level and speed thereby giving pupils greater control over his or her own learning, and, enhancing the development of the abilities of mentally and physically challenged students.
- Engaging students in research, data analysis and problem solving, thereby facilitating higher-order thinking processes such as synthesizing, interpreting and hypothesizing, and promoting active learning rather than passive learning (Jamaican Ministry of Education, Youth and Culture (2003).

Many other scholars in educational technology believe that technology could increase the exploratory behavior of learner. Mattingly (1998) claims that computer-based instruction improves student learning by providing different avenues for students to explore. Similarly, Jonassen (2000) holds that computers provide students with mindtools i.e. computer applications programs such as databases, spreadsheets, semantic networks, hypermedia, multimedia, programming, microworlds etc., which require students to think critically and in meaningful ways to use the applications to represent what they know.

These studies show that ICT is contributing a lot to the success of students' learning. It is, so, important to note the worth of ICT in Ethiopian's teaching-learning environment. Though the number of studies on the impact of ICT on the student's learning in Ethiopian context is limited, it is possible to learn from the experience of the other pioneering countries that ICTs could bring profound effect the teaching-learning environment. So, it is compelling and timely to integrate computers in educational systems in Ethiopian educational institutions to get a hold of those advantages of ICTs in education. Ethiopian educational institutions should benefit from the computer and internet technologies. This new generation needs to show expertise in experimentation and exploration using technology. Similarly, it is indispensable that Addis Ababa University, College of Education meaningfully incorporate ICT in the teaching-leaning process.

The integration of ICT in the educational system requires the development of comprehensive ICT Policy. In relation to this UNESCO Bangkok (2005) emphasized that in order to make successful use of ICT in enhancing the reach and quality of teaching and learning, policy makers need to be aware of how ICT can be of best value in their country's education system, and need to develop a supportive policy environment and framework at the national level for the integration of ICT into their education systems (www.unescobkk.org). The case of Addis Ababa University with respect to owning comprehensive and working ICT policy is in question. One of AAU's ICTDO officer, Moges Delelegn (2005, October 22), has

presented and reported on AAU's E-learning readiness to GTZ officials (Funding NGO) and University Community that his office was working on Draft ICT policy. On the other hand, Dawit (2006) has indicated that one of the major challenges that the ICTDO faced in integrating ICT into teaching and learning was absence of institutional ICT policy (p. 87). The current study then tries to look into the ICT policy in AAU and tries to assess the contents and comprehensiveness of the policy.

In addition to ICT policy, it is mandatory to have prepared implementing bodies for successful ICT integration in the education system. The administrators need to have positive attitude towards the computer-based paradigm and should be ready to implement computers in teaching-learning environment. The teachers also need to be prepared well with respect to their attitudes, skills, understanding of pedagogical use of computers, and how they can model the computerized classroom to the learners. Related with this, Wang as cited in Foster (2005) holds that tertiary educators need to help pre-service teachers develop a clear vision about how they can facilitate student learning with computers. One of the ways this clear vision can be formed, as Pope, Hare & Howard as cited in Foster (2005) claimed is by modeling appropriate Information and Communication Technology skills in tertiary education i.e. as pre-service teachers see technology modeled and as they are provided with more opportunities to use technology in the classroom setting, high anxiety levels stemming from negative attitudes toward computers will be lessened. This means that, university teaching staffs should be a good model for others, let alone for themselves.

The point in here is, the readiness level of AAU, College of Education to integrate ICT into education is not specified yet. The attitude readiness, the skill preparedness and ICT awareness of the teaching staff and administrative bodies of College of Education to successfully integrate ICT into the education system is not indicated. What is present and what is lacking is not researched out. Dawit (2006) found out that lack of ICT skill by teachers and absence of adequately trained staff with good technical and pedagogical skill in AAU (the universe not the case) were

reported by the ICTDO as challenges faced in integrating ICT into teaching and learning (P. 86). It is also evident that Dawit (2006) has found out the teaching staff of Addis Ababa University have positive attitude towards ICT in the teaching and learning process (P. 86). The situation of the College of Education with respect to ICT preparedness level, and lack of knowledge of what is present and what is lacking to successfully integrate ICT into the teaching-learning system of the College of Education are points which need attention.

Moreover, securing appropriate infrastructure is also noteworthy for the implementation of the computer-based education. What material and technical resources i.e. computerized classrooms, internet connections, electronic textbooks, digital camera, web sites, projectors and other interactive multimedia, are available to make the computer-based programme practical (Foster, 2005). From practical observations during the researcher's stay at AAU, College of Education, it was possible to see that the students have no or limited access to the ICT infrastructures i.e. computers, internets, and etc. Some of the members of the teaching staff were seen to have no or limited or access to internets at their offices. This is an indication for need of investigation of ICT infrastructure at College of Education for successful ICT integration into the teaching-learning process.

So, investigating the preparedness of the concerned bodies and the availability of necessary resources to host the computer-based education paradigm in to Addis Ababa University, College of Education is crucial for the practicality of the ICT integration into education. The researcher in this study, then, attempts to accomplish the following purposes related with the above rationales.

1.3. Objectives of the Study

The objectives of this study are to:

1. Assess the readiness (preparedness) of Addis Ababa University, College of Education to integrate ICT in to the education system;
2. Investigate the infrastructure which is necessary to integrate ICT in the education system.

1.4. Basic Research Questions

Based on the statement of the problem, the researcher set the following basic research questions:

1. What does the preparedness/readiness level of Addis Ababa University, College of Education look like with respect to awareness, attitudes and skills of the management team and teaching staff, and the indispensable ICT infrastructure?
2. What are the human and infrastructure resources available in the College of Education to make the educational system ICT based?
3. What are the human, and infrastructure resources lack in the College of Education to make the educational system ICT based?
4. What are the contents of ICT Policy of Addis Ababa University? What are the strengths and weakness of the Policy?

1.5. Significance of the Study

The researcher believes that the results of the study will help the:

- University to evaluate the comprehensiveness (strengths and weaknesses) of its ICT in Education Policy for further development.
- College of Education to be aware of the level of their preparedness to integrate ICT and to indicate what more human and technical resources they need to integrate ICT in the educational systems.
- College of Education to re-check its ICT infrastructure for successful implementation.

- Teaching staff in the College of Education to raise their awareness of the role of ICT in the teaching and learning environment.
- Educational planners and curriculum experts in their attempt to integrate ICT into education system.
- Future researchers in the area of ICT in Education in Ethiopia to have background information about the ICT in Education Policy, to measure preparedness of higher educational institutions to host the computer-based education program and to learn the indispensable infrastructure for the ICT integration; and to fill the gap that is created by the emerging ICTs.

1.6. Scope of the Study

The research has delimited the study in the following manner:

The place of the research is College of Education, Addis Ababa University. The research will not include the other faculties or departments of the University other than the College of Education. ICT policy is treated in the University context because of its inclusiveness.

The variables to be included in the study are ICT Policy of Addis Ababa University, administrative readiness (of College of Education), teacher readiness (Attitude/awareness, ICT Skill, ICT Training, level of Use of ICT in daily life) of the College of Education and the ICT Infrastructure of the College of Education (Computers, Internet, Bandwidth and Network). Variables other than the aforementioned ones such as, the content aspects, self-efficacy of the teaching staff, ICT and Library, ICT and Distance Education, though very important in ICT integration are not treated in this study.

1.7. Limitation of the Study

The researcher planned to distribute 133 questionnaires to the teaching staffs out of which 105 were successfully distributed. The other 28 questionnaires were not distributed at all because the teaching staffs were not available i.e. some were on

study leave and some others were left for practicum teaching out of town, and few others were not willing to fill in the questionnaire because they said they were busy on office work and classes. Moreover, from the assumed six interviewees, only three were met. One was not willing to sit for interview because of work overload, the other said he would not have better information on the topics of discussion than the other management teams and recommended the researcher to meet them and the other was not found at all. These factors may, to some extent, affect the findings.

1.8. Operational Definition of Terms and Concepts

The following terms are used in the following context and meaning in the study.

Information and Communication Technology (ICT): This phrase stands for any use of computers and internet technology to facilitate the teachers in the designing and presentation of their teaching materials and the workers in office. ICT is the Universal set of Computer-Based Education (CBE).

Computer-Based Education (CBE): This stands for a system of education where computers are used for learners as a tool of meaning construction (Constructivist View), and for teachers as a tool for designing and presenting their teaching materials. The researcher may use ICT instead of CBE. CBE is a subset of ICT.

Preparedness: The readiness of AAU, College of Education teaching staff and administrators to function successfully in the ICT integrated environment in terms of their awareness, attitude, and skills. It also stands for the readiness of the University and College of Education to integrate ICT into the teaching-learning environment in terms of owning working ICT policy and indispensable ICT infrastructure such as computer labs, internet connectivity, bandwidth and other hardware and software facilities.

Infrastructure/Resources/Requirements: By infrastructure the researcher mean the mandatory physical deliverables without which the computer-based education cannot be practical such as computers, network, connectivity, and Internet. It answers what material resources are needed to implement the computer based education paradigm.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The purpose of this section is to make a survey of past studies in the integration of computers in the teaching and learning situation and to look into the possible gaps which need to be researched out to narrow the gaps. An attempt will also be made to discuss the different models of computer integration into the teaching learning process and the logical reason to choose one in Ethiopian context.

2.1. Meaning of Information and Communication Technology

Information and Communication Technology (hereafter ICT) is the magic phrase in this thesis. Different scholars have defined the concept ICT using different expression but almost carrying similar meanings. Accordingly, some of the Web definitions of the phrase ICT are:

- ICT is the catch-all phrase used to describe a range of technologies for gathering, storing, retrieving, processing, analyzing and transmitting information (http://www.smartstate.qld.gov.au/strategy/strategy05_15/glossary.shtm).
- Information technology (IT) or information and communication technology (ICT) is the technology required for information processing. In particular the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information from anywhere, anytime (http://en.wikipedia.org/wiki/Information_and_communication_technology).

Similarly, the Tech Target (2004) have defined ICT as ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as

videoconferencing and distance learning. They also add that ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries.

The above definitions point out that ICT is the generic term which stands for the use of the different technologies (computer and telecommunication technologies) to help us in gathering, manipulating and processing, controlling, distributing and sharing, and using information and enhancing communication.

2.2. Uses of ICT

ICT is becoming the fundamental role player in humans' daily lives. In relation to this, UNESCO (2002) claims that ICT has become, within a very short time, one of the basic "building blocks of modern society". Similarly, Addo (2003) claims that ICT have become indispensable tools in today's information age, making a dramatic impact on the lives of people globally.

In the same token, Sciadas (2002) holds that ICTs have catapulted into our lives and absorb a substantial amount of brain power to:

- Conceive, design and produce ICT goods and services (Supply).
- Devise ways to integrate them efficiently in production and consumption (demand), and;
- Understand what it all means (socio-economic research).

The above assertions compel the researcher to conclude that ICT have bought interesting amount of energy, money and time from governments, researchers, professionals, and anyways, the society at large.

2.3. ICT Integration: Meaning

Defining ICT integration may be a difficult task. Lloyd (2005) after reviewing a number of research papers to define ICT integration has noted the following:

> ...it can be seen that there are multiple and often conflicting definitions of ICT integration. It is, in one instance something which is non-existent and in another, so seamlessly embedded it is invisible. It is regarded as critical practice by some commentators and empty rhetoric by another. What is known, however, is that integration can be a state, an outcome and also a process; and deciphering which is which may well be the key to developing effective measurement instruments (p. 8).

ICT integration shortly means the use of different technologies to aid the teaching-learning process. Dudley as cited in Miller (1997) states that integrating the computer in education means using the power and ability of the computer to aid learning in every subject area within the school.

Successful integration of ICT at educational institutions from the perspective of the learning environment, as described by Milton (2003), would be demonstrated by:

- A culture of innovation; clearly defined educational goals that include deeper understanding and problem solving.
- Teachers and students use technology as a tool for their own learning: teachers select pedagogical strategies appropriate to both learning goals and individual needs of students, learners engage in authentic investigations using a variety of resources and people inside and outside of the learning environment, displaying their learning in a variety of ways as demonstration of their performance and they become more skillful in choosing their own goals, constructing their own strategies, assessing their own knowledge and monitoring their own progress. Work produced by students is available for access by subsequent groups working on similar problems;;
- Teachers and students work in collaboration creating professional as well as learner communities. Learning communities extend

relationships beyond the classroom, engaging parents, community members and experts;

- Computer and network standards sufficient for the pursuit of the educational goals; robust, reliable hardware, networks, software and timely technical support;

The work by Milton (2003) described above looks for changes in educational institutions in multiple dimensions i.e. the goals of educational institutions, deliverables for teaching and learning (ICT infrastructure instead of or in addition to pen, pencil, textbooks, exercise books, blackboard, chalk, etc), the relationship between the teacher and learner, the relationship between the educational institution and the community at large, and the role of teachers and students, to list some.

2.4. ICT Integration at Universities (Educational Institutions)

It is undeniable that the future of education is hopefully going to be determined by the intervention of ICT. UNESCO (2002) claims "ICTs in higher education are being used for developing course material; delivering content and sharing content; communication between learners, teachers and the outside world; creation and delivery of presentations and lectures; academic research; administrative support, student enrolment." It further declares that educational systems around the world are under increasing pressure to use the new information and communication technologies (ICTs) to teach students the knowledge and skills they need in the 21st century.

It is well recognized in the ICT-in-Education Implementation Strategy Action Plan of the Federal Democratic Republic of Ethiopia (2006) that ICTs play a key role in widening access to education to a wider section of the population; and in literacy education and for facilitating educational delivery and training at all levels. It is further stated in the same document that a key question in relation to the deployment and exploitation of these technologies and systems to support

education, training and learning with in the various educational and training institutions within the country relates to: how to integrate these technologies into the educational system at the schools and higher educational institutions level to support the teaching and learning process and as well as management activieties in schools, universities and colleges.

On the other hand, Intaganok, Waterworth, and Srisamai (2005) describe the situations at the educational institutions of developing countries as follows:

> The demand for economic progress in developing countries is often accompanied by a powerful (sometimes uncritical) appetite for technology. There is a need, not just for knowledge of what technological wizardry is available, but also of an understanding of the appropriateness and desirability of various kinds of equipment and applications. Higher education institutions should be strategically placed to provide such services to the community, particularly to the education community. They have large numbers of technologically hungry young people within them and are expected to have a transformative function within the society. Yet in many ways they are not fitted to respond adequately to the technological revolution.

As can be seen from the above description, the educational institutions of developing countries are not well prepared to harness the full potential of ICT.

2.5. Rationales for ICT Integration at Universities

ICT have shown to have positive contribution in the teaching-learning process. UNESCO Bangkok (http://www.unescobkk.org/index) emphasized that the introduction of ICT in schools has brought about a more positive attitude to school among learners. They add that teachers and students are stimulated because teaching becomes more dynamic which expands their vision as well as access to high quality materials and educational software.

Loxley and Julien (2006) after making a comprehensive review of research studies concerning the impact of ICT on teachers, learners and their environment have summarized that ICT stimulate:

- Less directive and more student-centered teaching and increased emphasis on individualized instruction.
- Increased interest in teaching as a profession and a practice.
- Broadening of professional sources of knowledge and training and career horizons for teachers.
- Teacher preferences for multiple technology utilization and increased administrator and teacher productivity.
- Rethinking and revision of curriculum and instructional strategies and interest in experimenting with emerging technology.

Loxley and Julien (2006) have also summarized that a number of results have been proven attributable to the introduction of ICTs in education:

- Students were found to score significantly higher in standardized tests
- Computer use facilitates student collaboration on projects, and thus enhances the team work abilities that are indispensable in the work place.
- Students especially "at risk" were found to improve their attitude and confidence toward learning and students with learning handicaps significantly improved their problem solving skills.
- Another study found that technology improves students' communication skills and the quality of their presentations and makes it easier for them to complete writing and editing assignments.

In an other study, Bruniges as cited in Lloyd (2005) noted that the purpose of integrating ICT is to improve and increase the quality, accessibility and cost-

efficiency of the delivery of education, while taking advantage of the benefits of networking learning communities together to equip them to face the challenges of global competition.

As can be seen from the aforementioned research summaries, the integration of ICT in the teaching-learning process affects the whole business of the school environment: the student achievement, the student motivation to learning, the student communication skills, the students' research abilities, student cooperative and team work abilities, students with disabilities, students' retaining of information, students' learning styles, the teaching methods, the assessment methods, the teacher-student communication styles, communication between the school community and etc.

2.6. Factors to be considered in ICT Integration

There are different factors to consider in trying integrating ICT in the teaching and learning environment. The major factors are comprehensive and working ICT policy, the preparedness of the implementing bodies with regards to awareness, attitude, and skill, and the availability of the indispensable infrastructure. Haddad & Draxler (2002) argues that technologies have great potential for knowledge dissemination, effective learning, and efficient education services. Yet, if the educational policies strategies are not right, and if the prerequisite conditions for using these technologies are not met concurrently, this potential will not be realized. According to UNESCO (http://www.ifip-tc3.net) to effectively harness the power of the new information and communication technologies (ICTs) to improve learning, the following essential conditions must be met:

- Students and teachers must have sufficient access to digital technologies and the internet in their classrooms, schools, and teacher education institutions.
- High quality, meaningful, and culturally responsive digital content must be available for teachers and learners.

- Teachers must have the knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards.

In the same token, Walker, as cited in Naidoo (2003) noted "three pre-conditions for a successful introduction of new information technologies into an education system:

- An appreciation by government of the financial, resource and operational requirements and the resulting consequences;
- A commitment by government to give time and take responsibility for decision-making and implementation strategies;
- A commitment to a policy of an integrated support service encompassing teacher and technician training, curriculum and assessment-together with software and hardware provision."

Accordingly, the following major factors i.e. ICT policy, preparedness of the administrative and teaching staff and infrastructure, are identified solely in this research and dealt with in detail.

2.6.1. ICT Policy

According to Westerinen (2003) policy can be defined as:

- A definite goal, course or method of action to guide and determine present and future decisions
- Policies as a set of rules to administer, manage, and control access to network resources

The first and an inescapable thing to consider to integrate ICT in education systems is the policy, the ICT in Education Policy. UNESCO Bangkok, the Policy Project sector, explains the matter:

> It is not enough to equip schools ad hoc with personal computers (PCs) and train teachers in their use to prepare pupils for the demands of the

> 21st century. ICT in itself is not going to radically change education systems for the better. An overall view of what education should be seeking to achieve is needed for ICT to be utilized to their full potential within education systems. Thus, the policy project component intends to assist decision and policy makers in reformulating necessary and appropriate policies. (www.unescobkk.org)

The ICT integration should be guided by working policy statements. Loxley and Julien (2006) note that successful introduction of any technology or any innovative way of doing things better in the education sector depends to a large extent on an enabling policy environment coupled with a well structured and logical implementing framework (www.adb.org). UNESCO Bangkok (www.unescobkk.org) also assert that in order to make successful use of ICT in enhancing the reach and quality of teaching and learning, policy makers need to be aware of how ICT can be of best value in their country's education system, and need to develop a supportive policy environment and framework at the national level for the integration of ICT into their education systems. It furthers the issue that decision makers and policy makers need to formulate appropriate policies based on their specific situation and educational goals. By the same token, Naidoo (2003) puts "in the context of education, having a sound policy, as well as an implementation strategy that compiles with that policy, could result in a more systematic introduction to and use of ICT."

The International Association of Universities (AIU) (2004) recommends that universities intending to use ICT in education should develop and continuously update institutional ICT policies in order to align educational and research objectives with the most appropriate technology choices and adequate financial and human resources.

A working ICT Policy, as noted above, is simply vitally important and inescapable matter in ICT integration at educational institutions for guiding ICT use.

2.6.1.1. Components of ICT Policy

Naidoo (2003) states that there is no single policy document or template that can meet the needs of all governments and address all contexts however there are generic elements that any policy on ICT in education should cover. These generic elements as documented in Naidoo (2003) are:

- A careful analysis of the current context that the country finds itself in with respect to the type of society and economy that is being built and the education system necessary to contribute to it;
- Research and analysis of international developments and trends in ICT use in education; and
- An outline of the key issues that need to be addressed together with proposed methods of doing so.

Naidoo (2003) contended that ICT in Education Policy should address the following elements:

1- Preparing all sectors of the education system to understand the investment in and value of technology
2- Preparing schools to accept the technology
3. Procuring and installing the technology
4- Training teachers to use ICT
5- Developing and managing content
6- Planning for continuous evaluation and research
7- Integrating curriculum
8- Providing ongoing technical support
9- Providing ongoing curriculum support
10- Developing partnerships

The AIU also recommends that the ICT policies should:

- place quality in teaching and learning as well as in research at the center of ICT-based developments at the institution, since a focus on pedagogy, curriculum and content-related questions are of utmost importance as the use of ICT tools expands. ICT application to teaching and learning should not be viewed as a substitute for teachers, but rather as a means of their empowerment. Policy should promote adoption of ICTs as a means for teachers to gain easier and wider access to information, to initiate greater exchange opportunities with peers and engage in a new, enriched interaction with students;

- provide all members of the academic community and non-academic staff with skills to use up-to-date ICTs. Sufficient and on-going financial support should also be allocated to ensure that all students are provided with the relevant ICT skills;

- safeguard a genuine cultural pluralism in educational and research material, given the increasing globalization of higher education, enhanced by ICTs; (http://www.unesco.org/iau/he/icts/index.html)

UNESCO Bangkok recommends for policy maker and planners a toolkit for preparation of ICT in Education Policy. The toolkit constitutes the following elements:

- Mapping the present situation in terms of national goals, educational context, ICTs in education, and the dynamics of change
- Identification of educational areas for ICT intervention and formulation of corresponding ICT-in-education policies

- Planning for implementation of infrastructure, hardware, contentware, and personnel training
- Planning for Contentware
- Consolidating implementation plans and their financial and managerial implications into one master plan
- Assessment of implementation, effectiveness and impact of ICT interventions and subsequent adjustments and follow-up actions (www.ictinedtoolkit.org)

2.6.2. Administrative and Staff Readiness/Preparedness

The other factor crucial considering in ICT integration is the readiness of institutions with regard to leadership, attitude, skill, and confidence to use ICT in the teaching-learning environment. Hoffman as cited in Abebe (2004) suggested that successful implementation of ICTs needs to address five interlocking frameworks for change: the infrastructure, attitude, staff development, support (technical and administrative) and also sustainability and transferability.

2.6.2.1. Administrative readiness

Bloeemen et al as cited in Abebe (2004) noted that the commitment and the interest of the principal is the most critical factor for successful implementation of any school innovation especially technology. Loxley and Julien (2006) claim that officials of the local executing agency, including the policy experts, key administrators, and influential teachers must have a sound appreciation of the process and expected results and they must be personally convinced that the introduction of ICTs in the learning environment needs to be well supported to ensure that the new technologies will not be used to simply extend or replicate a traditional classroom model, but rather to fundamentally change the instructional paradigm, with ICTs serving as levers for system-wide curricular reform and educational change.

Dwyer, Ringstaff, and Sandholtz as cited in Abebe (2004) hold that for the implementation and integration of ICT 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. Colleagues as well as school and district administrators must provide ongoing support for long-term change to be successful.

2.6.2.2. Staff Readiness

The introduction of ICT at schools calls for a paradigm shift in the teaching-learning process. The teacher's roles have been changed by virtue of the ICT integration at schools. The teacher is no more an information feeder of the learners in ICT integrated classroom. Voogt, Gorokhovatsky and Almekinders as cited in Abebe (2004) claim that the implementation of technology is a complex attempt for teachers, because many things in classroom and teacher's role will change. Similarly, Fullan as cited in Abebe indicates that integration of ICT in teaching and learning does not only deal with getting used to new materials –hardware and educational software, but at the same time the teacher and the students have to adopt new roles. Therefore, the implementation of such an innovation in the classroom not only require from the teachers to use new materials, but also to change their behavior and beliefs about education.

From an online discussion, in which the author was a part, coordinated by Andrea Geotske and Andreas Stamm 21 August-10 September 2006 on the topic Internet in African Higher Education: Teaching and Learning, it was found that African higher institutions:

- Lecturers/teachers/educators lack skills to use ICT in their teaching and to develop online/e-Learning content. They are not used to take a role as facilitator and mentor, as required for e-Learning and ICT-

enabled teaching which is much more student- than teacher-centered learning.

- Students are not used to be managers of their own learning.
- Administrative staffs at universities, library staff, as well as university management officials lack ICT skills as well as awareness on how higher education could benefit from use of the Internet.
- ICT specialists at universities often do not have enough high level ICT skills to take adequately informed decisions on solutions and maintain Internet and ICT systems properly.
- At the government levels, the lack of political will is often a result of lack of capacity and awareness.

2.6.2.3. ICT Awareness and Attitude of the Teaching Staff

The ICT awareness and appreciation probably is the very element which drives the teachers to put their utmost energy into the integration process. The teaching staff must have good awareness, positive attitude and appreciation to the value of ICT in the teaching-learning environment. Laferrière as cited in Milton (2003) strongly argue "it is assumed that the more aware a teacher becomes of the transition towards a knowledge society and its implications, the more he/she may be willing to put in the efforts required to access and master the technical possibilities of the new technologies." Becta (2003) in 'What Research Says about Barriers to the Use of ICT in teaching' found out that negative attitude towards computers in education is one of the key barriers to using ICT.

Becta (2005) summarizes the findings of various studies "there is a view that aspects of individual attitude and belief are the main factors influencing a teacher's use of ICT. A key general point, as argued by Preston et al. as cited in Becta is the need for a teacher to be motivated to use the technology. Similarly, Zhao and Cziko cited in Becta also noted that:

- They [the teachers] must believe that use of the technology can more effectively meet learning objectives or reach a higher level goal than could otherwise have been achieved
- By using the technology other goals perceived as more important are not dislodged.
- The teacher must feel s/he has the confidence, ability and access to necessary resources to apply the technology to her/his teaching situation.

(http://partners.becta.org.uk/page_documents/research/bursaries05/bedding_in.pdf)

2.6.2.4. Skill and Professional Development of the Teaching Staff

Teachers need working skills in freely manipulating computers so that they can integrate technology into their teaching-learning environment. UNESCO (http://www.ifip-tc3.net) in the list of 'essential conditions' to be met to effectively harness the power of the new information and communication technologies (ICTs) to improve learning, points out "teachers must have the knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards."

Clyde as cited in Addo (2003) notes that, to be able to use a computer, one requires "the knowledge and skills…which are relate to the hardware, the system, the software, the information source and the information itself." She categorizes these skills as:

- Hardware or equipment-related knowledge and skills, including the ability to use a mouse and keyboard.
- System knowledge and skills, including knowledge of network procedures, and of the DOS or Windows system interfaces.
- Application software knowledge and skills, including word processing, electronic mail software and Internet software.

- Knowledge and skills associated with the use of the information system itself-storage and search procedures, as well as access techniques.
- Knowledge and skills associated with using the information that is contained in the source or service.

Pelgrum and Law (2003) after reviewing the findings of many studies on the competencies required from teachers for integrating ICT into the learning process have distinguished handling hardware and software, curriculum (re)design, coaching, monitoring, developing digital materials, developing a vision of ICT in education, co-operation with colleagues, etc. as some of the competencies required from the staff.

The professional readiness of the teaching staff is the key for successful integration of ICT at educational environment. Hawkins (2002) in his 'Ten lessons for ICT and Education in the Developing World' strongly holds that the professional development of teachers sits at the heart of any successful technology and education program. Milton (2003) strongly suggests that staff development is the single most frequently identified factor in successful ICT integration. Carlson and Gadio (2002) also claim "spending scarce resources on informational technology hardware and software without financing teacher professional development as well is wasteful."

An exhaustively dealt with model for staff development is the approaches model for ICT development at institutional level (IFIP, 2000). There are four phases: the emerging, the applying, the integrating and the transforming phases. The summary of the staff development process in the approaches model is given in Appendix A.1.

Solomon and Solomon as cited in Rogers (2000) forward the use of what they call "10 Tips to Make it Better" for Technology and Professional Development as follows:

1. Offer Training
2. Give technology they can take home

3. Provide on-site technical support
4. Encourage collaboration with colleagues
5. Send professional to professional development conferences
6. Stretch the day
7. Encourage research
8. Provide online resources
9. Influence pre-service education
10. Celebrate success

This professional readiness of the teaching staff makes the teachers pedagogically able to utilize ICT effectively. UNESCO notes that as professional teacher educators continually develop their pedagogical use of ICTs to support learning, teaching, and curriculum development, including assessment of learners and the evaluation of teaching, they will:

- Demonstrate understanding of the opportunities and implications of the uses of ICTs for learning and teaching in the curriculum context;
- Plan, implement, and manage learning and teaching in open and flexible learning environments;
- Assess and evaluate learning and teaching in open and flexible learning environments.

The implication is for Addis Ababa University, College of Education to prepare the teaching staff in this respect: training teachers in these very crucial ICT skills so that they can freely manipulate and effectively use the emerging ICTs in the teaching-learning environment, providing technical support, providing resources, encouraging collaboration, etc.

2.6.2.5. Training of the Teaching Staff

Training teachers relentlessly is a crucial matter in teacher skill and professional development for ICT use in education. Gressard and Loyd (1986) found that

elementary school teachers that had received computer training were significantly less anxious and more confident about computer use after training than before (Gilmore, 1998). Results of many other studies have shown that training has a positive impact on some, if not all, aspects of subjects' self-perception of knowledge, confidence, and attitudes toward computers (Green & Kluever et al, 1992 in Gilmore, 1998).

Hawkins (2002) in his 'Ten lessons for ICT and Education in the Developing World' labels lesson #8 as "Training, training, training" which shows the attention he gave to training for successful ICT integration. He further explains "teachers need not only formal training, but also sustained and ongoing support from their colleagues to help them learn how best to integrate technology in their teaching. Studies have shown that a lack of training has had the largest effect on faculty attitudes toward the integration and use of information technology (Collis, 1988 in Gilmore, 1998).

2.6.3. Infrastructure Development

ICT infrastructure is about the availability computers, hardware, software, internet, and network. There could be more ICT infrastructure but the focus of this research is on the aforementioned ones because of their importance to begin integrating ICT in educational systems. Anyways, which ICT infrastructure to use is determined by our purpose. Becta (2005) claims that 'What do we want to achieve?' and 'How can we do this better?' are two questions that would help the school determine the most appropriate infrastructure.

Promising ICT infrastructure is the very factor to be considered in ICT integration. Plante and Beattie (2004) hold that it is critical that schools have the necessary infrastructure available if ICT is to be integrated into the learning environment. Law et al. (2000) as cited in Abebe (2004) claims that in order to have a teaching

learning process or education system supported by technology, the availability of suitable infrastructure is essential.

However, research showed that owning working ICT infrastructure is a problem in the world, especially in developing world. Hawkins (2002) notes that establishing a working computer lab and a reliable connection to the internet remains a dream for most schools around the world. He further points out that in a recent survey of teachers in developing countries conducted by SRI International for World Links, the majority of teachers in African and Latin American countries reported that the lack of adequate hardware and software as well as unreliable internet access were significant barriers to using computers in instruction.

2.7. ICT Integration Model

A working model for ICT integration is mandatory in an attempt to integrate ICT in the educational institutions. The researcher found that the Approaches to ICT Development at Institutional level developed by IFIP (2000) could be a working model for modeling ICT development at Addis Ababa University, College of Education. The details about the approach are given below.

2.7.1. Approaches to ICT Development at Institutional Level

IFIP (2000) presented an approach which higher educational institutions could proceed in their attempt to adopt and use of ICT.

The approach has four phases: Emerging----Applying----Integrating-----Transforming. It is believed that the identified approaches and areas of development are in line with international trends of the use of ICT in education (IFIP, 2000). The summary of the phases is given in Appendix A.2.

According to IFIP (2000) an institution can determine progress in various areas of ICT development. The major ones identified by IFIP (2000) are Vision, Philosophy of learning and pedagogy, development plans and policies, facilities and resources, understanding the curriculum, professional development of institution staff, community involvement, and assessment.

These areas of ICT development along with the approaches to ICT development can be shown in a matrix (Appendix A.4). The matrix helps the institutions to determine their stage of development in various areas.

2.7.2. Rationale for Using the Approaches to ICT Development Model

The Approaches to ICT Development model is selected as an appropriate model for ICT integration at Addis Ababa University, College of Education because of the following imperative reasons:

- It's appropriate with regard to the intended research variables identified such as ICT policy, preparedness of staff, and infrastructure requirement
- It's functional with regard to its advantage on considering the baseline requirements to start ICT integration which is more related to the condition of AAU, College of Education
- It's recently developed approach
- It's a model for Higher Educational Institutions
- It's synthesized from different international trends

2.7.3. The Relationship between the Research Questions and the Proposed Integration Model

The ICT integration model considers the development of ICTs at schools from eight point of view: vision, learning pedagogy, development plans and policies, facilities and resources, understanding of the curriculum, professional development for

institutional staff, Community and Assessment. Whereas the major variables of this research are ICT policy (related to development plans and policies of the integration model), readiness of the implementing bodies (related with the professional development of the integration model), and infrastructure development (related with facilities and resources of the integration model). More relationship between the research questions and major areas of ICT development indicated in the proposed ICT integration model can be shown as in Appendix A.3.

2.8. Brief History of ICT Development in Addis Ababa University

The introduction of information technology in Addis Ababa University dated almost more than three decades. It started around 1970 with the establishment of System Design and Data Processing Center (SDDPC) (The AAUNet Project, n.d). The driving force for the establishment of SDDPC was increasing complexity of operations carried out by the University and the resultant increase in the number of sub units and staff which called for a means for coordination and control (Engida, 1999). The objectives of SDDPC were to review the management system and to suggest possible ways to minimize wastage, delays and uncertainty for the betterment of control and communication. The specific objectives of SDDPC as indicated in Engida (1999) were:

- Centralized business system and data processing services
- Organizational systems analysis
- Work simplification and measurement
- Office equipment and evaluation
- Forms and design control
- Computer hardware and software evaluation in the University
- Programming, documentation and data control
- Training in electronic data processing systems
- Providing data processing and information services (P. 52)

Engida (1999) noted that SDDPC had been providing various services to the University community. Among the major services provided to the different units in the University were:

- Supporting research activities by providing machine time services and data processing assistance to staff members, graduates and undergraduates
- Training staff members on computer programming and word processing
- Installing applications software to various departments and maintaining upon request
- Assisting the finance division and the personnel department by developing programs that support their activities even though it is not up to the expectation
- Maintenance of both hardware and software for requesting department (P. 53-54)

It was reported that SDDPC had difficulties in providing even basic services for the University due to the following major problems:

- The system has major compatibility problems with the modern technology
- The operating system that the center uses is no more supported
- The system has a major maintenance problem because it is obsolete. Parts are no more available.
- The system supports only a maximum of twenty terminals and this capacity has already been saturated (Engida, 1999, P. 55)

Through time, certain developments have been observed in the widespread penetration of IT in the various academic and research units of AAU. There observed deployment of various IT infrastructures in the different units and departments of the University. A fairly large proportion of the introduced IT equipments, however, were used as stand-alone system to provide access to word processing applications and some other related office applications which necessitated large scale networking. It was then this situation which forced the University to initiate a project under a name of AAUNET Project, with the help of

funding organizations namely ETHIOPIAID and SIDA/SAREC. The Ethiopian Telecommunications Corporation (ETC) agreed to assist in the procurement, installation, testing and commissioning of the fiber optic cables. It was believed that the existing mode of using stand-alone machines could be greatly enhanced through efficient networking and information sharing. It was also assumed that aside from wider access to scarce resources, the ability to easily communicate documents, messages, images, and files could greatly improve the effectiveness of AAU in general and individuals involved in teaching and research in particular through the large scale networking (AAUNet project, n.d).

Moreover, through the development of large scale networking (internet) it was believed that it could be possible to send and receive messages to and from users within or outside AAU; circulate official circular; advise student; pipe/post (or retrieve) electronic bulletin board information to (from) users using the network; broadcast/announce information (or receive information that is broadcast) on seminars, workshop, conferences, etc.; send current content of periodicals; share abstracts of papers being published; retrieve text of journals available on line; log onto remote computers in order, for instance, to search a database or library catalogue; work together on projects and tasks that require coordination and communication; form/find discussion groups on any topic of interest. The AAUNet initiative then was successful in establishing networks first in the so called nearby campuses i.e. Sidist Kilo (main campus), Amist Kilo (technology faculty) and Arat Kilo (science faculty) (The AAUNet Project, n.d).

Though the AAUNet project has achieved some improvements in AAU than the SDDPC especially in enhancing the network facility in the University, lately, in January 2003, the then called ICT Development Office of Addis Ababa University (ICDO) was established with a vision to become a center of excellence in utilizing the potential of ICT in learning, research, innovation, and educational environment for national development. The ICTDO was believed to liaison between the AAU on the one hand and stakeholder such as international donor agencies, collaborating

overseas universities and relevant local institutions on the other hand in initiating and implementing ICT-related projects and activities. The specific objectives of the AAU ICTDO as stated on the AAU's official website were:

- To provide effective and efficient ICT services to the AAU community;
- To promote e-learning initiative to the AAU and the nation at large;
- To bridge ICT skill gap between academia and industry;
- To promote research on ICT sector application and base line studies;
- To provide ICT community services of development impact;
- To establish collaboration and partnership with public & private higher learning institutions. (http://www.aau.edu.et/ict/index.php)

It was also believed that the ICTDO would have such broad duties and responsibilities as developing ICT strategic plan and overseeing its implementation with the following major activities:

- Developing short- and long-term ICT strategic plans to introduce and expand application of ICT at AAU
- Coordinating and overseeing the implementation of existing ICT projects at AAU
- Developing new ICT project in accordance with the ICT strategic plan and strategies of AAU
- Engaging and coordinating the fund raising activities to implement new and ongoing ICT projects at AAU
- Establishing linkages with potential donors, collaborating institution and individuals, that could contribute positively to the success of ICT projects at AAU
- Serving as an information center on ICT-related visions, project and activities of AAU
- Identifying resources required to implement the projects and facilitating the acquisition of that (human resource, physical resource and infrastructure, and financial resource)

- Advising the university management on matters related to ICT (http://www.aau.edu.et/ict/index.php)

It was reported by ICTDO officer in 2005 that the current AAU network had the following facilities:

- 4,000 desktop computers/thin clients networked
- 45 Servers (Solaris & Intel based)
- 8 Data Centers
- 17 points of presence (different locations)
- Central Internet gateway with PIX firewall
- Full class C public IP (213.55.95.0/24)
- Private IP addressing 10.x.x.x with DHCP
- 200 + Network Switches among them 8 are core switches
- Collapsed Core –Access Network
- Fully Managed by Internal Staffs
- Content filtering & Proxy servers are deployed
- 10 kms of intercampus and inter campus fiber network
- Connected with the local telecom with fiber of 6 mbps

The aforementioned network facilities of AAU were not been familiar in the earlier times. It was also noted by the same ICTDO officer that the current network has the following applications:

- E-mail storage based on Netscape Messaging
- Postfix as SMTP relay, anti-spam, antivirus for mails
- 8 chained Squid Proxy servers (Solaris/windows)
- Library System –Koha- Open Source
- Learning Management –Moodle (on going)
- In house developed finance ,payroll & HR system
- In house developed –online Application system
- Student Registration System

With these facilities, currently, the AAU community is exploiting the potentials of ICT personally better than any other time in the history of AAU. The members of the teaching staff and the administrative offices are using ICT facilities such as computers, computer labs, office computers for different academic and office purposes and internet facilities such as emailing, internet browsing, chatting and etc for communication and assisting the teaching-learning process than never before. The e-mail service which once was via FidoNet(a non-internet e-mail network) is now through Netscape messaging and via broadband internet connection.

The College of Education is also seen to exploit the different ICTs in different ways than never before. The teaching staff and the administrative offices are using the different ICT facilities for different purposes. ICTs are opened as new fields of study in the different colleges and faculties in the University. Examples are the Faculty of Informatics, AVU and Electrical and Computer Engineering at Faculty of Technology. Similarly, the College of Education is seen to incorporate introduction to computer (ICT) into the freshman courses. Moreover, the IT Education at undergraduate level and the Master of Education in ICT (a pilot project with UNESCO-IICBA) has been underway as new fields of study at the College of Education.

The point in here is it seems that there is not coordinated effort from the teaching staff and the management team to meaningfully incorporate these ICTs into the teaching-learning system, where students use ICTs to assist their meaning construction and where teachers use in presenting their learning materials. The question 'to what extent are these teaching staff and the management team are ready to integrate ICTs into the teaching-learning' is not known yet.

CHAPTER THREE

METHODS OF THE STUDY

3.1. Introduction

The purpose of this study was to investigate the Preparedness (readiness) of AAU, the College of Education to integrate ICT into the educational system and to make analysis of the infrastructure that are indispensable to integrate ICT in the education system. To achieve these purposes the researcher designed the study in the following ways.

Depending on the problem of the research, a mixed research method was believed to be appropriate method of research i.e. the use of both quantitative and qualitative methods (Johnson & Christensen, 2003). A quantitative research method, descriptive survey research, was believed to be crucial to make a survey of the preparedness of the teaching staff with regard to their awareness, attitude and skills to integrate ICT into the teaching-learning environment. On the other hand, qualitative research, a case study, was used in this research because it enabled the researcher to reveal the situation of College of Education with regard to the status of ICT use and the ICT Policy and to evaluate the general setting of the College of Education to incorporate ICT in the teaching-learning environment.

3.2. Participants of the Study

The target populations from which the major data gathered were the ICT Development Officer (ICTDO) of Addis Ababa University, the management team and teachers of Addis Ababa University, College of Education. The researcher purposely delimited the research to Addis Ababa University, College of Education because the College of Education is the oldest teacher education center which could be typical example for need of reform in the whole country for ICT integration into the teaching and learning environment.

3.3. Sampling Technique

Representatives of the target population were drawn for inclusion in the research as follows. Available sampling was employed in the case of the management team. It was believed that this technique would enable the researcher to include all information rich samples regarding the education system of the College of Education. The following were the participants: three of the management team of Addis Ababa University, College of Education i.e. Associate Dean for research and graduate programs, Associate Dean for undergraduate programs, and Assistant Dean for undergraduate programs in educational sciences. The Dean of the College of Education was not willing to sit for interview with the researcher to which he reasoned there was a work overload and recommended the researcher to interview his delegates. The researcher's attempt to interview the Assistant Dean for undergraduate programs in social sciences was also a failure. He cordially advised me to meet the Associate Dean for Undergraduate programs whom he said has been working on the ICT issues in the College of Education. The researcher also tried to meet the Assistant Dean for undergraduate programs in natural sciences and could not find the case.

The ICTDO officer was purposely selected for inclusion in the study because it was believed that he was resourceful in providing the situation of ICT development in the University.

Available sampling technique was also employed to gather data from the teaching staff of the College of Education. It was possible to learn from College of Education, AAU Prospectus, 2005/6 that there were 158 teaching staffs permanently employed in the College of Education. Out of these teaching staffs, the researcher used 25 teachers in the pilot study. The researcher planned to distribute 133 questionnaire papers to the remaining teaching staffs but only succeeded distributing to 105 teachers out of which 97 of the teachers filled in the questionnaire papers properly and returned on time. Some 8 teaching staffs didn't

return the questionnaire papers on time. Some 28 teaching staffs were not included in the research because they were either on study leave, or were out of town on practicum education. Very few of the teaching staffs were not willing to fill in the questionnaire because they were busy on some other jobs or tired off filling in every questionnaire which they are requested to do frequently.

3.4. Instruments

The required data was collected from the target population through interview and questionnaire (Attitude scaling and Checklist). Document analysis was employed to investigate the ICT development in AAU, the ICT policy and the infrastructure facilities.

There were two interview instruments: one for the ICTDO officer, the other for the management team of the College of Education. The interview schedules were fairly formal and semi-structured. The major purposes of the interview schedules were to gather information regarding the awareness, attitude and motivation towards the role of ICT in the Addis Ababa University, College of Education.

The questionnaire was adapted from Gilmore (1998). The questionnaire was originally named Faculty Attitude towards Information Technology (FAIT) but the adapted questionnaire was named College Attitudes towards ICT (CAICT). CAICT helped the researcher to look into the attitude of the teaching staff towards ICT in education. The questionnaire had such sections as the background section which focuses on the demographic, educational background and ICT use information of the teaching staff; and the attitude section which focuses on the attitude of the teaching staff towards ICT in education. The original Gilmore (1998) questionnaire had 69 items. The adapted questionnaire had 34 items. The number of items was reduced to 34 by excluding some inapplicable items and deleting weak items during the pilot testing process by using SPSS 11.0 program till satisfactory internal reliability was found.

Included in the FAIT as well as in the CAICT were five different domains designed to examine several relevant areas of interest in ICT. The domains were the enthusiasm/enjoyment, anxiety, avoidance, internet for learning, and productivity improvement. The domain 'e-mail for classroom learning' was replaced by the generic term 'internet for learning' because teachers could use more communication and browsing strategies other than e-mail by internet such as chat, blog, listserv, discussion group, browsing and some other facilities to facilitate teaching-learning process.

Though the internal reliabilities for the different sections of the original instrument used ranged from 0.90 - 0.96, the researcher in this study had pilot tested and checked for the internal reliabilities because the study was taking place in a totally different environment and there were some changes on the instrument so that it could meet the need of this research. Following is description of the piloting procedure: The first adapted questionnaire had 50 items. The researcher distributed the adapted questionnaire to 25 teaching staffs for piloting and found internal reliability of 0.86. The researcher then started excluding the weakest items by using SPSS 11.0 program and at the same time looking into the reliability. The same procedure was followed till internal reliability of 0.93 (α =0.93) was found. The number of items remained at the end of the 0.93 reliability was 34. The remained items were believed to be strong and used to gather data from the target population.

The checklist format which was adopted from Gilmore (1998) was used to assess the skill (competence) of the teaching staff on productive tools, e-mail and internet. It specifically was used to assess the competences on Microsoft applications such as word processing, PowerPoint presentation, database management using MS access, and spreadsheets, and e-mail and internet (the World Wide Web).

The other part of the questionnaire, which of course was adopted from Knezek and Christensen (2000), was the Concerns-Based Adoption Model: Level of Use of an innovation (CBAM-LoU). It was used for indicating the educator's progress along a technology integration continuum. It was targeted toward describing behaviors of

innovation users through various stages-from orienting, to managing, and finally to integrating use of the technology. It did not focus on attitudinal, motivational, or other affective aspects of the user (Knezek & Christensen, 2000). The instrument was used to have a fast look at the level of the teaching staff with respect to the technology use and integration. The instrument was based on the eight levels of use defined in the Levels of Use Chart (Loucks, Newlove, & Hall, 1975, in Knezek and Christensen, 2000). The levels of Use were: (0) Non-Use, (I) Orientation, (II) Preparation, (III) Mechanical Use, (IVA) Routine, (IVB) Refinement, (V) Integration, and (VI) Renewal (Knezek & Christensen, 2000). The data gathered from this procedure strengthen the reliability of the data which was gathered through the attitude and skill questionnaires.

The questionnaire and the interview instruments were presented to specialists in the area for evaluation of the quality of the items and the content validity of the instruments before they were used for gathering data. The researcher had received comments on wording of the items, redundancy of items, number of items, and relevance of items. The researcher had consumed the comments of the different personalities for perfecting the instruments.

3.5. Data Gathering Procedure

The researcher managed distributing the questionnaire papers by using the following mechanisms. Firstly, the researcher identified contact persons (most of them friends/relatives or relatives of researcher relatives) from the majority of the departments who can manage distributing the questionnaires to their own department members. Secondly, in cases where there were no relatives or relatives of researcher relatives, the researcher distributed the questionnaires through the secretaries (very few of them were met by this method). Thirdly, the researcher himself distributed some of the questionnaires to some of the teaching staffs.

Knowing that the teaching staffs were busy on some other tasks, the researcher informed the teaching staffs that they could fill in the questionnaire papers and return them back in 15days.

For the interview schedule, the researcher first wrote letter of request briefing the purpose of the interview with some possible interview questions indicating the areas on which the researcher needs information and handed them onto the interviewees a week before the interview schedule. Together with the letter of request and possible interview questions the researcher had listed down possible interview schedules and handed them onto the interviewees so that they could choose comfortable schedule according to their free time. This first contact had helped the researcher to create personal relationship with the interviewees.

According to the agreed upon schedule the researcher made everything ready i.e. prepared every questions on single papers for easy note taking/making, and took with himself a tape recorder according to agreement made during the first contact. The interview was so smooth because the personal rapport was already built.

3.6. Data Analysis

The data gathered through the different instruments were analyzed by using different data analysis techniques. The data gathered through the interview technique were analyzed by reviewing the notes taken (by hand writing and taping), narrating, abstracting, interpreting and reflecting on key points related to the objects of the research. Data from the document analysis was analyzed by making meaning out of the document and by reflecting on related issues.

The questionnaire data was analyzed as follows: at the outset, the questionnaire was coded and raw data were entered into SPSS 11.0 for windows (Statistical Package for Social Sciences). The raw data then was analyzed using frequency tables, charts and means.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

The purpose of this study was to investigate the ICT Policy of Addis Ababa University, the Preparedness (readiness) of Addis Ababa University, College of Education to integrate the emerging ICT into the educational system and to make analysis of the infrastructure that are indispensable to implement the computer-based education. Accordingly, different instruments such as interviews, questionnaire and checklist and document analysis were employed to gather pertinent data from research participants.

4.1. Population Characteristics

There were three groups of research participants from whom the data was collected. These were the ICTDO officer of AAU, the management team of the AAU, College of Education and the teaching staff of the AAU, College of Education.

An interview was conducted with one ICT Development Officer (ICTDO) of Addis Ababa University, and three management teams of the Addis Ababa University, College of Education. The other management teams were not interviewed for different reasons given in method section (page 37).

From 105 questionnaires distributed to the teaching staff 97 papers (93%) were filled in and returned. The characteristics of the sample population are depicted below.

The ICTDO officer was a master's holder in mathematics and computer science. He has been working at the University as a consultant for the last two years. He also reported that he had worked in World Space (USA) as network administrator and security officer before he came to the current job position. This shows that the ICTDO officer has got a good exposure and work experience with the developed

country specifically with the world space organization in networking and security which could be a promising resource for Addis Ababa University.

Table 1: *Characteristics of the Management Team*

Sex	Qualification	Current Job	Experience
Male	PhD in Education and Music	Associate Dean for Graduate Studies	• Two and half year in AAU • 23 + years in developing curriculum, Ministry of Education
Male	PhD in Educational Planning and Management	Associate Dean for Undergraduate Programs	• Seven months in current position
Male	MA in Measurement and Evaluation, and PhD student	Assistant Dean for Undergraduate programs in Educational Sciences	• Three years at current position • Total of 16years of service (the last five years at AAU where as the others at Jimma Univiersity)

Table 1 shows that all the three interviewed management teams were males. The two of the officials are PhD holders and one is acquiring it very soon. All the three were Deans at different streams i.e. graduate studies, undergraduate programs and undergraduate programs in educational sciences.

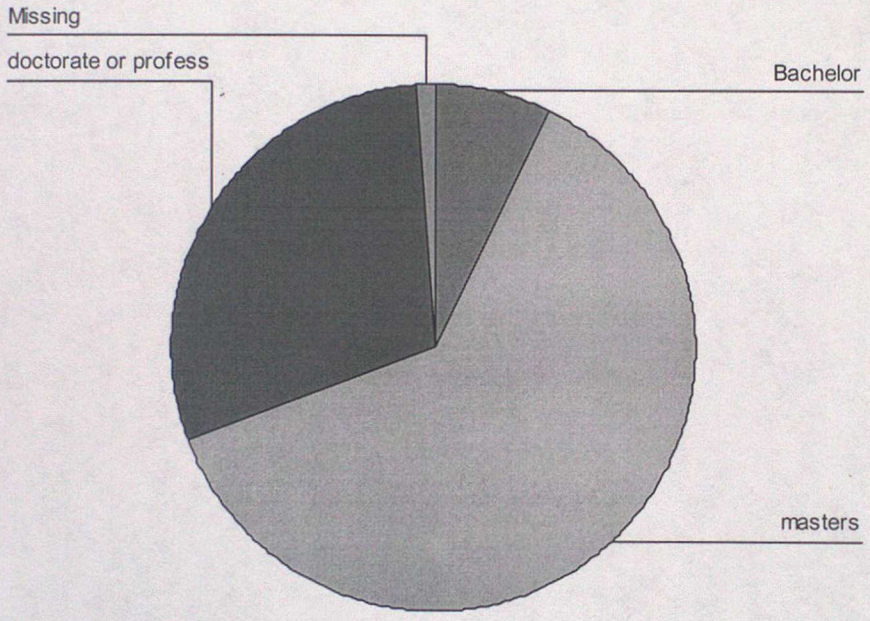
Table 2: *Characteristics of the Teaching Staff*

Characteristics		**Frequency**	**%**
Sex	Male	85	87.6
	Female	12	12.4
	Total	97	100.0
Age	21-24 years	2	2.1
	25-29 years	9	9.4
	30-34 years	18	18.8
	35-39 years	21	21.9
	40-44 years	16	16.7
	45-49 years	15	15.6
	50-54 years	7	7.3
	55+ years	8	8.3
	Total	96	100.0
Educational Level	Bachelor Degree	7	7.3
	Master Degree	60	62.5
	Doctoral or Professional Degree	29	30.2
	Total	96	100.0
Department	Biology Education	7	7.2
	Business Education	13	13.4
	Chemistry Education	6	6.2
	Teacher Education and Curriculum Studies	16	16.5
	Educational Planning and Management Education	9	9.3
	English Education	10	10.3
	Ethiopian Languages Education	3	3.1
	Geography and Environmental Science Education	3	3.1
	History Education	2	2.1
	Mathematics Education	7	7.2
	Physics Education	4	4.1
	Psychology Education	10	10.3
	Physical Education	7	7.2
	Total	97	100.0

As Table 2 shows there were more male teaching staff (87.6%) than female (12.4%) which is an indication for low female participation at Addis Ababa University, College of Education. Age wise, it is well depicted above that 21.6% of the sample were aged between 35-39 years, and 18.6%, 16.5% and 15.6% of the sample were

aged between 30-34years, 40-44years and 45-49years respectively. From these observations it can be derived that well more than 73% of the sample were aged between 30-44years.

The educational level of most of the teaching staffs of the College of Education was master's (61.9%) and a good number, 29.9% of the teaching staff were doctoral or professional degree holders where as only 7.2% were at bachelor's degree level. This is more visible in Graph 1.



Graph 1: *Educational Level of the Teaching Staff*

The teaching experience of the samples was found to be varying from less than one year of teaching experience to 32 years. The mean of the teaching experience was calculated to be 12.38 years. As shown below in Table 3 well around 25.8% of the samples have a teaching experience under 5years where as 22.7%, 17.6% and 18.5%has experience of 6-10years, 11-15years and 16-20years respectively. From this it is save to derive that the majority 84.6% of the teaching staffs got teaching

experience below 20years. Others (15.4%) of the teaching staffs were found to have teaching experience between 21years and 32years.

Table 3: *Teaching Experience of the Teaching Staff*

Years of Teaching	Frequency	%
Under 5years	25	25.8
6-10years	22	22.7
11-15years	17	17.6
16-20years	18	18.5
21-25years	8	8.2
26-30years	5	5.1
31-35years	2	2.1
Total	97	100.0

4.2. ICT Policy of Addis Ababa University

In relation to one of the purpose of this study the researcher has tried to look into the current ICT policy of Addis Ababa University by interviewing different resourceful persons and by analyzing documents. It was possible to learn that there is no currently developed ICT policy document in AAU. It was also found that there were contradicting views about the need for ICT policy among the interviewees. The contradictions are presented in the following paragraphs.

The researcher presented to all interviewees the following questions: Is the ICT Use in AAU supported by Policy? Do you believe that supporting ICT use with policy will help the betterment of use of ICT?

The interview session with the ICTDO officer revealed that there was no working ICT policy developed for Addis Ababa University, only that the University was on the way of developing the ICT policy. From a document the ICTDO officer gave the researcher it was found that one of the nine Areas of Activity identified by

ICTDO for 2006/7 was ICT Policy Development. It was stated in the document that the development of a well-considered ICT policy is essential for the proper conduct of business as well as efficient use of resources in the University. The ICTDO officer also had emphasized that ICTDO had been looking at a number of ICT policies from various sources upon which to model its own. The document also supports the aforementioned argument.

Supporting the above positive reaction to the importance of ICT policy, the Associate Dean for Graduate Studies, after disclosing the absence of institutionally documented ICT Policy in the University, argued the University should have an institutional ICT Policy document.

On the contrary, interview with the other two management teams of the College of Education shown that there needn't be ICT Policy for the University because the University was only guided by national policy. They argued that the University only needs to develop a guideline which actually was absent currently.

4.3. ICT Infrastructure

Looking into the infrastructure readiness/preparedness of AAU, College of Education was one of the purposes of this research. The researcher raised the following questions to the ICTDO officer of the University and the management team of the College of Education for acquiring relevant information with regard to the above purpose: What ICT infrastructures are available for exploiting ICT's potential in the University? What infrastructure problems are you encountering? The following information had been found from the interviewees.

4.3.1. Computers

The ICTDO officer said that the University has lots of computers (5,000) at hand and planning to deploy more infrastructures with funds obtained from external

donors such as SIDA/SAREC. The officer further disclosed that one of the nine projects that ICTDO planned for 2006/7 was increasing the access of computers to students and teachers by building more laboratories and more nodes. For a related question, "Do you believe these computers can be enough for the 22, 000 regular and 14, 000 extension students?" the officer responded that reaching every learners with computers was a serious problem. The ratio of nodes/computers to students and teaching staffs was very low. He added that the current infrastructure of the University was only serving the teaching staff, some very few students and offices, and the majority was using these computers only for e-mail and internets.

The management team also made clear that there were enough computers for the teaching staff and there was a plan to reach all the 11,500 students in the College of Education but currently there is a serious problem of access to students.

4.3.2. Networks and Bandwidth

It was found from the interview that there is problem of network access to the teaching staff and students. It was documented in the action plan of ICTDO that the current level of access is limited to about 5,000 access points for a community that exceeds 50,000 in number. Out of the 5,000 nodes a high percentage was dedicated to administrative and non-teaching/learning functions. This means there was shortage of access to teachers and students. Because the current bandwidth is insufficient to the teaching-learning process, the bandwidth issue was a frontline goal. It was stated in the same document that the ambitious goals AAU had set before itself to use its ICT infrastructure in teaching/learning and administrative support would create bandwidth demands that could not be met with the currently available bandwidth.

It was reported by the ICTDO officer that there were couples of projects to address the connectivity issue: one with Chinese company, Huawai Technologies Co. Ltd which was on upgrading connectivity devices or Datacom devices i.e. switches,

roaters, gateway, and firewall. Before such upgrading the University was using code switches that went from fiber to copper which lost bandwidth which they were going to remove and have straight fiber connectivity. The second project was one funded by SIDA/SAREC and that was on cabling.

The ICTDO officer had comfortably argued that the intranet of the University was very excellent, only that the Internet had got a problem for the majority. It was also indicated in the Action Plan of the ICTDO that AAU's internal network has adequate bandwidth to accommodate most of the functions planned for the foreseeable future. The external connectivity, however, is nowhere near sufficient.

The Associate Dean of Undergraduate Programs uncovered:

> "The available internet connectivity of the College of Education was not powerful i.e. in some rooms and offices it was present only by name which made downloading even simple documents/texts a problem. The University better look for other access options such as satellite internet connection instead of the current broadband connection." (Dr. Jeilu, January 9, 2007 at 11:30am).

Related with this, it was indicated in the Action Plan of the ICTDO "the bandwidth deficit is a problem that needs to be solved if AAU is to succeed in its planned use of ICT to support various functions. The proposed solution is securing permission from the government to obtain VSAT (very small aperture terminal) access to the Internet with sufficient bandwidth."

4.3.3. Infrastructure Problems

The interviewees identified the following as major problems of the College of Education with regard to ICT infrastructure:

- Less developed ICT infrastructure such as computers and internet
- Unbalance number of computers with the number of users

- Network problem (low bandwidth)
- Poor electricity in some buildings
- Absence of maintenance
- Absence of support system.

In general, the responses the researcher found from the interview session were intentions of change, and ambitions for use and deployment of more ICT infrastructure. All the interviewed management teams disclosed their utmost longing to integrate ICT in the education system of the college of education for optimal utilization of the ICT infrastructure. On the other hand, the reflection of the interviewees on the currently available developments in ICT use and deployment of ICT infrastructure in the College of Education revealed their dissatisfaction.

4.4. ICT Use by the Teaching Staff

The other purpose of this research was to look into the readiness of the teaching staff in utilization of ICT infrastructures. Table 4 shows the frequency distribution of the teaching staff's report on their use gathered through questionnaire.

Table 4: *Computer Use by the Teaching Staff*

Do you use computer?	Frequency	%
Yes	94	96.9
No	3	3.1
Total	97	100.0

As shown in Table 4, almost all (96.9%) of the samples use computer. Only 3.1% of the respondents indicated that they were not using computers. The reason for not using computer, as reported by the respondents was that they did not have access to computers at their offices.

Table 5: *Places where the Teaching Staff use Computers*

Place of Use	Responses	Frequency	%
Use at home	Yes	45	47.9
	No	48	51.1
	Total	93	100.0
Use at office	Yes	87	92.6
	No	7	7.4
	Total	94	100.0
Use at classroom	Yes	7	7.4
	No	87	92.6
	Total	94	100.0
Use at lab	Yes	10	10.6
	No	84	89.4
	Total	94	100.0
Use at private Internet centers	Yes	22	23.4
	No	72	76.6
	Total	94	100.0
Use at other places	Yes	2	2.1
	No	92	97.9
	Total	94	100.0

Those who were using computers were found to be using at different places but the majority at offices and home (92.6% and 47.9% respectively (Table 5). Very few (2.1%) were found to be using computers at other places i.e. at friend's offices as specified by the respondents (Table 5). Only 7.4% of the respondents indicated that they were using computers at classrooms (Table 5). This shows that only insignificant percentage of the teaching staff use computers for assisting their classroom instruction i.e. using computers instead of blackboard/white board for presenting their learning materials, creating environment where students could learn by using computers, online communication, etc. This also implies that the teaching-learning environments especially the classrooms at the College of Education were still traditional i.e. teachers using their blackboard/whiteboard and chalks for presenting their learning objects and students using pen, pencil and papers to assist their learning. On the other hand it was found that the majority of the teachers were using computers for organizing their teaching materials (Table 8).

Table 6: *Frequency of use of computers by the teaching staff*

Options	Frequency	%
Daily	85	93.4
Once a week	2	2.2
Other	4	4.4
Total	91	100.0

The majority (93.4%) of the teaching staffs were found to be using computers daily (Table 6). This shows that the majority of the teaching staffs were not only using computers but also using frequently and that using ICT is becoming the culture of the teaching staff. On the other hand, insignificant number (2.2%) of the respondents indicated that they were using computer only once a week. Some others (4.4%) not indicated the frequency at which they were using computers.

Table 7: *Frequency of those who own computers at home and office*

	Responses	Frequency	%
Own Computer at home	Yes	48	52.2
	No	44	47.8
	Total	92	100.0
Own computer at office	Yes	77	89.5
	No	9	10.5
	Total	86	100.0

As shown in Table 7 it was found that 52.2% of the respondents were owning computers at home where as the majority (89.5%) said that they were owning computers at their offices. This was an indication for the wide distribution of information technology particularly computers among the teaching staffs.

The respondents were found to be using computers for different purposes. Table 8 shows that frequency of the purposes for which the teaching staff use computers.

Table 8: *Purposes for using Computers by Teaching Staff*

USE COMPUTER FOR	Responses	Frequency	%
Organizing my teaching materials	Yes	85	90.4
	No	9	9.6
	Total	94	100.0
Teaching in the classroom	Yes	8	8.5
	No	86	91.5
	Total	94	100.0
Chatting	Yes	13	13.8
	No	81	86.2
	Total	94	100.0
E-mailing	Yes	76	80.9
	No	18	19.1
	Total	94	100.0
Office work	Yes	58	61.7
	No	36	38.3
	Total	94	100.0
Grading student marks	Yes	58	61.7
	No	36	38.3
	Total	94	100.0
Research purpose	Yes	68	72.3
	No	26	27.7
	Total	94	100.0
Other purpose	Yes	9	9.6
	No	85	90.4
	Total	94	100.0

As shown in Table 8, the majority were using computers for organizing their teaching materials (90.4%), research purpose (72.3%), e-mailing (80.9%), office work (61.7%), and for grading student marks (61.7%). Some of the respondents (9.6%) reported that they were using computers for browsing international news and playing computer games.

On the other hand, only 8.5% claimed that they were using computers for teaching in the classroom (Table 8). This was an indication for the premise that the majority of the teaching staffs were not using computers to assist teaching-learning in the classroom where teachers use ICTs for presenting their learning objects and learns to learn and also that students' access to computers was seriously limited.

Table 9: *Frequency of Internet Use by the Teaching Staff*

	Frequency	**%**
yes	90	95.7
no	4	4.3
Total	94	100.0

From the data gathered through questionnaire it was found that the majority (95.7%) of the respondents were using internet (Table 9). Only 4.3% of the teaching staffs indicated that they were not using internet because they did not have access to the internet at their offices.

Table 10: *Frequency of Teachers' Place of Use of Internet*

Use Internet at	**Responses**	**Frequency**	**%**
Home	Yes	10	11.0
	No	81	89.0
	Total	91	100.0
Lab	Yes	18	20.0
	No	72	80.0
	Total	90	100.0
Office	Yes	65	72.2
	No	25	27.8
	Total	90	100.0
Private Internet Centers	Yes	41	45.6
	No	49	54.4
	Total	90	100.0

As shown in Table 10, the majority of the respondents were using internet at their offices (72.2%). Some others indicated that they were using internet at other places such as private internet centers (45.6%), labs (20%), and home (11%). As shown in Table 7, 52.2% of the respondents had shown they were owning computers at home but from Table 10 it is indicated that only 11% of the respondents were using internet at home which was an indication for though a good percentage of the teaching staff have computers at home they were not connected to internet.

The respondents were found to be using internet for various purposes. The majority of the respondents were using internet for e-mailing (91%), browsing (92.1%) and research (77.5%) whereas only 18% for chatting and 7.9% for other purposes such as browsing international news (Table 11).

Table 11: *Purposes for which the Teaching Staff use Internet*

Use Internet For	Responses	Frequency	%
E-mailing	Yes	81	91.0
	No	8	9.0
	Total	89	100.0
Internet browsing	Yes	82	92.1
	No	7	7.9
	Total	89	100.0
Research purpose	Yes	69	77.5
	No	20	22.5
	Total	89	100.0
Chatting	Yes	16	18.0
	No	73	82.0
	Total	89	100.0
Other purpose	Yes	7	7.9
	No	82	92.1
	Total	89	100.0

The teaching staffs were asked to report on their familiarity with computer applications to which the following response (Table 12) was obtained. As can be seen from the Table, all of the respondents (100%) reported that they were familiar with word processing program, whereas a little more than half of the respondents (51.1%) were familiar with PowerPoint presentation, 59.6% were familiar with spreadsheet (excel), and 24.5% were familiar with database management program (MS access). Few (19%) of the respondents responded that they were familiar with one or more of the following computer applications: authoring tools, SPSS, Lotus, Developmental languages (C, $C^{++,}$ Java, VB), FORTRan Programs, chemdraw, Microsoft publisher, GIS (Arc View, ERDAS), CANOCO, PC-ORD, mathlab, and latex.

Table 12: *Teaching Staff Familiarity with Computer Applications*

Basic Applications	Responses	Frequency	%
Word Processing	Yes	94	100
	No	0	0
	Total	94	100.0
PowerPoint Presentation	Yes	48	51.1
	No	46	48.9
	Total	94	100.0
SpreadSheet (Excel)	Yes	56	59.6
	No	38	40.4
	Total	94	100.0
Database Management System (Access)	Yes	23	24.5
	No	71	75.5
	Total	94	100.0
Other Programs	Yes	18	19.1
	No	76	80.9
	Total	94	100.0

Generally, the majority of the teachers were found to be using ICT (computer and internet services). It was also found that the large parts of the teaching staff were using computers and internets for composing teaching materials, emailing, internet browsing and research purposes. Moreover, all of the respondents who were using computers were also familiar with the word processing program.

4.5. Teaching Staff Perception of their Fluency in Basic Computer Applications and Programs

In an attempt to look into the preparedness level of the teaching staff to integrated ICT into the teaching-learning, teachers' fluency in basic computer applications and programs were measured using five point scale (Excellent, Very good, Good, Fair and Never Used). Table 13 depicts the frequency and mean of the teaching staff along the scales.

Table 13: *Frequency of Teaching Staff Fluency in Basic Computer Applications*

Scale	Excellent		Very Good		Good		Fair		Never Used		Mean
	N	%	N	%	N	%	N	%	N	%	
Word	26	27.7	45	47.9	15	16.0	8	8.5	0	0.0	3.95
Power Point	16	21.6	13	17.6	20	27.0	9	12.2	16	21.6	3.05
Excel	13	17.6	12	16.2	22	29.7	16	21.6	11	14.9	3.0
Access	7	11.3	5	8.1	10	16.1	10	16.1	30	48.4	2.18
Email	41	46.6	28	31.8	13	14.8	6	6.8	0	0.0	4.18
Internet	37	43.0	27	31.4	18	20.9	3	3.5	1	1.2	4.12

As can be seen from Table 13, well around 27.7% of the teaching staff reported that they were excellent at word processing. The other 47.9% indicated that they were very good at word processing application and 16.0% were good at word processing. Only 8.5% of the respondents rated their fluency in word processing as fair. The table clearly shows that the majority (91.6%) of the teaching staffs rated their fluency in word processing as good or very good or excellent. More over no respondent indicated that she/he never used a word processor. This result was similar to Table 12 which showed the familiarity of all the respondents to word processing application. The mean of respondents' fluency in word processing was found to be 3.95(where Excellent =5, Very Good=4, Good=3, Fair=2 and Never Used=1). It was also found that the fluency of 75.6% of the respondents was well above the mean.

Table 13 also shows the results found from the rating of the teaching staff on their fluency on PowerPoint application. The mean score of the perception of teaching staff fluency on PowerPoint was measured to be 3.05. It was also found that the scores of 39.2% (Excellent and Very Good) of the teaching were above the calculated mean. The other 27.0% of the teaching staff were said their competency

in PowerPoint application is good. Some 12.2% of the teaching staffs were found to be fair at PowerPoint. On the other hand 21.6% indicated that they had never used the PowerPoint application software.

The mean of the fluency of the teaching staff on spreadsheet program was found to be 3.0 (Table 13). The same table shows that, 17.6% and 16.2% of the respondents indicated their fluency in spreadsheet application was excellent and very good respectively. 29.7% rated their fluency as good. From these, it is safe to conclude that the scores of 63.5% of the respondents was either equal to (good) or greater than (Excellent and Very Good) the calculated mean. On the other hand, some 21.6% rated their fluency in spreadsheet as fair and the other 14.9% of the respondents indicated that they had never used the spreadsheet program.

As can be seen from Table 13, 11.3%, 8.1%, and 16.1% of the respondents rated their fluency in database management (access) as excellent, very good and good respectively . These ratings were found to be well above the calculated mean (2.18). Some 16.1% of the respondents indicated that they were fair at working with database management application. On the other hand, a good percentage (48.8%) of the teaching staffs were reported to be never used the Microsoft Access software.

Table 13 shows, the majority of the teaching staff were either excellent (46.6%) or very good (31.8%) in email. 14.8% had indicated that they were good at emailing. On the other hand only 6.8% were reported to be fair at emailing program. The table also shows that no respondent indicated that he/she never used email. This proves that all the teaching staffs who said that they were using computers were also using email. Similarly, as Table 13 depicts, the majority of the respondents reported that they were either excellent (43.0%) or very good (31.4%) or good (20.9%) at using internet. On the other hand, only 3.5% indicated they were fair and a very limited percent (1.2%) indicated that they never used internet. A look into the mean score of the respondents showed that the fluency scores of 43.0% (excellent) of the respondents were comfortably above the calculated mean (4.12).

In addition to the above fluency measure in basic applications (Table 13), the researcher tried to assess specific basic computer application skills (Competency) of the teaching staff by using a checklist on three levels (1=low, 2=Medium and 3=High). Tables 14, 15, and 16 depict the frequency and mean of the respondents.

Table 14: *Teachers' Competency in Productivity Tools*

Productivity Tools	**High**		**Medium**		**Low**		**Mean**
	N	**%**	**N**	**%**	**N**	**%**	
Composing with a Word Processor	46	49.5	39	41.9	8	8.6	2.41
Cutting and Pasting text	66	71.0	22	23.7	5	5.4	2.66
Printing Options	57	62.0	31	33.7	4	4.3	2.58
Using a Spreadsheet program	19	20.9	33	36.3	39	42.9	1.78
Manipulating Graphics	17	18.7	22	24.2	52	57.1	1.62
Use of Presentation Graphics	17	18.7	23	25.3	50	54.9	1.98

As can be seen from Table 14, about 50% of the samples reported that their competency in composing with a word processor was high i.e. the scores of 50% of the respondents was found to be above the mean score (2.41). The other 41.9% indicated that their competency in composing with a word processor was medium. Only 8.6% reported that their competency in composing with a word processor was low. Moreover, the majority of the respondents (71.0%) reported that their competency in cutting and pasting text was high where as the competency of 23.7% of the respondents was medium (Table 14). Only 5.4% reported that their competency in cutting and pasting was low. The above findings were also supported by the fluency measure (Table 13). The table clearly shows that the majority (91.6%) of the teaching staffs rated their fluency in word processing as good or very good or excellent.

In the same token, it was also found that the majority of the respondents (93.7%) rated their skill in printing options as high or medium. Only 4.3% indicated that their skill in printing was low (Table 14). The table also depicts that a good percentage of the respondents (42.9%) reported that their competency in spreadsheet program was low. Similarly, 57.1% and 54.9% indicated that their skill in manipulating graphics and use of presentation graphics respectively were low.

Table 15: *Teachers' Competency in Electronic Mail*

Specific Areas	High		Medium		Low		Mean
	N	%	N	%	N	%	
Sending a Message	62	67.4	27	29.3	3	3.3	2.64
Replying to a Message	63	68.5	26	28.3	3	3.3	2.65
Sending Group Message	35	38.9	28	31.1	27	30.0	2.09
Sending and Receiving Attachments	43	47.8	30	33.3	17	18.9	2.29

It was found earlier (Table 13) that the majority (93.2%) of the respondents reported that their fluency in emailing was either excellent or very good or good. In the same token, the majority (67.4% in sending a message and 68.5% in replying to a message) reported that their competency was high (Table 15). 29.3% in sending a message and 28.3 % in replying to a message indicated their skill was medium. Only 3.3% in both cases reported to own low skill in sending and replying to a message. It was also evident that the scores of the majority on sending and replying to a message was well above the mean score (2.64 and 2.68 respectively).

On the other hand, 38.9% of the respondents rated their skill in sending a group message as high whereas 31.1% rated their skill as medium (Table 15). The same table shows that 30.0% of the respondents rated their skill in sending group message as low. The skills of 47.8% of the respondents in sending and receiving attachments were found to be high whereas for 33.3% it was found to be medium.

For the other samples (18.9%), the competency rating in sending and receiving attachments was low.

Table 16: *Teachers' Competency in Internet Services*

Specific Areas	**High**		**Medium**		**Low**		**Mean**
	N	**%**	**N**	**%**	**N**	**%**	
Accessing the Internet /World Wide Web	53	57.6	28	30.4	10	10.9	2.80
Locating Specific Topics	43	46.7	34	37.0	15	16.3	2.30
Downloading text/graphics	45	48.9	34	37	13	14.1	2.35

It was recalled from Table 13 that the majority of the samples reported that they were either excellent (43.0%) or very good (31.4%) or good (20.9%) at using internet. The findings from the current instrument (Checklist) depicts that the skill for 57.6% in accessing the internet, 46.7% for locating specific topics and 48.9% for downloading text/graphics were reported to be high (Table 16). In the same table it was shown that the skill of a good percentage of the samples, 30.4% for accessing the internet, 37.0% each for locating specific topics and downloading text/graphics was found to be medium. The skill scores for the other samples, 10.9% for accessing the internet, 16.3% for locating specific topics and 14.1% for downloading text/graphics was reported to be low.

In general, the results found from the fluency measure and skills checklist showed that the competency of the teaching staff in the basic applications specifically word processing i.e. composing, cutting and pasting, email i.e. sending and replying message, and internet browsing i.e. accessing internet, locating specific topics on the internet and downloading text/graphics was promising. The expertise that the respondents had shown to own on these basic ICT applications ignites a glimmer of hope for the future of ICT integration in Addis Ababa University, College of Education.

4.6. Teaching Staff Attitude towards ICT

One of the major purposes of this research was to investigate the attitude of the teaching staff towards ICT/preparedness of the teaching staff with regard to attitude towards ICT. To achieve this purpose, the researcher used an attitude questionnaire which was prepared to measure attitude on five point scale (1=Strongly Disagree, 2= Disagree, 3=Undecided, 4=Agree and 5=Strongly Agree). The questionnaire contained 34 items. Table 17 shows the frequency of the sum of the scores of the respondents on the 34 items.

Table 17: *Attitude of the Teaching Staff towards ICT*

Total Score	**Frequency**	**%**
115-130	11	13.6
132-145	27	34.4
146-160	25	36.0
161-175	12	16.0
Total	75	100.0

The mean of the scores of the respondents was found to be 145.17. This mean (145.17) shows that the average scores of every individual on each item was at least 4 (Agree) because 4 times 34 is 136 which is a little less than the calculated mean. So the responses of the majority of the respondents to every attitude item were either agree (4) or strongly agree (5). As Table 17 shows, the total scores for 52.0% of the respondents were above the mean whereas the total scores for 48% of the respondents were found to be below the calculated mean. So, the above table is an evidence to conclude that the teaching staff had a positive attitude towards ICT.

4.7. Level of Use of an Innovation (ICT)

The level of use of ICT by the teaching staff was investigated by the use of CBAM –LoU (Concerned Based Adoption Model Level of Use). As the concept of ICT is a new innovation, the instrument was used to have a fast observation into how the teachers rate their level of use of ICT as an innovation. The Levels of Use were: (0) Non-Use, (1) Orientation, (2) Preparation, (3) Mechanical Use, (4) Routine, (5) Refinement, (6) Integration, and (7) Renewal. Further definitions for the different levels where given as follows:

Level 0 Non-use

I have little or no knowledge of information technology in education, no involvement with it, and I am doing nothing toward becoming involved.

Level 1 Orientation

I am seeking or acquiring information about information technology in education.

Level 2 Preparation

I am preparing for the first use of information technology in education.

Level 3 Mechanical Use

I focus most effort on the short-term, day-to-day use of information technology with little time for reflection. My effort is primarily directed toward mastering tasks required to use the information technology.

Level 4 A Routine

I feel comfortable using information technology in education. However, I am putting forth little effort and thought to improve information technology in education or its consequences.

Level 4 B Refinement

I vary the use of information technology in education to increase the expected benefits within the classroom. I am working on using information technology to maximize the effects with my students.

Level 5 Integration

I am combining my own efforts with related activities of other teachers and colleagues to achieve impact in the classroom.

Level 6 Renewal

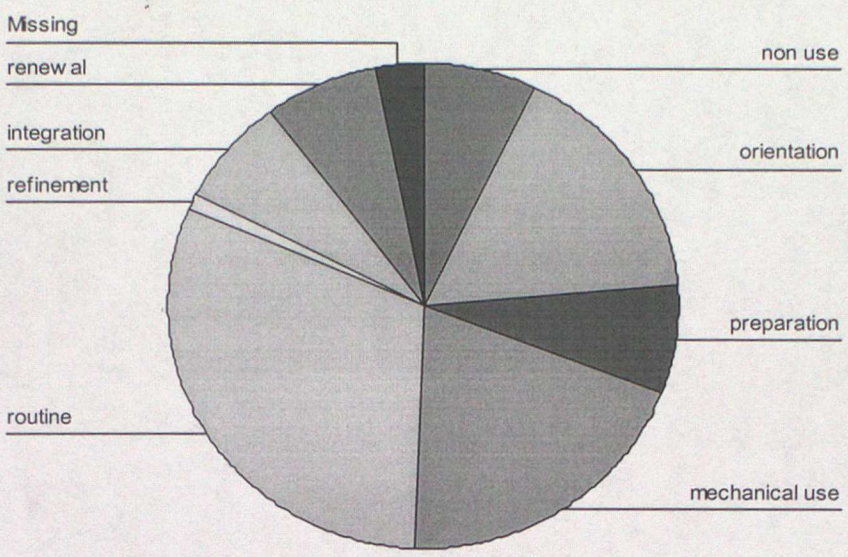
I reevaluate the quality of use of information technology in education, seek major modifications of, or alternatives to, present innovation to achieve increased impact, examine new developments in the field, and explore new goals for myself and my school or district.

Table 18 shows the frequency of teachers' self rating on the different levels of use.

Table 18: *Level of Use of ICT by the Teaching Staff*

Level	**Frequency**	**%**
Non use	7	7.4
Orientation	16	17.0
Preparation	7	7.4
Mechanical use	19	20.2
Routine	30	31.9
Refinement	1	1.1
Integration	7	7.4
Renewal	7	7.4
Total	94	100.0

As shown in Table 18, the teaching staffs were varyingly found in different level of use. A good percentage of the teaching staff leveled themselves as using ICT routinely (31.9%). Some (20.2%) of the teaching staff were found at the mechanical use level. The others were distributed almost similarly across the levels of non use (7.4%), preparation (7.4%), integration (7.4%) and renewal (7.4%). Stated in a different way, 83.9% of the teaching staffs were found at levels Non use to Routine use. The following graph (Graph 2) depicts the levels of the teaching staffs more clearly.



Graph 2: *Teachers' Level of Use of ICT*

It is more visible from Graph 2 that almost half of the samples had indicated that they were using ICT mechanically and routinely where as a good part of the samples were at orientation level.

4.8. Training on Basic ICT Applications and Programs

An attempt was made to investigate whether the teaching staff received any training on ICT applications and programs from the College of Education or other. The researcher presented the following questions to the interviewees: Are the teaching staffs given any training on ICT? What skill and pedagogical preparedness do you think the teaching staff own? The information from the ICTDO officer and the management team showed that the teaching staffs were given no adequate training except that a very few graduated in MEd_ICT (Masters of Education in Information and Communication Technology) and the staff in the department of Business Education particularly IT Education got ICT related trainings. Information from a

document received from the ICTDO office uncovered that there is a future plan to build a new training center and train the teaching staff and subsequently others.

Moreover, the part of the questionnaire presented to the teaching staff requested them to indicate whether they did get any training on basic ICT applications or need more training. The following result was found from the process (Table 19).

Table 19: *Teachers' Training on ICT*

Basic Applications	Responses	Frequency	Percentage
Word Processing	Yes	61	67.0
	No	27	29.7
PowerPoint	Yes	23	28.0
	No	51	62.2
Excel	Yes	39	48.1
	No	36	44.4
Database/Access	Yes	24	30.8
	No	40	51.3
E-mailing	Yes	29	35.4
	No	47	53.3
Internet Browsing	Yes	27	32.5
	No	48	57.8
Others	Yes	13	13.8
	No	81	86.2

Table 19 shows that 67% of the teaching staffs have received training on word processing, 28% on PowerPoint, 48.1% on spreadsheet, 30.8% on MS access, 35.4% on e-mailing, and 32.5% on internet browsing. Only 13.8% of the respondents indicated that they received trainings on one or more of the following ICT applications: authoring tools, SPSS, Developmental languages (C, $C^{++,}$ Java, and VB), FORTRan Programs, chemdraw, Microsoft publisher, GIS (Arc View, ERDAS), CANOCO, PC-ORD, mathlab, and latex.

Comparably few of the teaching staffs indicated that they need more training on the basic computer applications (Table 20). Only 12.8% of the respondents have shown that they need more training on word processing, 21.3% on PowerPoint presentation, 20.2% on spreadsheet/excel, 31.9% on database management/MS

access, 16.0% on e-mailing and 20.2% on internet browsing. This shows that the majority of the teaching staff did not need training on the basic computer applications.

Table 20: *Teachers who need More Training on Basic ICT Applications*

Basic ICT Applications	**Responses**	**Frequency**	**%**
Word Processing	Yes	12	12.8
	No	82	87.2
PowerPoint	Yes	20	21.3
	No	74	78.7
Excel	Yes	19	20.2
	No	75	79.8
Database/Access	Yes	30	31.9
	No	64	68.1
E-mailing	Yes	15	16.0
	No	79	84.0
Internet Browsing	Yes	19	20.2
	No	75	79.8

Overall, the investigation into the training of the teaching staff revealed that there were no meaningful and adequate training given to them. It was also found that only small percentage of the samples indicated they need more training on the basic ICT applications.

CHAPTER FIVE

DISCUSSION

The major object of this research was to investigate the Preparedness (readiness) of Addis Ababa University, College of Education to integrate ICT into the educational system and to make analysis of the infrastructure that are indispensable to implement the computer-based education. In this section a discussion on the main objects of this research will be made based on the results and the review of literature. The levels of every components of ICT integration at AAU, College of Education will be dealt with in relation to the proposed ICT integration model.

5.1. ICT Policy of Addis Ababa University

It was documented in the literature review section that ICT policy is inescapable component of ICT integration at institutions. Loxley and Julien (2006) noted that successful introduction of any technology or any innovative way of doing things better in the education sector depends to a large extent on an enabling policy environment coupled with a well structured and logical implementing framework However, the results of the interview with the different management bodies, ICTDO officer, and the result from the document analysis showed that Addis Ababa University has no institutionally developed and documented ICT policy. This result was consistent with Dawit (2006) who indicated that one of the factors that affected the ICT use in the AAU was the absence of ICT policy document. Though there was no ICT policy document in the University, a couple of the major elements that ICT in education policy should address as proposed by Naidoo (2003) such as procuring and installing the technology, and Training teachers to use ICT were practiced to some extent in the College of Education.

With regard to the future plans of the University as ICT policy document was concerned, it was possible to learn that one of the main activities scheduled for

1999 by the ICTDO was developing ICT policy document. It was noted on the action plan as below:

> ICTDO has been looking at a number of ICT policies from various sources upon which to model its own. The Emory visit will also provide an opportunity to review an ICT policy at work at an institution of higher learning. Additionally, a part of a NUFFIC funded capacity building project that is at an early stage of planning includes an ICT policy development component (ICT Development Office E.C. 1999 Action Plan).

5.2. ICT Policy of Addis Ababa University in Light of the Proposed Integration Model

In the proposed ICT integration model it was documented that development plans and policies refer to the detailed steps of how the vision and philosophies are carried out. Plan, goals and objectives are further defined providing interim and long-term targets. Policies are set, budget is allocated, facilities are dedicated, roles are defined, tasks are delegated, and an evaluation plan is created to define the direction ICT development will take (IFIP, 2000). It was also indicated in the document that the institutions at the beginning stage of ICT development, emerging phase, has no policies or has restrictive policies (Appendix A. 4). Depending on the findings the case of Addis Ababa University was that ICT Policy document was non-existent. So, it could be concluded based on this result that Addis Ababa University was found at the first level of the proposed ICT integration model, the Emerging Phase.

5.3. Readiness of AAU, College of Education to Integrate ICT

It is not debatable that when there is an innovation, prepared bodies are required for implementation of the innovation. As ICT is an innovation, it requires some level of preparedness/readiness from the implementing bodies. A survey of different

literatures shows that the implementing bodies need to be ready in terms of awareness, attitude, skill and the availability of the indispensable infrastructure to integrate ICT into the education system. Related with this, Hoffman (2001) as cited in Abebe (2004) suggests that successful implementation of ICTs needs to address five interlocking frameworks for change: the infrastructure, attitude, staff development, support (technical and administrative) and also sustainability and transferability.

5.3.1. Administrative Readiness of AAU, College of Education

A look into the readiness of the administrative bodies of Addis Ababa University, College of Education revealed that they had a positive attitude towards ICT. All of them sought to exploit the potentials of ICT in their offices as well as in the education system. What was observed during the interview session with the different management bodies at AAU was that almost all of them had a strong ambition to see ICT fully integrated into the education system. This finding showed that though ICT is not currently integrated into the education system of Addis Ababa University, College of Education, there is a fertile ground from the administrative bodies to welcome ICT into the education system. This in turn entails that one of the most critical factor for successful implementation of any school innovation especially technology, as contended by Bloeemen et al quoted in Abebe (2004), is not actually a worry in the College of Education as the administrative were very welcoming to the ICTs.

5.3.2. Staff Readiness of AAU, College of Education

The teaching staffs are the main implementing bodies of any innovation, in this case ICT. It is also undeniable that the teaching staffs need an operational readiness with regard to awareness, attitude and skill to integrate ICT into the education system. The results of this study showed that the teaching staffs had some level of readiness with regard to the main components of ICT integration in education. In contrast to

the findings of Dawit (2006) who reported that teachers (of Addis Ababa University- the universe of the case) are utilizing computers and other ICT tools significantly below the expected value, it was exhibited in this study that almost all of the teaching staffs of the College of Education were using computers (96.9%) (Table 4) and internet (95.7%)(Table 9). On the other hand, in agreement with the findings of Dawit (2006) on Addis Ababa University (the universe) who indicated that the teaching staff of AAU has positive attitude towards ICT in education, the teaching staff of the College of Education were reported to be having a positive attitude towards ICT in education.

A look into the perceptions of the teaching staff towards their skills in different computer applications revealed that they had a promising level of competency. The results found from the fluency measure (Table 13) and skills checklist (Table 14, 15 and 16) showed that they perceived they were promisingly competent in the basic applications specifically word processing, PowerPoint presentation, email and internet browsing. The expertise that the respondents had reported to exhibit on these basic ICT applications really ignites a glimmer of hope for the future of ICT integration at the College of Education; if not a guarantee for successful integration, as ICT integration goes beyond these.

5.3.3. Infrastructure Readiness

It is unarguable that institutions need to deploy appropriate number of ICT infrastructures to exploit the potentials of ICT. Accordingly, the findings from the interview with the different management bodies revealed that currently there were enough computers for the teaching staffs but reaching every learner with computers was a serious problem. Interview with the ICTDO officer showed that the current infrastructure of the University was only serving the teaching staff, some very few students and offices, and the majority was using these ICTs only for e-mail and internets.

The network and bandwidth facilities that Addis Ababa currently own were found to be very limited. Interview with the ICTDO officer and document analysis of the Action Plan of the ICTDO showed that the current level of access was limited to about 5,000 access points for a community that exceeds 50,000 in number. Out of the 5,000 nodes a high percentage was dedicated to administrative and non-teaching/learning functions. This was an indication for the presence of shortage of access of internet even to the teaching staff let alone the learners who had no access even to the computers.

It was also found that the following were the major infrastructure constraints prevalent at Addis Ababa University:

- Less developed ICT infrastructure such as computers and internet
- Unbalanced number of computers with the number of users
- Network problem (low bandwidth)
- Poor electricity in some buildings
- Absence of maintenance
- Absence of support system.

5.4. Readiness of AAU, College of Education Seen in Relation to the Proposed ICT Integration Model

The proposed ICT integration model makes clear that administrator and teachers at the beginning of ICT development, emerging phase, are just starting to explore the possibilities and consequences of using ICT for institution management and adding ICT to the curriculum, where the institutions are still grounded in the traditional teacher-centered practice. It is also characterized by the teacher's personal use of ICT, such as for instance, the use of word processing to prepare worksheets, locating information on the internet, communicating with friends and family by email. Findings from the current survey of the situation of AAU, College of Education resembled the characteristics of a typical institution at the emerging phase of ICT development. The teaching staffs had reported that they were

personally using computers and internet for different purposes such as for organizing their teaching materials (90.4%), e-mailing (91%), internet browsing (92.1%) and research (77.5%)(Table 4.8 and 4.11). This indicates that the teaching staffs were exploring ICT by trying to develop ICT literacy. These observed behaviors of the teaching staff resemble the behaviors of teachers at the emerging phase of the proposed ICT integration model.

Findings from the Concerns Based Adoption Model-Level of Use (CBAM-LoU) of an Innovation showed that some 52.1% of the teaching staff were at the level of mechanical use and routine use which indicates focusing most effort on the short-term, day-to-day use of information technology with little time for reflection, effort primarily directed toward mastering tasks required to use the information technology, and feeling comfortable using information technology in education (Table 18) which is the characteristics of teachers at the emerging phase of the proposed integration model (Appendix A.1,2,4). It was also apparent from CBAM-LoU that the majority (83.9%) of the teaching staffs were found at the first five levels, Non Use to Routine Use, of the adoption level which shows the teaching staffs were only trying to personally explore the different ICT apart from use in the classroom.

On the other hand, it was found that very few (8.5%) of the teaching staffs were using computers for teaching in the classroom (Table 8). This indicates very few of the teaching staffs were found at a different level of the proposed ICT integration model, applying, or less probably infusing or transforming.

The proposed integration model shows that institutions at the beginning of ICT integration, emerging phase, begin to purchase or have had donated some computing equipment and software, own a few isolated, stand-alone computers and printers in the institution offices and a few classrooms. The current situation of Addis Ababa University, College of Education seems to resemble the above institutional characteristics. The College had deployed some computers for the

teaching staff and administrative use where access to the majority of the learners was very limited.

One of the components of the proposed integration model, the professional development of the institution staff, suggests that institutions at the emerging phase of the integration model have the following characteristics:

> "Learning and ICT training will emphasise the need to learn a limited range of software for teaching and administration. Individual members of staff will identify their training needs, generally restricted to technical training. The ICT development plan will identify training separately from other institution training and professional development. ICT training and development is partly funded by the institution and the teacher." (IFIP, 2000)

The above descriptions of a typical institution at the emerging phase of the proposed ICT integration model seems to be similar to the situation of the AAU, College of Education in that the professional development of the teaching staff at College of Education were given trainings or acquired trainings only in some of the basic ICT applications such as word processing, emailing and internet browsing and some subject specific software such as mathlab, chemdraw, and GIS which seem to emerge from personal interest of the individual teacher.

More illustration of the comparison between the proposed integration model and the current situation of Addis Ababa University, College of Education is given in Table 21.

Table 21: *Comparison of AAU, College of Education with the ICT Integration Model*

Phase	Proposed Integration Model	AAU, College of Education
Emerging	• Institutions begin to purchase, or have had donated, some computing equipment and software.	• AAU, College of Education is purchasing computers for the teaching staff, administrative offices, and building computer laboratories for Business Education Department and some graduate studies.
	• Involves teachers own personal use of ICT, such as, the use of word processing to prepare worksheets; finding learning resources on CD-ROMs or on the Internet; communicating with friends and family by e-mail.	• The majority of the teachers have found to be using word processor, PowerPoint presentation, email and internet.
	• Institutions are still firmly grounded in traditional, teacher-centered practice.	• The current teaching mode is traditional, teacher-centered(for the majority)
	• Learners access to technology is through individual teachers	• Learner's access to ICT is very limited except for some Business Education Department students and some graduate students.
Applying	• A new understanding of the contribution of ICT to learning has developed	• Very routine and mechanical
	• Administrators and teachers use ICT for tasks already carried out in institution management and in the curriculum.	• The administrative offices are using ICT for administrative purposes; the majority of the teaching staffs are using computers for organizing their teaching materials, research and communication.
	• Learners access to technology is mainly through computer labs	• Access is very limited to the majority of the learners
	• ICT has been taught as a separate subject area (ICT-literacy)	• Introduction to ICT is give as one subject for the students of the College of Education
Integrating	• Range of technologies both in laboratories,	Not applicable

	classrooms and administrative offices • The curriculum begins to merge subject areas to reflect real-world applications • Total access to learners so that they can choose projects and ICT tools to learn and demonstrate their knowledge across subject areas	
Transforming	• Institutions use ICT to rethink and renew their organization in creative ways • ICT becomes an integral though invisible part o daily personal productivity and professional practice • Focus of curriculum is learner centered • Learner's access to technology is broad and unrestricted	Not applicable

In general, the survey of the different characteristics of Addis Ababa University, College of Education with regard to the different components of ICT integration according to the proposed integration model exemplify characteristics of a typical institution found at the beginning phase of ICT integration, EMERGING PHASE, which looks for further commitment from the College of Education (management team and teaching staff) to focus and coordinate their energy institutionally to meaningfully integrate ICT into the education system.

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Appendix A.2: *Summary of Approaches to ICT Development*

Phase	Description
Emerging Approach	• The beginning stages of ICT development. • Institutions begin to purchase, or have had donated, some computing equipment and software. • Administrators and teachers are just starting to explore the possibilities and consequences of using ICT for institution management and adding ICT to the curriculum. • Institutions are still firmly grounded in traditional, teacher-centred practice. • Institution organisation provides discrete time periods for each subject. • Learners access to technology is through individual teachers
Applying Approach	• A new understanding of the contribution of ICT to learning has developed. • Administrators and teachers use ICT for tasks already carried out in institution management and in the curriculum. • Teachers largely dominate the learning environment. • Learners access to technology is mainly through computer labs • ICT has been taught as a separate subject area (ICT-literacy) • Institutions adapt the curriculum in order to increase the use of ICT in various subject areas with specific tools and software
Integrating Approach	• Institution now has a range of technologies both in laboratories, classrooms, and administrative offices • The institution staff explores new ways in which ICT changes their personal productivity and professional practice • The curriculum begins to merge subject areas to reflect real-world applications • Learners access to technology enables them to chose projects and ICT tools to learn and demonstrate their knowledge across subject areas; learners have more choices with regard to learning styles and pathways; they take more responsibility for their own learning and assessment • ICT is taught to selected students as a subject area at the professional level
Transforming Approach	• Institutions use ICT to rethink and renew institutional organization in creative ways • ICT becomes an integral though invisible part of daily personal productivity and professional practice • The focus of the curriculum is learner-centred and integrates subject areas in real-world applications. • Learners' access to technology is broad and unrestricted. • ICT is taught as a separate subject at the professional level and is incorporated into all vocational areas • The institution has become a centre of learning for the business community

Appendix A.3: *Relationship between the Research Questions and the Proposed ICT Integration Model*

Research Question	Areas of ICT Development	Approaches
1. What are the contents of ICT policy of AAU? What are the strengths and weaknesses?	• Vision • development plans and policies • understanding the curriculum • professional development of institution staff • community involvement • assessment	• Emerging • Applying • Integrating • Transforming
2. What does the preparedness/readiness level of Addis Ababa University, College of Education look like with respect to awareness, attitudes and skills of the management team and teaching staff, and the indispensable ICT infrastructure?	• professional development of institution staff • Philosophy of learning and pedagogy • facilities and resources • assessment	• Emerging • Applying • Integrating • Transforming
3. What are the human and infrastructural resources available in the University to make the educational system ICT based?	• professional development of institution staff • facilities and resources	• Emerging • Applying • Integrating • Transforming
4. What are the human and infrastructural resources lack in the University to make the educational system ICT based?	• professional development of institution staff • facilities and resources	• Emerging • Applying • Integrating • Transforming

Appendix A.4: *Matrix of indicators to determine an institution's stage of progress in implementing ICT in terms of four approaches to ICT development and eight characteristics of Institutions (IFIP, 2000).*

	Vision	**Learning Pedagogy**	**Development Plans and Policies**	**Facilities and resources**	**Understanding of the curriculum**	**Professional development for institution staff**	**Community**	**Assessment**
Emerging	Dominated by individual interest Limited Pragmatic	Teacher centred Didactic	Non-existent Accidental Restrictive policies No planned funding	Stand-alone workstations for administration Individual classrooms Computers and printers Word processing Spreadsheets, databases, presentation Institution administration software Games	ICT Literacy Awareness of software Responsibility of individual teachers	Individual interest	Problem driven Accidental	Equipment based Budget orientated Discrete subjects Didactic Paper and pencil Controlling Closed tasks Responsibility of individual teacher.
Applying	Driven by ICT specialist	Factual knowledge based learning Teacher centred Didactic ICT a separate subject	Limited ICT resource lead Centralised policies Hardware and software funding Automating existing practices	Computer lab or individual classrooms for ICT specific outcomes Computers, printers and limited peripherals Word processing Spreadsheets, databases, presentation ICT software Internet access	Applying software within discrete subjects Use of artificial and isolated contexts	ICT applications training Unplanned Personal ICT skills	Seeking donations and grants	Skills based Teacher centred Subject focused Reporting levels Moderated within subject areas
Integrating	Driven by subject specialists Discrete areas	Learner centred learning Collaborative	Individual subject plans include ICT Permissive policies Broadly based funding, including teacher training	Computer lab Networked classrooms, intranet and Internet ICT and learning resource rich learning centres Range of devices, including: digital cameras, scanners, video and audio recorders, graphical calculators, portable computers, remote sensing devices Video-conferencing Word processing, spreadsheets, databases, presentation software Range of subject orientated content Multimedia authoring, video/audio production Range of subject specific software	Integration with non-ICT content Integrated learning systems Authentic contexts Problem solving project methodology Resources based learning	Subject specific Professional skills Integrating subject areas using ICT Evolving	Subject based learning community providing discrete, occasional assistance, by request. Global and local networked communities	Integrated Portfolios Subject oriented Learner centred Student responsibility Multiple media choices to demonstrate attainment Moderated across subject areas Social and ethical as well as technical

Transforming	Leadership Acceptance by entire learning community Network centred community	Critical thinking and informed decision making Whole learner, multi-sensory, preferred learning styles Collaborative Experiential	ICT is integral to overall institutional development plan All students All teachers Inclusive policies All aspects of ICT funding integral to overall institution budget Integral professional development	**Whole institution learning and ICT infrastructure and access to technology resources a wide range of current devices.** **Emphasis on a diverse set of learning environments.** All of the above and Web based learning spaces Brainstorming Conferencing and collaboration Distance education Web courseware Student self-management software	Virtual and real time contexts, new world modelling ICT is accepted as a pedagogical agent itself The curriculum is delivered by the web as well as by staff	Focus on learning and management of learning Self-managed, personal vision and plan, institution supported Innovative and creative Integrated learning community – students/teachers co-learners	Broad based learning community actively involved business, industry, universities, vocational institutions, voluntary organisations. Global and local, real and virtual Institution is a learning resource for the community – physically and virtually	Continuous Holistic – the whole learner Peer mediated Learner centred Learning community involvement Open ended Project based

Appendix B: Letter of Request

Letter of Request

Addis Ababa University, College of Education

Dear Sir:

The world is hosting a superb change in the education system due to the introduction of Information and Communication Technology (ICT) into the education environment. In this study the author is assessing the status of the ICT integration at your college, Addis Ababa University. The study is believed to be of an invaluable resource to your college in indicating the level of ICT integration and the whole picture of ICT use at your college.

The purpose of this letter is then to appeal for your honest support in providing me your 30 minutes to sit for an interview. Your responses and your opinion will be used only for research study and will be kept confidential.

During the interview schedule the researcher is planning to use tape recorder so that it could be possible for the researcher to attend fully to the interview session, and it really will minimize the interruptions that could occur from handwriting. If it is your will to record the interview session, the researcher promises to offer the transcribed version to you so that you could authenticate the taped data before it is used in the research.

Once the research is completed, the researcher vows to provide the copy of the research report to your organization so that it could be an immediate reference.

Attached with this letter are the possible interview questions which the researcher is planning to ask you. Although I need information on all the questions, I may not ask all the questions or may ask other questions which are related and inclusive.

As an appreciation for your willingness to give me your time and sought information, I have presented a THANK YOU card to you. I hope you like that.

With the very honest regards,

Miressa Neme

Interview Schedule (Maximum of 30 minutes)

The Timetable is as of **January, 3-5, 2006**.

Please **indicate** the appropriate interview schedule from the list in the following page or **specify** one which you do think is appropriate for you.

Week Days	**Morning**		**Afternoon**	
	Set Time	Specify Other	Set Time	Specify Other
Monday				
Tuesday				
Wednesday	9:00-9:30		3:00-3:30	
Thursday	10:30-11:00		2:00-2:30	
Friday	10:30-11:00		3:00-3:30	

TO BE RETURNED TO THE RESEARCHER

Appendix C: Interview Questions for the ICTDO officer

1. Please briefly describe your background and current job.
2. Do you believe ICT will be an enabler in the university? And why?
3. What is the major goal of your office with regard to ICT?
4. How do you think ICT will help in the teaching-learning process of the College of Education (AAU)?
5. What are you past achievements with regard to the Use of ICT in the College of Education (AAU)?
6. Do you have any policy support for the Use of ICT in the University? Do you believe policy will help the betterment of the use of ICT?
7. What are the strengths and weakness of the policy?
8. What deliverables are available for enhancing ICT use in the University?
9. How many computers do the college of education own?
10. How you judge the connectivity level of the university? How many hits per second? What is the connectivity type? Broadband or dial up?
11. How many of the computers are connected to the internet and intranet?
12. Do you believe the current available infrastructure is enough to make the whole university computer based?
13. What infrastructural problems are your office encountering?
14. Do you have enough support funds from the university or NGO or the government or other governments?
15. Other comments?

Appendix D: Interview Questions for Management Team

Interview Questions for the Management Team

1. Please briefly describe your background and current job.
2. What are the major goals of your institutions?
3. How are you planning to achieve those goals? Is ICT a part of your focus?
4. Do you believe ICT will help in achieving your goals?
5. How do you think ICT will help in college of education?
6. What are the most important contributions of ICT in college of education?
7. What are the available infrastructures of ICT in the college? What other ICT infrastructure do you believe you lack and need to deploy in the future?
8. Is ICT use in AAU, College of education supported by Policy? Do you believe that supporting ICT use with policy will help better use of ICT?
9. Are the teaching staffs given training on ICT? Do you believe that the teaching staffs are aware of the role of ICT in education?
10. What skill and pedagogical preparedness do you think your teaching staff own?
11. What are your past achievements with regard to the use of ICT in the education system of the college?
12. What are the future plans of the university with regard to the integration of ICT in the education system?
13. Other comments?

Appendix E: Questionnaire

College Attitude towards ICT Questionnaire

Addis Ababa University, College of Education

Dear Sir:

The world is hosting a superb change in the education system due to the introduction of Information and Communication Technology into the education environment. In this study the researcher is assessing the status of the ICT integration at your college, Addis Ababa University. The study is believed to be of an invaluable resource to you and your college in indicating the level of ICT integration and the whole picture of ICT use at your college. The result of the study will also be a useful resource in recommending a working ICT integration model at your college.

Attached with this letter are questions which only need maximum of 20 minutes to answer. Please your honest response will be what makes the very research a valuable and successful product.

Once the research is completed, the researcher vows to provide the copy of the research report to your organization so that it could be an immediate reference. Your information will be used only for research purpose and will be handled safely and confidentially.

As an appreciation for your willingness to give me your time and sought information, I have presented a THANK YOU card to you. I hope you like that.

With very honest regards,

Miressa Neme

Addis Ababa University

College of Education

COLLEGE ATTITUDES TOWARD INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) QUESTIONNAIRE

The purpose of this survey is to gather general information concerning knowledge of, skill in and attitudes toward information technology especially in the teaching-learning environment of the teaching staff of Addis Ababa University, College of Education.

NOTE: Information and Communication Technology (ICT) stands for any of the emerging technologies such as computers, Internet, CD-ROMS, networks etc. which are used to facilitate the teaching-learning process.

Direction: The questionnaire has the following major sections:

1. Background Information
2. ICT use and Skills
3. Attitude towards ICT
4. Skills checklist
5. Technology adoption level

Please respond by putting (√) mark or by writing your responses on the space provided where applicable.

SECTION ONE: BACKGROUND INFORMATION

1. Age: __ 21-24 __ 25-29 __ 30-34 __ 35-39 __ 40-44__ 45-49 __ 50-54 __ 55+

2. Education Level: ___ Bachelors degree ___ Master's degree___ Doctorate or professional degree

3. Gender: ___ Male ___ Female

4. Department: _____ (print)

5. Years of teaching: _____years

SECTION TWO: ICT USE AND SKILLS

6. Do you use computer? ___Yes ___No

7. If your answer to item no.6 is No, Why? (Thank you and STOP HERE!)
Specify_____
_____

8. If your answer to item no. 6 is Yes, Where do you use computer? (Tick √ all that apply)

___Home ___Office ___Classroom ___Computer Lab ___Private Internet Centers ___Others (specify_____)

9. How often do you use computer?

___ Daily ___ Once a week ___ Once a month ____Other (Specify_____)

Can you put in hours (approximate)?

____hours a day ____hours a week _____hours a month

10. Do you own a computer at home: ___Yes ___ No

at office: ___Yes ___No

11. What do you use computer for? I use computer for: (check all that apply)

____organizing my teaching material ____teaching in the classroom

____E-mailing _____Chatting _____Office Work _____Grading of student marks _____Research _____Others (Specify_____)

12. Which of the following computer programs are you familiar with? (Check all that apply)

____Word processing _____PowerPoint Presentation _____Spreadsheet (Excel)
____Database (Access) _____Others (Specify all that you are familiar with
_____
_____

13. Show your fluency in the following programs (Please check all that apply)

	Excellent	Very Good	Good	Fair	Never Used
Word processing					
PowerPoint Presentations					
Spreadsheets (Excel)					
Database (Access)					
E-mailing					
Internet Browsing					

14. Do you use internet? ____Yes ____No

15. If your answer to item no. 14 is No., why? (specify_____)

16. If your answer to item no. 14 is Yes, Where do you use internet? (Check all that apply)

____at home ____at computer lab ____ office ____ Private Internet Centers Others (specify-_____)

17. If your answer to item no. 14 is Yes, for what purpose do you use internet? (Check all that apply)

____E-mailing ____ Internet Browsing ____ Research Purpose ____ Chatting Others (specify_____)

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

	Yes	No	Need more training
Word processing			
PowerPoint Presentations			
Spreadsheets (Excel)			
Database (Acess)			
E-mailing			
Internet Browsing			

Specify other areas you have received training on

_____

SECTION THREE: ATTITUDE TOWARDS ICT

Instructions: Please read each statement and then circle the number which best shows how you feel about ICT.

1	2	3	4	5
SD=Strongly Disagree	D=Disagree	U=Undecided	A=Agree	SA=Strongly Agree

		SD	D	U	A	SA
1	The challenge of learning about computers is exciting.	1	2	3	4	5
2	Learning about computers is boring to me.	1	2	3	4	5
3	I like learning on a computer	1	2	3	4	5
4	I will use a computer as soon as possible.	1	2	3	4	5
5	If given the opportunity, I would like to learn about and use computers.	1	2	3	4	5
6	Computers are not exciting.	1	2	3	4	5
7	Computer lessons are a favorite subject for me.	1	2	3	4	5
8	Working with a computer makes me feel tense and uncomfortable.	1	2	3	4	5
9	Computers frustrate me.	1	2	3	4	5
10	Computers could enhance remedial instruction.	1	2	3	4	5
11	Teacher training should include instructional applications of computers.	1	2	3	4	5
12	Computers would motivate students.	1	2	3	4	5
13	Computers would significantly improve the overall quality of my students' education.	1	2	3	4	5
14	Computers would stimulate creativity in students.	1	2	3	4	5
15	Computers would help students work with one another.	1	2	3	4	5
16	Computers would help me organize my work.	1	2	3	4	5
17	Computers would increase my productivity.	1	2	3	4	5

		SD	D	U	A	SA
18	Computers would help me learn.	1	2	3	4	5
19	I will probably never learn to use a computer.	1	2	3	4	5
20	Not many people can use computers	1	2	3	4	5
21	I see the computer as something I will rarely use in my daily life as an adult.	1	2	3	4	5
22	Learning to operate computers is like learning any new skill - the more you practice, the better you become.	1	2	3	4	5
23	Knowing how to use computers is a worthwhile skill.	1	2	3	4	5
24	The use of internet makes the student feel more involved.	1	2	3	4	5
25	The use of internet helps provide a better learning experience.	1	2	3	4	5
26	The use of internet makes the course more interesting.	1	2	3	4	5
27	The use of internet helps the student to learn more.	1	2	3	4	5
28	The use of internet increases motivation for the course.	1	2	3	4	5
29	More courses should use internet to disseminate class information and assignments.	1	2	3	4	5
30	The use of internet creates more interaction between students enrolled in the course.	1	2	3	4	5
31	The use of internet creates more interaction between student and instructor.	1	2	3	4	5
32	Internet provides better access to the instructor.	1	2	3	4	5
33	Internet is an effective means of disseminating class information and assignments.	1	2	3	4	5
34	I prefer internet to traditional class handouts as an information disseminator.	1	2	3	4	5

Please make any comments:_____

_____

_____

_____

SECTION FOUR: SKILLS CHECKLIST

Instruction: Please rate your competence in each of the following areas (circle one number for each):

	Low	Med	High
Productivity Tools			
Composing with a word processor	1	2	3
Cutting and pasting text	1	2	3
Printing options	1	2	3
Using a spreadsheet program	1	2	3
Manipulating graphics	1	2	3
Use of presentation graphics	1	2	3
Electronic Mail			
Sending a message	1	2	3
Replying to a message	1	2	3
Sending group messages	1	2	3
Sending and Receiving attachments	1	2	3
Internet Services			
Accessing the Internet/World Wide Web	1	2	3
Locating specific topics	1	2	3
Downloading text/graphics	1	2	3

SECTION FIVE: CONCERNS-BASED ADOPTION MODEL (CBAM) LEVELS OF USE OF AN INNOVATION

Instructions: Please read the descriptions of each of the eight levels related to adoption of technology. Then complete the statement at the bottom of the page.

Level 0 Non-use

I have little or no knowledge of information technology in education, no involvement with it, and I am doing nothing toward becoming involved.

Level 1 Orientation

I am seeking or acquiring information about information technology in education.

Level 2 Preparation

I am preparing for the first use of information technology in education.

Level 3 Mechanical Use

I focus most effort on the short-term, day-to-day use of information technology with little time for reflection. My effort is primarily directed toward mastering tasks required to use the information technology.

Level 4 A Routine

I feel comfortable using information technology in education. However, I am putting forth little effort and thought to improve information technology in education or its consequences.

Level 4 B Refinement

I vary the use of information technology in education to increase the expected benefits within the classroom. I am working on using information technology to maximize the effects with my students.

Level 5 Integration

I am combining my own efforts with related activities of other teachers and colleagues to achieve impact in the classroom.

Level 6 Renewal

I reevaluate the quality of use of information technology in education, seek major modifications of, or alternatives to, present innovation to achieve increased impact, examine new developments in the field, and explore new goals for myself and my school or district.

I best fit into Level _____.